



REMCO'S MANUAL
OF
APARTMENT HOUSE SERVICE

REGULAR SERVICE EDITION



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REMCO'S MANUAL

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OF
APARTMENT HOUSE
SERVICE



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INTRODUCTION

During the last fifteen years while building up an organization and perfecting a system for the care of improved real estate we have had many problems to meet and have had frequent occasion to issue circular letters of instructions to our employees.

Some of these have dealt with the service, some with the care of the machinery in use, others with the maintenance of the property, all of them important to the comfort of tenants and vital to the income of the property.

With time this material has become very voluminous and of increasing value, it has been necessary to classify, index and arrange it for ready reference and finally to complete it by covering the whole subject of apartment house management. In its final form it practically provides for a management service extending over the entire twenty-four hours, and assembles in a convenient form for daily use the instructions prepared by the greatest experts in the country for the operation and preservation of the expensive machinery in common use in buildings.

The purpose of the *MANUAL* is to bring about a better understanding of the responsibilities of employees of

apartment house properties—to acquaint them with the most approved methods of operating and maintaining the machinery they use, and to equip them with the experience obtained by practical men who have made the subjects in which they are interested a life study, to the end that their work may meet with more appreciation and that the doing of it may be made less laborious.

We believe that its use will stop waste, improve incomes, increase wages and add something to the comfort of every resident of apartment house property.

GENERAL INSTRUCTIONS

INSTRUCTIONS TO JANITOR

GENERAL INSTRUCTIONS

1 You report to the management, and should know where and how to reach your owner, agent, or superintendent quickly at any hour of the day or night. Enter in your Record Book his house address and telephone number for use after his office closes.

2 Enter the house address of all your help in your Record Book.

3 You represent the management on the premises and are responsible to it for:

4 The house service.

5 The conduct and work of employees.

6 The condition of the plant.

7 The care of the property.

8 The renting of the apartments.

9 Waste of steam, electricity, water, gas or of anything else. Waste hurts you with your employer and does not help you with your tenants.

10 Systematize your work.

11 Insist on having proper tools to work with.

12 Have a place for everything.

13 Fix a time for each part of the day's regular work.

14 Hang in your basement a schedule of service hours for each position. Require every employee to report for duty on time.

15 Make each of your help responsible for his part of the work.

16 Do not leave the premises unless it is necessary.

17 Before you leave, notify your superintendent or agent and your first assistant where to find you in case of fire or of an emergency.

18 Appoint one of your help your first assistant. Have him take charge whenever you are absent.

19 Have him study your work in the manual.

20 Notify each of the other employees who is in charge when you are away.

21 Study the whole manual carefully, as you must see that every employee does his duty.

22 Complete house service should be given from 8 A.M. to 7 P.M. Open front basement doors at 6 A.M. Open rear basement doors at 6 A.M. Open main entrance doors at 8 A.M. Open roof doors and sky-lights at 8 A.M., and ventilate the hall thoroughly by opening front doors before closing the roof doors.

23 Close rear basement doors and lower your lights at 8 P.M., except on Saturdays and days before holidays.

24 Close front basement doors and put out basement lights at 10 P.M., except on Saturdays and days before holidays.

25 On Saturdays and days before holidays close front and rear basement doors at 11 P.M.

26 After the hour for closing the basement doors deliveries are to be made through the main entrance.

27 Turn off all outside and vestibule lights at 10 P.M.

28 Close main entrance vestibule doors and roof doors and sky-lights at 10 P.M.

29 In houses having hall-boy service only, close main entrance vestibule doors and roof doors and sky-lights at the hour fixed for the hall-men to go off duty.

30 Supply hot water at all hours.

31 Bank hot water heater fires at 10 P.M.

32 Before banking fire see that the hot water tank is full of hot water.

33 Supply steam heat from 6:30 A.M to 10:30 P.M. daily during the term fixed by your lease; it is usually from October 15th to May 15th.

34 Bank your fire at 10 P.M. See that all tanks are full before you bank your fire.

35 Insure your effects. In case of fire you must give your whole time to the care of your tenants and your house.

36 Your employers and the public will judge you by the character of the service you maintain. Set an example for the other employees in every way.

37 Always be polite, obliging and prompt.

38 Keep yourself, the other employees and your property as neat and clean as possible.

39 Have your uniforms cleaned every month. Get new uniforms twice a year, in March and September.

40 Never allow uniforms to be worn away from the building.

41 A breakdown in your elevator or dumbwaiter service, except as the result of an accident, is inexcusable and can only be due to your neglect to make inspections regularly or to your failure to order repairs in time.

42 Elevator and dumbwaiter and house-bell repairs must always be made quickly. The service must not be interrupted for a moment longer than is necessary. Night and day and Sunday work must be done to keep these in service.

43 Lack of heat, or of hot or cold water is bad management. See that you are not to blame for it.

44 Fill your coal bins before September 1st. Always have a month's supply of coal on hand.

45 You must be able to work fast in any emergency. Therefore enter in your Record Book and keep in your pocket-book a list of the names and addresses and 'phone numbers of the makers of all the machinery you use. Also record the numbers of all your machinery in both lists.

46 Enter in your Record Book and keep in your pocket-book the names of the mechanics usually employed by the office to make repairs to the plumbing, the steam-plant, the hydraulic elevators, the electric elevators, the bells, the pumps, and the roof, and their night address

and telephone numbers as well as their day addresses and telephone numbers.

47 Never promise tenants repairs that you cannot make yourself without cost to the owner; say that you will report the request to the office.

48 Make the tenants your friends. If they see that you are doing everything you can to make them comfortable and to perfect the house service they will be your friends.

49 Don't give information about your tenants to people who have no right to know about them.

50 Discourage gossip—the less you and your help know about the tenants' affairs the better.

51 Never talk back to tenants; if they don't treat you right, report the facts to the office.

52 Remember always that your house is a place of residence, therefore permit no unnecessary noise.

53 It is much better to keep an old tenant than to get a new one, and it is less work for you and less expense to the owner.

54 Tenants frequently move because they do not like the house service. Give them the best house service that you can.

55 Before your tenants leave town for the summer, get their mail, telegraph and telephone addresses. Enter them in your Record Book and supply them to the office.

56 Get the names of tenants' guests and notify your help to receive mail for them.

57 Do not allow tenants to make alterations in the property unless you have orders to permit it.

Report to the office immediately :

58 If you have a fire.

59 All accidents causing damage to persons or property, with name and address of witnesses.

60 When there is a loss by theft.

61 When workmen or tradesmen have damaged the property in any way. Get the name of the man or wagon number and the name and address of his employer.

62 When there is a disturbance you cannot control.

63 When anything is causing the tenants dissatisfaction.

64 When you hear a tenant is going to move.

65 When you hear a tenant is trying to sub-let.

66 When a tenant damages the property in any way.

67 When the street and crossings are not cleaned promptly by the City.

68 When there is contagious disease in your house.

69 If you have objectionable tenants or neighbors.

70 If your renting sign needs painting.

71 When there are dead animals in the street or on the premises; the office will get the Board of Health to remove them.

72 When smoke odors or excessive noise from neighboring buildings make your tenants uncomfortable.

73 Prevent disturbances whenever you can If

caused by a tenant, never call a policeman unless it is absolutely necessary.

74 The inspectors of the Board of Health, the Tenement House Commission and the Building Department have the right to go through your premises. Facilitate their work and treat them courteously.

75 Do not permit inspections to be made by private individuals without authority of the office.

76 Do not give information about the owner or property; refer inquiries to the office.

77 As far as you can, prevent tradesmen, and delivery men from smoking on the premises.

78 Keep solicitors and peddlers out of the building.

79 Have a telegraph messenger call in your main hall.

80 Allow no signs on the premises unless you have authority for doing so from the office.

81 Keep the renting sign clean.

82 Place a bell in the janitor's apartment and connect it with the front entrance door bell; provide a switch on the line, so that after the house closes the front door bell may be switched to ring in the janitor's apartment.

83 It is your duty to make the deliveries from the storerooms to apartments and from the apartments to the storerooms.

84 Van deliveries are to be made to or from the store-room by the van men.

85 To prevent your main hall help having to leave the main hall to get you connect the hall by an electric bell with the basement. Place the bell where you or your family will always hear it.

86 Wrap up, label and store in your storeroom all left-over wall paper; you will need it for repairs.

87 Keep the basement air sweet by proper ventilation. Use wire screens on storerooms and openings to keep cats and other animals out.

88 Before you retire for the night see that all roof and basement openings are closed.

89 Unless the premises especially require attention, the only work, aside from the garbage and ashes, to be done on Sunday is the cleaning of sidewalks and of the vestibules and first floor of the main hall.

90 Before you cut the water off to make repairs notify all the tenants and give them time to draw a supply. After they have done so fill all your tanks before you shut the water off.

91 When the City notifies you that it will cut off the water to make repairs, notify all your tenants and have them draw a supply, and after they have done so fill all your tanks before it is cut off.

92 If your elevator is to be shut down for repairs, notify the tenants the day before, in order that they may not be more inconvenienced than necessary.

93 When you need an ambulance always call Police Headquarters: "3100 Spring."

94 When not in use, oil machinery all over, then cover it carefully with cloth to keep dirt and dust off it.

95 Never allow water to be used on hardwood floors.

96 Study the instructions for the "Care of the Plant and Property" very carefully. The directions given in it are the work of experts.

97 You may not find in the "Directions for the Care of the Plant and Property" instructions for the care of the particular make of machine you use, but you will probably find the information you want in the instructions for some make of the same kind of machine. The principles governing operation are practically the same for every make of a machine.

98 Keys are to be provided for the elevator doors. If there are no locks, have them put on.

99 Where the service requires more than one man in the same position, no employee is permitted to go off duty until the relief man reports, and overtime is to be paid.

100 When an apartment is closed and the tenant out-of-town, you should permit no one to have access to it except some member of the family or one of their employees. Do not allow employees to have access to an apartment in the tenants' absence unless they present a written request. If you do not know the signature of the tenant do not recognize the request, but report to the office at once.

101 Under no circumstances enter an occupied apartment during the absence of the tenant. In case of leaks in them causing damage, report to the office immediately.

102 When more than one tenant is to move on the same day, try to arrange for them to use different hours for their moving; it will prevent blocking your service.

103 Try your safety valve monthly, lifting it to see if it is working properly.

104 Have your main hall rugs taken up and use a carpet runner in rough weather or when moving is being done.

TO PREVENT ACCIDENTS

105 Inspect elevators daily.

106 Inspect dumbwaiters monthly.

107 Insure elevators to secure inspections.

108 Never use an elevator that is out of order in any particular.

109 Never attempt to leave an elevator car while it is in motion.

110 Remove snow and ice from walks and steps quickly.

111 Use sand or sawdust on slippery walks and steps.

112 Repair all holes in your basement floor at once.

113 Repair all loose or defective stair work quickly; until you can repair them, close the stairway.

114 Put rubber treads on your basement stair and on the stairway from the top floor to the roof.

115 Never allow stair carpets to get loose. Tack down all loose edges.

116 Never allow excelsior, hay, straw or light packing material to be stored or to remain on the premises.

117 Keep the line of travel to your dumbwaiters free from refuse that burns readily. Keep paper and light refuse as far from the dumbwaiter as possible

118 When you are doing work in a dark place keep it lighted, and do not leave tools or materials where any one could fall over them.

119 See that coal-hole covers are fast and chained from below.

120 Require window sills kept clear of pots, plants and storage of all kinds.

121 Require the fire escapes kept clear as provided by law.

122 Keep drying racks sound and in good repair.

123 Remove immediately all loose material hanging from the building or lying on the roof.

124 When you first put a new elevator operator to work, remain in the car with him at least an hour and have him operate it continuously under your directions.

125 Before shutting down an elevator for repairs, lower it as far as it will go and close the valve or shut off the power to prevent it starting when you put the power on again. A full stop will close the valve.

126 Put a permanent guard around all moving machinery.

127 See that there are no pipes that can be gotten out of the way which project above the level of the basement floor; if any are above the floor make a runway over them.

128 See that all stair rails are secure.

129 See that there is a guard to prevent any one from standing under the dumbwaiter while using it—the car might slip or fall.

130 Keep the doors to all elevator pits locked.

132 Try the safety valve on boiler every month by lifting it to see if it is working properly.

133 Never permit signs or other projections from or on the building to become loose.

134 If your gas freezes and goes out, notify every tenant and see that all fixtures in the apartments are closed before you turn it on again.

135 ACCIDENT INSURANCE

136 Some Elevator, Boiler and Liability Insurance policies cover property damage as well as personal injuries.

137 The companies require immediate notice of all accidents. Therefore report at once to the office accidents causing damage to persons or to property.

138 Enter the facts about accidents in your Record Book with the names and addresses of all witnesses and the date and time of the accident.

139 INSPECTIONS

DAILY

140 Inspect vacant apartments—nothing should be stored in them.

141 Inspect the water tank telltale.

142 Inspect sidewalks, areas, halls, basement, pumps, elevator machinery, dumbwaiter and elevator shafts and all inside shafts.

143 Inspect all cesspool and area drains.

144 Remove all inflammable refuse at once.

145. WEEKLY

146 Inspect all servants' toilets which are not in the apartments.

147 Inspect basement toilets.

148 Inspect laundries.

149 Inspect roofs and drying racks. Remove all refuse and see that drying racks are sound and safe.

150 Inspect dumbwaiter bells and speaking tubes. These must be kept in order if you would give good service.

151 MONTHLY

152 Inspect the safety valve—try it by hand.

153 Inspect elevator and dumbwaiter, guides, cars and cables.

154 Inspect ropes: the wear on hemp ropes is on the inside. Untwist them up to determine the wear.

155 See that there is no chafing of the elevator cables at bearings, and that all is clear and fast at the bottom and top of your shaft and at the car.

156 ANNUALLY

157 *In June of every year:*

158 Have Police Department Boiler Inspections made.

- 159 Have Insurance Boiler Inspections made.
- 160 Inspect, clean and repair:
- 161 Boilers, Firebox and Grate-bars.
- 162 Water and heating line valves and governors.
- 163 Furnaces, heaters and pumps.
- 164 Flues.
- 165 Elevator plant in every part.
- 166 Dumbwaiter plant.
- 167 Repair and paint roofs, roof doors and drying racks.
- 168 Repair and paint all sky-light metal work.
- 169 Clean and repair roof tanks. See that the ball cock, the overflow, and the telltale are right.
- 170 Carefully inspect and repair the roof beneath all tanks.
- 171 See that water lines and tank are properly packed to prevent freezing.
- 172 Inspect storerooms and outside basement white-washing.
- 173 Inspect and kalsomine shafts.
- 174 Inspect, repair and clean sky-lights glass.

175 JANITOR'S HELP

- 176 Require every employee to report on time.
- 177 For all high pressure steam plants a Police Department engineers' license is required. This is obtained by making application to Police Headquarters and will be granted to competent men on a request from the agent or

landlord. Low pressure boilers (under 10 pounds) may be operated without such license.

178 The age required by the Building Department for persons operating elevators is eighteen years. Do not employ any one under that age for this work. (See Section 5, Elevator Regulations, Bureau of Buildings.)

179 If you are in charge and employ your own help you should supply the office with at least three references for each of your assistants, including that of their last employer. You should have your appointment confirmed before putting an employee on duty, unless filling the position immediately is very urgent.

180 Enter the name and address of every employee in your Record Book.

181 Make each of your help responsible for his or her part of the work.

182 Arrange meal and relief hours and fix the change time for each employee who relieves another.

183

HELP'S DRESSING-ROOM

184 In a convenient part of the basement construct a dressing-room for the male, and one for the female help, and equip them with a private locker for each employee.

185 If possible put in a wash-basin. Supply a mirror, a clothes brush, hair brush and comb, blacking brush and blacking, soap and towel.

186 Give each of the help a key to the dressing-room

and also to the locker they are to use. Require them to keep both the locker and the room locked.

187

TOOLS & SUPPLIES

188 Get your cleaning supplies on the 5th of each month. Always keep the following tools and supplies on hand:

189

TOOLS

One 8 ft. step ladder	Monkey wrench	Saw
One 3 ft. step ladder	Gas plyers	Chisel
Shovel	Rule	Screw driver
Snow shovel	Force cup	Tack lifter
Wheelbarrow	Hatchet	Stilson wrench
Whitewash brush	Claw hammer	Wire cutter
	Tinsmiths-shears	

190

CLEANING AND HOUSE SUPPLIES

Washing soap	Cotton waste	Floor broom
Bon-Ami	Chamois	Feather duster
Sapolio	Tapers	5 ft. duster handle
Pearline	Candles	Iron hoop pail
Solarine	Scrub brush	Dust pan
Pumice stone	Mop	Cheese cloth
½ pound Petermans'	Broom	Gas lighter
Roach Food	Whisk broom	Matches
Disinfectant	Long handle scrub	Canton flannel
Sponge	brush	

191

REPAIR SUPPLIES

Oil.

Washers of each kind in use.

Pump packing.
Radiator valve packing.
Lubricant for elevator and dumbwaiter guides.
Electrician's tape (try it on leaking pipes).

192

50 feet small copper wire.
Bell wire and push buttons.
Speaking tubes, whistles, and mouth pieces.
100 feet of white wood, half inch picture molding.
100 feet white wood, half-inch quarter-round molding.
100 feet of felt weather strip.
100 feet of rubber weather strip.
25 feet of meeting rail weather strip.
10 pounds of oakum.
Barrel of sand for slippery walks
Bag of cement.
Box of plaster of Paris.
Nails, screws, tacks.
Gas tips, gas pillars, globe holders, white lead.
Door stops, sash fasteners, padlocks, hoops and staples.
12 sheets of tin.
Key rings, key tags, shipping tags.

193

RENTING

194 If your house does not pay, the owner will be hard to satisfy.

195 Your most important duty is to keep your house fully rented.

196 Get all the help you can in your renting work.

197 If you are permitted to do so, give a list of your vacant apartments to the prominent real estate agents near you, and to the Illustrated Apartment House Directory office, Broadway and 98th street. This institution

will advertise you very widely and without charge if it gets you no tenants. It is popular with the public because it saves so much time and because its service costs the public nothing. It receives a very large number of applications for apartments of all kinds.

198 Be courteous to all applicants.

199 Keep your vacant apartments very clean.

200 Keep the light on so you may show them at night.

201 Always be able to show everything you have to rent quickly. Have your keys tagged and where you can find them.

202 Never wait until you have an inquiry to arrange for showing an occupied apartment. If the tenant is out-of-town or refuses to show it, notify the management at once. You should be able to show all occupied apartments from 9 A.M. to 6 P.M., daily, for three months before the lease expires.

203 Keep the agents' cards and the printed matter describing your property where you and your help can get them quickly.

204 Educate your help to assist in renting; have them do it when you are absent.

205 Back doors of vacant apartments should be kept locked. The front doors should be kept closed but not locked.

206 Have a complete list of what you have to offer where you can get it quickly. Give your assistant and each of your hall help a copy.

207 Telephone the office to send some one to meet your applicant, if it can help you in renting; try to hold the applicant until he arrives.

208 Always try to get the applicant's name and address and forward it to the management so that the office may follow up the applicant.

209 Short forms of "agreement to lease" will be supplied you by the management. Always have them on hand. Get them signed if you can and put on them the applicant's address.

210 In every case require three references—two personal references and one financial reference.

211 In giving a receipt for a deposit on an apartment, always write across the receipt the words "*subject to acceptance,*" in order to allow the office to return the deposit if the references are not satisfactory.

212

TENANTS MOVING IN

213 Enter in your Record Book the date of a tenant's arrival, and the name and address of the expressman who does the moving.

214 Do not allow a tenant to move in until you know the office approves the tenant.

215 Do not permit expressmen to block your sidewalk or halls. Require them to deliver goods from the van directly into the apartment.

216 If work is being done in the apartment rented to

the tenant, ask the management to allow arriving goods to be put in some vacant apartment until it is ready for occupancy.

217 See that every part of the apartment rented is clean, including the windows; polish the range and clean it inside and outside; clean the sinks, tubs and ice-box and the plumbing fixtures. See that all window shades, locks, and window catches are in order.

218 Do all you can to assist an incoming tenant in getting settled. Show them every possible courtesy.

219 Notify the tenant immediately on arrival that the gas is turned off, and where and with what company a supply should be arranged for.

220 Give the tenant two keys for the main entrance door and two keys for the front door of the apartment, also, if asked for, one key for each of the other doors.

221 Take a receipt for the keys you deliver to the incoming tenant.

223 Whitewash the basement, store or trunk-room which goes with the apartment before the tenant moves in.

224 If there is only a general storeroom, tag and date every article turned over to you for storage.

225 Notify tenants of your hour for calling for garbage.

226 Notify tenants of their laundry or drying day.

227 Give them a copy of the House Rules at once.

228 Test all the faucets and the toilet tank — try them to see that they are working properly.

229 TENANTS MOVING OUT

230 Be especially careful to show departing tenants every courtesy, and to assist them as much as your duties will permit.

231 Enter in your Record Book the date of departure, their new address and the name and address of the expressman who moves them.

232 Do not allow a departing tenant to leave any goods on storage in your care without the authority of the office.

233 As soon as a tenant moves out, remove all trash from the apartment. Sweep it out the day the tenant moves.

234 When a tenant has moved out, notify the management to have the gas or electric light turned off, or if the apartment has not been rented notify the management to have the meter read.

235 When tenants move out, surrender the receipt they gave you for the keys delivered to them when they moved in. Get all keys for the apartment. Tag them and put them away at once.

236 Collect all telephone money due you.

237 VACANT APARTMENTS

238 Are not to be used for eating-rooms or as dressing-rooms for the help.

239 Are not to be used for storage of any kind.

240 Must be broom cleaned the day the tenant leaves.

241 Must be kept as clean at all times and in every particular as it would be if occupied.

242 Must be cleaned daily while repair work is being done in them.

243 Rear doors are to be kept locked.

244 Front doors are to be kept closed but not locked.

245 Badly torn and soiled shades should be removed.

246 All shades should be drawn down to the top of the lower sash.

247 Every trap should be kept closed by flushing the toilets and by running water into each basin, bath, sink or tub frequently. If this is not done water which seals the trap dries out and sewer gas gets into the apartment. After a tenant leaves, it is a good idea to pour some oil in each trap: it will prevent evaporation.

248 Light is to be kept turned on so that apartments may be shown at night.

249 Keys are to be tagged and kept on the janitor's keyboard.

250 Keep toilet covers down.

251 REPAIRS AND COMPLAINTS

252 All repair work is done to satisfy tenants; see that it does so. See that workmen who come to your house are polite to tenants and show them proper consideration.

253 The management cannot advise tenants when its men will do work. You should explain this to your tenants and persuade them to allow the workmen to go ahead

whenever they come to do any work. If sent away the time lost is charged to your property.

254 All workmen are supposed to report to you before going to work; if they fail to do so notify the office.

256 Never delay in attending to tenant's complaints and requests. Enter them at once on your Complaint Book or on your Order Book, and send the order to the management promptly if you cannot do the work yourself.

257 Always date the entries and state plainly what is wanted, where it is wanted and when it is wanted.

258 Send orders to the office by mail daily. If the matter is urgent, telephone the order, or send it by a messenger, then repeat it by mail. To avoid mistakes all orders and complaints should reach the management in writing. Push the office if your work is delayed. Don't allow it to be delayed.

259 Plan to have no repairs to make during the renting season, get all your work done before the renting season begins. Avoid having repair work to do in March, April, July, August, September or October. In these months your most important duty is to rent your house.

260 Give all your orders to the office. Don't order supplies or repairs yourself. Take no unnecessary responsibility on yourself.

261

EMERGENCY REPAIRS

262 Avoid giving even emergency orders, *but* WHEN ABSOLUTELY NECESSARY TO PREVENT DAMAGE TO THE

BUILDING OR A BREAKDOWN IN THE PLANT, order repair work from the nearest mechanic or supply house and report the facts as soon as you can to the management. When you have to do this, keep an account of the time put in by the mechanic, and of the material used.

263 When you must give an order, try first to get the repair men who are regularly employed by the office.

264 You must be able to work fast in an emergency and should have the names, business telephone number and business address, and the residence telephone and the residence address of the mechanics employed by the office to make repairs. Therefore carry in your pocket-book and also enter in your Record Book, the following information:

265 The night and day telephone numbers and addresses of your owner, superintendent or agent, of the plumber, steamfitter, elevator repair firm (both hydraulic and electric), the roofer, and all the other repair men who usually do work for you, or who manufacture the machinery you use. Also enter in your Record Book the number and make of each machine you use.

266 Electric or hydraulic elevator repairs must be made by night and Sunday work. The car must not remain out of service an hour longer than necessary. Report any serious trouble or breakdown instantly.

267 If supplies are sent you that are not satisfactory, do not receive them. Report unsatisfactory work to the management immediately.

268

CONTRACT SERVICE-REPAIRS

269 Some of the house work may be done under annual contract. Learn from the management what work is done under contract and enter in your Record Book the name, address and telephone number of the contractors.

270 See that all contractors do their work promptly and well.

The following work is frequently let to contractors:

271 Elevator repairs.

272 Electric bell repairs.

273 Roof repairs.

274 Removing ashes and garbage.

275 Exterminating vermin.

276 Rented gas ranges are repaired by the gas company, but orders for repairs to them should go through the management office.

277 The gas companies' rent ranges at \$3.00 a year.

278 Keep on hand a supply of the addressed postals that contract repair men supply. Use them in making requests for work. If contract men do not give you prompt and good service, notify the management.

279

HEATING

280 Supply heat from 6:30 A.M. to 10:30 P.M.

281 Bank your fires at 10 P.M.

282 Stop all waste from any cause.

283 Leases usually provide that heat shall be supplied from October 15th to May 15th, between the hours fixed

by the lease. Do not turn the steam on the house or off of the house permanently without orders from the management.

284 Early in the fall put your heating plant on for one day. Test it for leaks and breaks, and repair them before the plant is to go into service.

285 Bear in mind that a warm spell usually succeeds the first few cold days in the fall. Do not be too quick about turning on heat in the fall, because after you have heated up your house it is difficult to cool it. Your tenants will be made uncomfortable by turning on the heat too soon.

286 Also keep in mind that cold days usually succeed the first few warm days in the early spring and do not turn off the heat at the first complaint; wait until a number of tenants demand it.

287 See if your riser lines are run properly; if there are any traps you will not get a proper circulation and will not be able to heat your house.

288 If a radiator does not give good service, see if it is trapped, and if so, block it up so it will drain properly, or remove the trap. Let the air out.

289 Radiator valves should be inspected and packed as soon as the heat is turned on in the fall. Leaking valves waste steam, stain ceilings and occasion expensive repairs.

290 It is good management and real economy to supply heat whenever it is really necessary to the comfort of the tenants.

291

HEATING

292

*Copyrighted by American Radiator Company,
104-108 West 42d Street, New York.*

In order to get effective, noiseless results, steam should be sent through the radiators quite dry—that is, not much water in the vapor.

When water is boiling in a single test tube (see Figure A), over a lamp, with no chance for circulation, a convulsive or fountain-like action is produced—the rising steam lifts so much water in the form of foam that the vessel boils over. But when heat is applied to one leg of a “U”-shaped tube (as shown by Figure B), a circuit is brought about—up one side and down the other—and thus violent action at the surface of the water ceases, resulting in a much larger supply of steam delivered to the space above in quite a dry state.

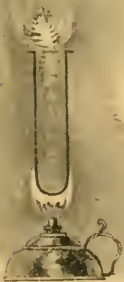


Fig. A.



Fig. B.

The foaming and lifting of water into mains, piping and radiators, which has been a source of trouble in boilers, is thus overcome. Erected with ordinary care, there can be no uncouth noises of "gurgling" or "hammering" in a heating plant.

As water is heated it rises to the highest point — to its level. Any one who has watched the boiling of water in an open kettle has noted the little globules or "bubbles" of heat rising *straight up* to the top-level of the water. Bulk for bulk, water when heated is lighter in weight than when cold. Thus a cubic foot of water at 39 degrees weighs about $62\frac{1}{2}$ pounds, while a cubic foot of water at 212 degrees (the boiling point) weighs about $59\frac{1}{2}$ pounds. This difference of about three pounds per cubic foot (or less) in weight brings about a circulation of the water throughout a hot water heating apparatus.

As the heat globules rise to the top of the heating plant they come in contact with the colder surfaces of the radiators, which absorb the heat from the water or steam and impart it to the atmosphere of the rooms. This cooled water, on account of its greater density and therefore greater weight, then drops to the lowest point in the system to be reheated — again and again.

It takes four principal things to make effective, economical heating — air, fuel, boiler, chimney. Air has as much to do with results, economical results, as has any other feature.

293 A certain part of air, the "oxygen," must be sup-

plied or no fire. To "smother" a fire is to cut off its supply of oxygen; that kills the flame. Too much air makes too great a draft; that chills the flame.

Air must be supplied under the grate to the fuel in addition to a proper amount through the fire-door of the fire to mix with the flame and free gases, and thus to cause good, sharp, complete combustion. In proportion as the right amount of air is supplied, at right points, the right economy in fuel is secured. Those who are familiar with the modern improved forms of gas and oil burners, in which gas and air are thoroughly mixed and produce far greater illuminating effect, will appreciate this point as applied to boilers.

294 A deposit of one-quarter inch of soot, which is a non-conductor of heat, requires fifty per cent more fuel than would be necessary if the surfaces were clean.

To get rapid, noiseless results, the steam should be sent through the radiators quite dry.

In the boiler designed for hot water heating, a perfectly free, continuous upward movement of water is maintained.

The low, slow, deep fire is vastly more economical in the burning of fuel.

Experience has taught that no heating apparatus should be without a check draft to smoke pipe.

These devices are as sensitively balanced as a pair of fine scales, and when they are connected by chain to the regulator rod, they materially assist in the *automatic* control of the fire, and bring about marked fuel economy.

It is not altogether infrequent that many buildings

require the services of the mason and of the carpenter as much as the services of the heating contractor to make them comfortably snug.

The same water is used over and over and over again. It is not necessary that a hot water or steam plant should be supplied direct from the street water main, as the system when once filled requires but a small amount of water to replace the loss due to evaporation. A few gallons only of water need be added once or twice during the heating season.

Let the water remain in the system during the summer months. No bad results will follow if the system is not refilled more often than once in two or three years. But generally, it is thought that best results are secured by emptying the system once a year (after fire is out) and immediately refilling with fresh water.

295 THINGS WORTH KNOWING ABOUT FLUES

296 *By the Boynton Furnace Company,
207 Water Street, New York.*

A range, a stove or heating apparatus has no more draft than a square box.

It is the chimney that creates the draft.

The taller the chimney the better the draft.

It should be higher than any other part of the building.

It should not be less than 8 by 8 inches inside and smooth.

It will carry but one smoke-pipe.

Every other flue or opening in this chimney must be closed.

The space below where the pipe enters should be cut off.

New flues are often left half filled with brick and mortar.

Old flues are often cracked outside and full of soot.

Such conditions obstruct the draft.

The pipe entering chimney must be the same size as the collar on the range.

The fire-box should not be filled above the top of linings.

297 THE CAUSE OF UNSATISFACTORY RESULTS
IN HEATING PLANTS

298 *By the Gurney Heater Manufacturing Company,
111 Fifth Avenue, New York.*

Unsatisfactory Results in Hot Water or Steam Heating can be traced to one or more of the following causes, namely:

Insufficient quantity of radiating surface.

Improper location of radiating surface.

Improper position of main pipes.

Insufficient rise in main pipes.

Obstructions in pipes caused by air or dirt.

Dip in the pipes, causing air pockets.

Air valves improperly fixed on radiators.

Insufficient size of heater.

Improper location of heater.

Deposit of soot and clinkers in heater.

Defective construction of chimney.

Improper firing.
 Imperfect draft to chimney.
 Deposit of soot in chimney.
 Improper size and quality of coal.
 Faulty ventilation.
 Adjustable ventilators neglected.
 Expansion tank improperly connected.
 Neglect to clean heater.
 Want of attention.

300 A warm basement usually means a warm house. See that basement doors are supplied with automatic closing devices, and are as nearly air tight as possible.

301 Replace all broken basement glass and make basement windows tight before October 15th.

302 Dumbwaiter, basement and roof doors should be made to fit tight to prevent drafts in the kitchen.

303 WATER

304 Supply hot water at all hours.

305 Bank hot water heaters at 10 P. M. but leave tank filled with hot water.

306 Clean your roof water tanks every month,

307 Stop all waste of water wherever you find it. Keep a supply of each kind of washer you need on hand at all times. Dripping faucets and running toilets are not a credit to you.

308 The City pressure may not raise water to your tank at all hours. If it does not, see that a check valve is

provided above the outlets on the highest floor that always get a water supply from the street pressure; you will then get a supply from the street below the check valve, and from the tank above the valve.

309 Locate all your cut-off valves as soon as you take charge of a property. There should be one in each apartment. You may have to use these valves at any moment. Know where they are.

310 Run a telltale from your tank to some point in your basement where you will see it very frequently.

311 On the first of each month read the water meter, if you have one, and enter the reading in your Record Book. Compare this with your bill before you O K it.

312 Protect all exposed lines from freezing. If you cannot do it yourself, request the office to have it done.

LIGHT

313 Stop all waste of gas or electricity.

314 Always have the light turned on in your vacant apartments, so that you may show them after dark.

315 Turn the house gas down at the meter.

316 Cut off every useless light.

317 Put on smaller tips when those in use are larger than necessary.

318 Put on pull gas switches like those used in bathrooms where they will save gas.

319 If you get electric light from the street, the Com-

pany replaces your burned out lamps without charge, but you must surrender the old lamps to get the new ones.

320 Electric light is not to be used in vacant apartments — use gas.

321 The lighting of the house is under your care — see that it is not wasteful.

322

CLEANING

323 Clean windows with Bon Ami.

324 Polish ranges with Enameline.

325 Scour marble with washing soap and warm water, or with pumice stone.

326 Scour sinks with potash or lye.

327 Clean refrigerators with hot water and soda; leave the doors open when not in use.

328 Scour dumbwaiter cars with hot water and washing soda.

329 Clean brass with solarine.

330 Clean nickel with solarine or whiting powder and wood alcohol.

331 Clean gas fixtures with cheese cloth and crude oil.

332 Clean tiling and porcelain tubs with hot water and washing soap.

333

KITCHEN

334 Scour floors with pearline.

335 *Never use water on hardwood floors.*

336

DAILY CLEANING

All vacant apartments; allow nothing stored in them.

Sidewalks. If your water supply is metered you can use a hose.

Areas.

Basement.

Main and rear halls from top to bottom.

Elevator cars and shaft pits.

Dumbwaiter shaft pits.

337

WEEKLY CLEANING

Roof.

All basement and servants' toilets; also disinfect them.

All shafts.

Tops of elevator cars.

Dumbwaiter cars. Scour with hot water and soda.

Laundries.

Gas and electric globes.

Wipe off all gas fixtures.

338

MONTHLY CLEANING

The water tanks.

Elevator guides—also grease them.

Dumbwaiter guides—also grease them.

Sky-light glass.

339

ANNUAL CLEANING

In June, whitewash basements and storerooms.

Clean all basement windows.

Paint machinery. Paint fences. Paint outside iron-work.

Have carpets, furniture and furnishings cleaned and repaired.

Do all cleaning of plant provided for by the regulations for your annual inspections. (See Annual Inspections.)

340 JANITOR'S RECORDS AND REPORTS

RECORD BOOK

341 The janitor should keep a Record Book. This book is his diary. In it should be kept a record of everything of importance relating to the property.

342 Complaints and requests from tenants are not to be entered in it. They should be entered on the stubs in the Order Book, or in the Complaint Book.

The Record Book should contain:

343 An inventory of all tools, implements, and furniture belonging to the building.

344 A chart showing the location of all valves and cut-off cocks.

345 A copy of all forms for the direction of the service, and of all house rules, and of the lease used by the house.

346 The names, and night and day addresses and telephones, if any, of all employees of the building and of the owner, agent or superintendent.

347 The names, and night and day addresses and telephone numbers of the makers of the elevators, pumps,

furnaces, engines, dynamos and of all the other machinery or equipment in the house; also the number of each machine used.

348 The names, and night and day addresses and telephone numbers of the men who usually make the repairs to the elevators, heating plant, pumps, plumbing or machinery.

349 All instructions received from the office.

350 The date of the arrival of each new tenant and the name and address of the expressman moving them in.

351 The date of departure of tenants, their new address, and the name and address of the expressman moving them out.

352 The out-of-town addresses of all absent tenants.

353 The date and character of extensive repairs to the plant.

354 The date and particulars of any new plant installed.

355 The date and name of any workman or person who damages the property and the name and address of his employer; also names and addresses of any witnesses.

356 The time consumed by workmen doing time work on the property.

357

ORDER BOOK

358 The janitor should have an Order Book with numbered stubs and numbered and perforated order blanks.

359 Requests involving work which the janitor cannot do should be entered in this book as soon as received.

360 All requests for supplies and outside work should also be entered on the stubs in this book. The orders themselves should be made out and sent to the management daily.

361 Date every stub and every order.

362 Make all your orders describe clearly what you want and where it is to be used.

363

COMPLAINT BOOK

364 The janitor should keep a Complaint Book and should enter in it immediately all complaints from tenants to which he will himself attend.

365 Date these entries and mark them "O K" when the work is done.

366 Look this book over every morning.

367

WEEKLY REPORTS

368 Make a regular weekly report to the management every Saturday night.

369 In this report inform the management of everything relating to the property that it should know, or of which you are expected to advise it.

370 In it report the date a tenant moves in or out.

371 In it report if a tenant will move or is sub-letting.

372 Report the facts and the reasons for any emergency orders you have given.

373 In it suggest improvements in vacant apartments, to the building generally, or in the service, when you think

of any that would be desirable; also report anything that is causing tenants dissatisfaction.

374 Forward cancelled fuel tickets with the weekly report.

375 JANITOR'S ACCOUNTING

376 Remit to the management the day you receive them, or report by that day's mail, particulars of any rent deposits given to you, or of any rent paid to you. Take a receipt for all moneys you pay to the management or the collector.

377 You are not allowed to use any money paid to you for any purpose whatever. When you require funds for any purpose, apply to the management. Under no circumstances use money received for telephone or rents to pay any of the house expenses.

378 TELEPHONE

379 The janitor is responsible for the telephone records and should be able to locate any carelessness or negligence in keeping them.

380 He should require each operator to keep a separate sheet for each day's business; to turn over to him before going off duty the sheet, the tickets and the cash receipts for that day. He should never permit the same sheet to be used for two days' business, or by two operators — he should receipt to the operator, after he has checked up the cash and tickets with the sheet, by placing his initials on the sheet.

381 The janitor makes his telephone accounting to the management each month by turning over to the collector the telephone sheets, the tickets and the cash received for the month. The collector should receipt for them.

382 Each telephone sheet should have the operator's signature and should show the date and ——

a. The time he came on duty and the time he went off duty.

b. The time of the call, the number called, by whom the call was made, and to whom the call is to be charged for each message.

c. The messages paid for in cash.

d. The amount to be charged for each message.

The tickets belonging to each sheet should be pinned to the sheet.

383 Cash payments must be required of all patrons of the telephone who are not employees of the house or office, or tenants of the building.

384 The janitor is expected to see that all telephone charges have been paid before a tenant moves out.

385 Telephone accounts are payable on demand.

386 Bills are usually rendered with the rent bill on the first of each month.

387 For all messages charged to the house or to the office the person using the telephone must sign a charge ticket and should state on the ticket the reason for the message.

388 JANITOR'S BILLS

389 If you make small supply purchases, always get a receipted bill.

390 In approving bills, if the place where the work is done is not shown on the bill, state it on the bill yourself.

391 Refuse to approve a bill for supplies or work done if anything has been damaged by workmen or delivery men, until the damage has been made good.

392 You should refuse to O K a bill when you regard the price as excessive or the work unsatisfactory.

393 You should not O K bills from memory.

394 TELEGRAPH, MAIL, NEWSPAPERS AND PARCEL DELIVERIES

395 You should know the names of all tenants' guests.

396 Telegrams, registered and special delivery mail must be delivered directly to tenants' apartments by the postman or messenger. Employees of the house must not receive them. If there is no one in the apartments, have postmen and messengers leave a notice with you and you deliver the notice to the apartment by slipping it under the door.

397 Mail must be delivered immediately. If the tenant is away, readdress and forward it. If you have no forwarding address, slip a notice that you have it under tenant's door and keep it in a mail box in your own apartment until the tenant returns.

398 Newspapers should be delivered promptly to the front or rear door of apartments.

399 Parcels must be delivered by the delivery men to the apartments. Employees are not allowed to receive them except when the tenant's written request that they be received for them is on file with the janitor.

400

KEYS

401 Supply a key for every lock in the apartment, if the tenant asks for them. Give the tenant two keys for the front door of the apartment and two keys for the main entrance door.

402 Get a receipt for the keys you turn over to the tenant when moving in.

403 Return the receipt and get the keys when the tenant moves out.

404 Put all the keys for an apartment on a ring, tag and label them and hang them on the key-board in your work room.

405 Keep a supply of key blanks, rings and linen key tags on hand.

406 Make a key-board and provide a hook for the keys of each apartment. Keep your key-board in your work room.

407 While an apartment is for rent supply the hall boy with a front door key and require him to keep it on a hook in the main hall where he can get it quickly.

408 JANITOR'S HOUSE NOTICES

409 In a proper frame in the main hall post the following information:

410 Telephone number of the Police Headquarters: "3100 Spring." (Always call Police Headquarters when you want an ambulance.)

411 The location of the nearest fire-alarm box, engine house, pay station telephone, post office, telegraph office.

412 Telephone, number, name and location of the nearest hospital, physician, drug store, city express office.

413 Keep in main hall:

414 A register of tenants and their guests.

415 A copy of the main hall rules.

416 On the inside of the bath room doors post a copy of the house rules.

417 On the kitchen side of the back hall doors post the garbage and ashes call hours, and the laundry or drying day for the apartment.

418 In the dumbwaiter cars post the car and shaft rules.

419 Near the basement doors of all dumbwaiters post a notice of the location of the toilet that delivery men may use.

420 In all vacant apartments post the cleaning schedule.

421 In the back hall a copy of the back hall rules.

422 In the basement post the general cleaning schedule, the hours of service schedule and the outside rules and the basement rules.

423 In the basement at the dumbwaiter a register of the tenants arranged by location.

424 Near the roof doors of both front and back halls a copy of the roof rules.

425

STOREROOMS

Keep storerooms locked at all times.

Screen with wire to keep animals out.

Whitewash them before delivering to a new tenant.

Keep room clean when vacant.

Do not use cheap padlocks.

Tag and lock up keys of vacant storerooms.

Fasten staples so that they cannot be drawn out.

Allow no excelsior, hay, straw, or other inflammable packing material stored in the storerooms.

434 Where individual storerooms are provided the tenant is entitled to the use of the room for any kind of storage except excelsior and other inflammable material.

435 Where there is only a general storeroom, furniture is not to be taken, only trunks and baggage are to be accepted for storage.

436

REFUSE

437 Never allow any refuse to remain on the roof or under the roof racks.

438 The storage of excelsior, hay, straw, paper and other light packing material in the storerooms, yards, areas, basement or elsewhere on the premises is absolutely prohibited.

439 Never burn garbage on the premises.

440 Burn all excelsior, paper and light refuse daily in the ash pit of the furnace; do not burn it in the fire-box.

441 Paper and other refuse from the apartment that will readily burn must not be allowed to remain or to be stored near the dumbwaiter shaft or on the line of tradesmen's travel to the dumbwaiter.

442 All refuse must be removed and the apartment swept out the day the tenant moves.

443 Refuse resulting from alterations must be removed to the basement daily. Plaster, brick and building refuse will not be taken away by the City carts. When you have it all down in the basement request the management to have it carted away.

444 Garbage and ashes should be removed from the premises daily. If the department carts fail to call for it notify the management.

446

VERMIN

447 Vermin contractors usually supply patrons with postal cards addressed to themselves. Keep a supply on hand.

448 Vermin contractors should include rats and mice, ants, roaches and bugs in their work.

449 If these contractors are slow about answering your calls notify the office.

450 For water-bugs and roaches "Peterman's Roach Food" is very satisfactory if used properly. Sift it around

the baseboard of the pantry and kitchens and all shelves of closets, cupboards and around the back of washtubs and sinks, also throw it up on the pipes under the sinks and washtubs. Let it remain for a week, then sweep it off and apply it a second time. The second application should also be allowed to remain for a week.

451 Trap mice and rats.

452 Most of the usual remedies for bedbugs are good.

453 CROTON BUGS AND ROACHES

From

Circular No. 51, Second Series.

United States Department of Agriculture,

Division of Entomology.

L. O. Howard, Entomologist.

454

COCKROACHES

By C. L. Marlatt,

First Ass't Entomologist.

Roaches are among the commonest and most offensive of the insects which frequent human habitations. They were well known to the ancients, who called them *lucifuga*, from their habit of always shunning the light.

The little German Roach, however, is very generally known as the Croton bug, or water-bug, from its early association with the Croton water-works system in New York City.

455

Habits

They conceal themselves during the day behind base-

boards, furniture, or wherever security and partial protection from the light are afforded. In districts where the large American roach occurs they sometimes swarm in this way at night in such numbers that upon entering a small room one will be repeatedly struck and scratched on the face and hands by the insects in their frantic flight to gain concealment.

The domestic roaches are practically omnivorous, feeding on almost any dead animal matter, cereal products, and food material of all sorts. They will also eat or gnaw woolens, leather (as of shoes or furniture), and frequently are the cause of extensive damage to the cloth and leather bindings of books in libraries and publishing houses. The sizing or paste used on the cloth covers and in the binding is to them very attractive. The surface of the covers of cloth-bound books is often much scraped and disfigured, particularly by the German cockroach, and the gold lettering is sometimes eaten off to get at the albumen paste.

They leave, wherever they occur in any numbers, a fetid, nauseous odor, well-known as the "roachy" odor, which is persistent and cannot be removed from shelves and dishes without washing with soap and boiling water. It frequently happens that shelves on which dishes are placed become impregnated with this roachy odor, and this is imparted to and retained by dishes to such an extent that everything served in them, particularly liquids, as coffee or tea, will be noticed to have a peculiar, disgusting, foreign taste and odor, the source of which may be a puzzle,

and will naturally be supposed to come from the food rather than from the dish.

The roaches are normally scavengers in habit and may at times be of actual service in this direction by eating up and removing any dead animal material.

One other redeeming trait has been recorded of them, namely, that they will prey upon that other grievous pest of houses which are not subjected to careful supervision, the bedbug.

The dampness of water pipes is favorable to it, and it may be carried by the pressure of the water long distances through the pipes without injury.

456 *Natural Enemies and Parasites*

Among other natural enemies of the roach are tree frogs; and a correspondent informs us that if these animals are enclosed in a room over night they will effectively clear it of roaches.

457 *Remedies*

458 A common remedy suggested for roaches consists of the liberal use of pyrethrum powder or buhach, and when this is persisted in, considerable relief will be gained. It is not a perfect remedy, however, and is at best but a temporary expedient, while it has the additional disadvantage of oiling the shelves or other objects over which it is dusted.

459 Flowers of sulphur, dusted about where roaches

abound, has proved, on the authority of Mr. A. I. Mudd, of this Department, very effective as a repellent.

460 There are many proprietary substances which claim to be fairly effective roach poisons. The only one of these that has given very satisfactory results is a phosphorous paste, also sold in the form of pills. It consists of sweetened flour paste, containing 1 to 2 per cent of phosphorous, and is spread on bits of paper or cardboard and placed in the runways of the roaches. It has been used very successfully in the Department to free desks from Croton bugs, numbers of the dead insects being found in drawers every day during the time the poison was kept about. It is also a repellent.

A safe remedy consists in burning pyrethrum in the infested apartment. The smoke and vapors generated by the burning of this insecticide are often more effective in destroying roaches than the application of the substance in the ordinary way as a powder. There is no attendant danger of explosion, and the only precaution necessary is to see that the room is kept tightly closed for from six to twelve hours.

461

Trapping

Various forms of traps have been very successfully employed as a means of collecting and destroying roaches. These devices are all so constructed that the roaches may easily get into them and cannot afterwards escape. The destruction of the roaches is effected either by the liquid

into which they fall or by dousing them with hot water. A few of the common forms of traps and the methods of using them are here described.

A simple form of trap which, Mr. F. C. Pratt informs the writer, is very successfully used in London, England, consists of any deep vessel or jar, against which a number of sticks are placed, and bent over so that they project into the interior of the vessel for a few inches. The vessel is partially filled with stale beer or ale, a liquid for which roaches seem to have a special fondness. In the morning these vessels are found charged with great quantities of dead and dying roaches, which have climbed up the inclined sticks and slipped off into the vessel. We have had fair success with this last method against the Oriental roach in Washington, but against the more wary and active Croton bug it is comparatively worthless.

Mr. Tepper, who has been quoted in relation to the habits of roaches in Australia, gives a simple remedy which he says has proved very efficacious wherever employed. He mixes plaster of Paris, one part, and flour, three or four parts, in a saucer, and places it where the roaches abound, with another flat plate nearby containing pure water, both supplied with several bridges to give easy access, and one or two thin boards floating on the water touching the margin. The insects readily eat the mixture, become thirsty and drink, when the plaster sets and clogs the intestines. The insects disappear in a few weeks, the bodies no doubt being eaten by the survivors.

Traps of the sort described above, placed in pantries and bakeries, will unquestionably destroy great quantities of roaches, and keep them, perhaps, more effectually in check than the use of the troublesome insect powders or the distribution of poisoned bait, especially as the latter are so often ineffective.

462

BEDBUGS

*From Circular No. 47, Second Series of the
United States Department of Agriculture.*

Division of Entomology.

By L. O. Howard, Entomologist.

The presence of this insect in a house is not necessarily an indication of neglect or carelessness; for, little as the idea may be relished, it may often gain access in spite of the best of care and the adoption of all reasonable precautions. It is very apt to get into the trunks and satchels of travelers, and may thus be introduced into homes. Unfortunately, also, it is quite capable of migrating from one house to another, and will often continue to come from an adjoining house, sometimes for a period of several months, gaining entrance daily. Such migration is especially apt to take place if the human inhabitants of an infested house leave it. With the failure of their usual source of food, the migratory instinct is developed, and, escaping through windows, they pass along walls, water pipes, or gutters and thus gain entrance into adjoining houses. In these or other ways, it may be any one's misfortune to have his premises temporarily invaded.

As with nearly all the insects associated with man, the bedbug has had the habits now characteristic of it as far back as the records run. It was undoubtedly of common occurrence in the dwellings of the ancient people of Asia. The Romans were well acquainted with it, giving it the name of Cimex.

The bedbug has accompanied man wherever he has gone. Vessels are almost sure to be infested with it. It is not especially limited by cold, and is known to occur well North. It probably came to this country with the earliest colonists; at least Kalm, writing in 1748-9, stated that it was plentiful in the English colonies and in Canada, though unknown among the Indians.

The most characteristic feature of this insect is the very distinct and disagreeable odor which it exhales.

The odor comes from glands, situated in various parts of the body, which secrete a clear, oily, volatile liquid.

The roach, which sometimes feeds on bedbugs, is evidently not deterred by the odor; while the common house ant, which will also attack the bedbug, seems not to find this odor disagreeable.

The bedbug is thoroughly nocturnal in habits and displays a certain degree of wariness and caution, or intelligence, in its efforts at concealment during the day. It usually leaves the bed at the approach of daylight to go into concealment, either in cracks in the bedstead, if it be one of the old wooden variety, or behind wainscoting, or under loose wall paper, where it manifests its gregarious

habit by collecting in masses. They are not apt to be very active in winter, especially in cold rooms, and ordinarily hibernate in their places of concealment.

463 The bedbug, on account of its habits of concealment, is usually beyond the reach of powders, and the ordinary insect powders, such as pyrethrum, are of practically no avail against it. If iron and brass bedsteads are used the eradication of the insect is comparatively easy. With large wooden bedsteads, furnishing many cracks and crevices into which the bugs can force their flat, thin bodies, their extermination becomes a matter of considerable difficulty. *The most practicable way to effect this end is by very liberal applications of benzine or kerosene or any other of the petroleum oils.* These must be introduced into all crevices with small brushes or feathers, or by injecting with small syringes. Corrosive sublimate is also of value, and oil of turpentine may be used in the same way. The liberal use of hot water, wherever it may be employed without danger to furniture, etc., is also an effectual method of destroying both eggs and bugs.

The great desideratum, however, in a case of this kind, is a daily inspection of beds and bedding and of all crevices and locations about the premises where these vermin may have gone for concealment. A vigorous campaign should, in the course of a week or so at the outside, result in the extermination of this very obnoxious and embarrassing pest.

464 In the case of rooms containing books, or where

liquid applications are inadvisable, a thorough fumigation with brimstone is, on the authority of the late Dr. J. A. Lintner, then New York State entomologist, an effective means of destruction. He says:

“Place in the center of the room a dish containing about 4 ounces of brimstone, within a larger vessel, so that the possible overflowing of the burning mass may not injure the carpet or set fire to the floor. After removing from the room all such metallic surfaces as might be affected by the fumes, close every aperture, even the keyholes, and set fire to the brimstone. When four or five hours have elapsed, the room may be entered and the windows opened for a thorough airing.”

465 The fact that the bedbug has a very active enemy in the common house cockroach has already been alluded to, and the proof seems to be fairly conclusive. Another common visitor in houses, and a very annoying one also to the careful housekeeper, the little red ant, is also known to be a very active and effective enemy of the bedbug. Mr. Theo. Pergande of this office, informs me that during the Civil War, he occupied at one time barracks at Meridian, Mississippi, which had been abandoned some time before. The premises proved to be swarming with bedbugs, but very shortly afterwards the little red house ant discovered the presence of the bedbugs and came in enormous numbers, and Mr. Pergande witnessed the very interesting and pleasing sight of the bedbugs being dismembered or carried away bodily by these very minute ants. The result was

that in a single day the bedbug nuisance was completely abated. The liking of red ants for bedbugs is confirmed also by a correspondent writing from Florida (F. C. M. Boggess), who goes so far as to heartily recommend the artificial introduction of the ants to abate this bug nuisance.

Note on Sulphur Remedy

466 The sulphur or brimstone remedy has been used very successfully by Dr. S. Wardell Stiles, of the Bureau of Public Health and Marine Hospital Service, for the disinfection of frame cottages, such as those at seaside resorts, where, from neglect, infestation with bedbugs may often occur. The treatment is inexpensive compared with the use of hydrocyanic-acid gas, and offers much less risk of danger to human beings. Two pounds of sulphur are recommended for each thousand cubic feet of space, and the buildings should be closed for treatment at least twenty-four hours. Sulphur candles may be used where available. The precautions indicated in the quotation from Dr. Lintner should be observed.

467

CLOTHES MOTHS

*From Circular No. 36, Second Series.
United States Department of Agriculture.
Division of Entomology.*

By C. L. Marlatt, 1st Ass't Entomologist.

THE TRUE CLOTH MOTHS

The destructive work of the larve of the small moths commonly known as clothes moths, and also as carpet

moths, fur moths, etc., in woolen fabrics, fur, and similar material, during the warm months of summer in the North, and in the South at any season, is an altogether too common experience.

468

Remedies

There is no easy method of preventing the damage done by clothes moths, and to maintain the integrity of woolens or other materials which they are likely to attack demands constant vigilance, with frequent inspection and treatment. In general, they are liable to effect injuriously only articles which are put away and left undisturbed for some little time. Articles in daily or weekly use, and apartments frequently aired and swept or used as living-rooms are not apt to be seriously affected. Carpets under these conditions are rarely attacked, except sometimes around the borders where the insects are not so much disturbed by walking and sweeping. Agitation, such as beating, shaking, or brushing, and exposure to air and sunlight are old remedies, and still among the best at command. Various repellents, such as tobacco, camphor, naphthalene cones or balls, and cedar chips or sprigs, have a certain value if the garments are not already stocked with eggs or larvae. The odor of these repellents is so disagreeable to the parent moths that they are not apt to come to deposit their eggs as long as the odor is strong. As it weakens the protection decreases, and if the eggs or larve are already present, these odors have no effect on

their development; while if the moths are enclosed with the stored material to be protected by these repellents, so that they cannot escape, they will of necessity deposit their eggs, and the destructive work of the larve will be little, if at all, restricted. After woolens have been given a vigorous and thorough treatment and aired and exposed to sunlight, however, it is of some advantage in packing them away to enclose with them any of the repellents mentioned: Cedar chests and wardrobes are of value in proportion to the freedom of the material from infestation when stored away; but, as the odor of the wood is largely lost with age, in the course of a few years the protection greatly decreases.

470 *Furs and such garments may also be stored in boxes or trunks which have been lined with the heavy tar paper used in buildings. New papering should be given to such receptacles every year or two. Similarly, the tarred paper moth bags are of some value; always, however, first subject the materials to the treatment outlined above.*

475 To protect carpets, clothes, and cloth-covered furniture, furs, etc., they should be thoroughly beaten, shaken, brushed, and exposed as long as practicable to the sunlight in early spring, either in April, May or June, depending on the latitude. *The brushing of garments is a very important consideration, to remove the eggs or young larve which might escape notice.* Such material can then be hung away in clothes closets which have been thoroughly cleaned, and, if necessary, sprayed with benzine about the cracks of the

floor and the baseboards. If no other protection be given, they should be examined at least once a month during summer, brushed, and, if necessary, exposed to the sunlight.

It would be more convenient, however, to so enclose or wrap up such material as to prevent the access of the moths to it, after it once has been thoroughly treated and aired.

This can be easily effected in the case of clothing and furs by wrapping them up tightly in stout paper, or enclosing in well made bags of cotton or linen cloth or strong paper.

Dr. Howard has adopted a plan which is inexpensive and which he has found eminently satisfactory. For a small sum he secured a number of the large pasteboard boxes, such as tailors use, and in these he packs away all winter clothing, gumming a strip of wrapping paper round the edge, so as to seal up the box completely and leave no cracks. These boxes, with care, will last many years. With thorough preliminary treatment it will not be necessary to use the tar-impregnated paper sacks sold as moth protectors, which may be objectionable on account of the odor.

480 *In the case of cloth covered furniture and cloth lined carriages, which are stored or left unused for considerable periods in summer, it will probably be necessary to spray them twice or three times, viz., in April, June and August, with benzine or naphtha, to protect them from moths.* These substances can be applied very readily with any small spraying device, and will not harm the material, but cau-

tion must be exercised on account of inflammability. Another means of protecting such articles is to sponge them very carefully with a dilute solution of corrosive sublimate in alcohol, made just strong enough not to leave a white stain.

485 The method of protection adopted by one of the leading furriers of Washington, who also has a large business and experience in storing costly furs, etc., is practically the course already outlined.

Furs when received are first most thoroughly and vigorously beaten with small sticks to dislodge all loosened hair and the larve or moths. They are then gone over carefully with a steel comb and packed away in large boxes lined with heavy tar roofing paper, or in closets similarly lined with this paper. An examination is made every two to four weeks, and if necessary at any time, any garment requiring it is rebeaten and combed. During many years of experience in this climate, which is especially favorable to moth damage, this merchant has prevented any serious injury by moths.

490

THE DESTRUCTION OF HOUSE ANTS

From Circular No. 34, Second Series.

*By C. L. Marlatt, 1st Ass't Entomologist
of the*

*United States Department of Agriculture
Division of Entomology.*

There are a number of species of ants often occurring in houses, the more important of which are common to

both hemispheres, and are probably of Old World origin. One of these, the little red ant, has become thoroughly domesticated and passes its entire existence in houses, having its nests in the walls or beneath the flooring, and usually forming its new colonies in similar favorable situations. Two other ants are very common nuisances in houses, namely: the little black ant and the pavement ant of the Atlantic seaboard. None of these ants are so destructive to household effects or supplies as they are annoying from the mere fact of their presence and their faculty of "getting into" articles of food.

491

Habits and Life History

In habits and life history these ants are all much alike. The specimens ordinarily seen in houses are all neuters, or workers. In the colony itself, if it be discovered and opened, will be found also the larger wingless females and, at the proper season, the winged males and females.

492

The Red Ant

As a house species the red ant is the common one. This species, nesting habitually in the walls of houses or beneath flooring, is often difficult to eradicate. There is no means of doing this except to locate the nest by following the workers back to their point of disappearance. If in a wall, the inmates of the nest may sometimes be reached by in-

jecting bisulphide of carbon or a little kerosene. If under flooring, it may sometimes be possible to get at them by taking up a section. *Unless the colony can be reached and destroyed, all other measures will be of only temporary avail.*

493

The Little Black Ant

The little black ant is not strictly a house species, although frequently occurring indoors, and becoming at times quite as troublesome as the red ant. Its colonies usually occur under stones in yards, but are frequently found in the fields, and will be recognized from the little pyramids of fine grains of soil which surround the entrances to the excavation. This species, when occurring in houses, can often be traced to its outdoor colony, and the destruction of this will prevent further trouble.

494

The Pavement Ant

The pavement ant of our Eastern cities is two or three times larger than either of the other species. It commonly has its colonies under pavements or beneath flagging or stones in yards. It is often a more persistent and pestilent house nuisance than the true house ant. Often with little difficulty this ant may be traced to its nest, which, if accessible, or not thoroughly protected by unbroken pavement, as of asphalt, can be rather easily exterminated. So well established is the species, however,

that new colonies will usually soon take the place of those destroyed.

Drenching the nests with boiling water or saturating them with coal oil, which latter also may be introduced into cracks in pavements or walls, are effective means of abating the nuisance of this ant.

495 *Means of Eradicating Ants*

In the foregoing account, the important remedies for each species of ant discussed have been briefly indicated. A more detailed description of some of the methods of control or extermination follows:

Whenever the nests of any of these ants cannot be located, there is no other resource than the temporary expedient of destroying them wherever they occur in the house. The best means of effecting this end is to attract them to small bits of sponge moistened with sweetened water and placed in the situations where they are most numerous. These sponges may be collected several times daily, and the ants swarming in them destroyed by immersion in hot water. It is reported also that a sirup made by dissolving borax and sugar in boiling water will effect the destruction of the ants readily and in numbers. The removal of the attracting substances, wherever practicable, should always be the first step.

That it is possible to drive ants away from household supplies by the use of repellents is asserted by a Washington lady, who has been much troubled in the past with

these pests. Her practice, which she says has always given complete satisfaction, consists in placing gum camphor, either free or wrapped loosely in paper, in pantry, sugar barrel, or other situation infested with ants. The odor of the camphor seems to be very distasteful to them and they promptly leave the premises.

500

TENANTS' FUEL

501 Where fuel is sold by the management, tickets or books of tickets calling for a fixed quantity are sold by the office or janitor.

502 When you deliver fuel get the number of tickets you are entitled to. You are not allowed to accept cash for fuel (unused tickets will be redeemed by the office at any time).

503 At the end of each week, and with your weekly report, turn into the office all the fuel tickets received.

504 JANITOR'S WHITEWASHING WORK

505 All inside shafts, the cellars, and the outside areas to the height of the first floor, should be kept whitewashed by the janitor.

506 In whitewashing the basement, use paint on the walls for a foot above the floor so that scouring the basement floor may be done without damage to the walls.

507 The following is an United States Government recepe for making whitewash. It does not rub or wash off:

“Take half a bushel of unslaked lime, slake it with boiling water, cover during process to keep in steam, strain the liquid through a fine sieve and add to it a peck of salt, previously dissolved in warm water, three pounds of ground rice boiled to a thin paste and stirred in while hot, half pound of Spanish whiting and one pound of clean glue dissolved. Add five gallons hot water to the mixture, stir well and let stand a few days covered from dust. It should be applied hot. The east end of the President's house at Washington is done with this mixture. It is used on all government lighthouses.”

508 One pint of whitewash will cover one square yard and is almost as serviceable as paint and is much cheaper than the cheapest paint.

For cream, add yellow ochre.

509 For pearl or lead, add lamp or ivory black.

For fawn, add four pounds umber to one pound Indian lead.

For stone color, add four pounds raw umber to two pounds lamp black.

APARTMENT HOUSE RULES

510 HOUSE RULES

511 Complete house service is to be given from 8 A. M. to 7 P. M.

512 Children are not allowed on the roof or in the basement, and are not permitted to play in the halls or about the entrance.

513 Velocipedes or bicycles are not allowed in passenger elevators, or in the halls, passageways, areas, or courts.

514 Dogs, cats, parrots, mocking birds, or wild or domestic animals are not allowed, under penalty of forfeiture of the lease at the option of the management.

515 Where practicable, furniture and baggage is to be received and delivered through the basement doors.

516 Servants, messengers, and tradespeople are not allowed to enter or leave the building by the main entrance or to use the main elevators, excepting nurses accompanying children.

517 No male servant is allowed to room on the servants'-room floor.

518 Tenants desiring telegraphic or telephonic connections should advise the management. It will direct the

electricians as to where and how the wires are to be introduced; without such directions no boring or cutting for such wires will be permitted.

519 Each tenant must keep the premises leased by him in a good state of preservation and cleanliness.

520 Tenants must not sweep, or throw, or permit to be swept or thrown from the premises leased by them, any dirt or other substance into any of the corridors or halls, elevators or stairways of said building, or into any of the light shafts or ventilators thereof.

521 Garbage and refuse must be sent down to the basement during the day when necessary, and at the hours fixed by the management.

522 Ashes must be sent down every morning between seven and eight o'clock.

523 Throwing refuse, garbage or paper down the dumbwaiter shaft and the placing of paper or garbage in papers or packages on top of or in the dumbwaiter car is prohibited.

524 The placing of ash-cans, ashes or refuse of any kind in the dumbwaiter, except at the hour fixed for deliveries by the janitor, is prohibited.

525 The storing of ash-cans in the dumbwaiter is dangerous, and is prohibited by the Fire Department.

526 The obstruction of the fire escapes is a menace to life, is against the laws, and is prohibited by the Fire Department, and also by the management.

527 No ash-can, garbage-can, coal-holder, wood-box,

kitchen supplies, ice, or other article shall be placed in the halls or on the staircase landings; nor shall anything be hung from the windows or balconies, or placed upon the window sills; neither shall any table-cloths, clothing, curtains or rugs be shaken or hung from any of the windows or doors.

528 The placing of packages, pots, or plants on window ledges is very dangerous and is expressly prohibited.

529 The storage in the basement or storerooms, or in any trunk, package or receptacle placed in the storeroom, of any excelsior, shavings or other inflammable material is expressly prohibited.

530 The storing of trunks, furniture or other effects in the hallways or vacant portions of the building is prohibited. The management assumes no responsibility for trunks, furniture or packages stored in the basement.

531 Visitors to the help of tenants are expected to leave at 10:30 P. M.: tenants' help are expected to return by 11:30 P. M.

532 All outside shades must be of a color approved by the management.

533 Employees are not permitted to receive registered mail or telegrams for tenants; they are required to deliver to the apartment a notice of the tender of registered mail or telegrams in the absence of the tenant.

534 Employees are not allowed to receive parcels, packages or tradesmen's deliveries except where the ten-

ant has made a signed request for and has assumed all risks of such service.

535 Where fuel is sold by the management, deliveries are made by its employees. Employees must require fuel tickets against these deliveries; they are not allowed to accept cash for fuel. Unused fuel tickets will be redeemed at cost on demand.

536 Sub-letting without the authority of the management is prohibited.

MAIN HALL RULES

537 The main hall equipment which, in addition to its furnishings, is to be maintained at all times, is:

A register of tenants, their guests and servants.

A mail box.

A messenger call.

An umbrella stand.

A large umbrella.

Blank cards for the use of visitors.

Paper and envelopes.

Ink and pen, a pencil and a blotter.

A Telephone Book.

538 Forms for:

Undelivered telegrams for tenants.

Undelivered packages for tenants.

Messages for tenants.

Undelivered mail held by janitor.

Undelivered Special Delivery and Registered Mail.

Mail forwarding addresses.

Telephone tickets.

Business cards of the management.

Literature describing the property.

Applications for apartments.

539 And a card, giving:

The location of the nearest fire-alarm box.

The number of Police Headquarters ("3100 Spring"), for use in calling an ambulance. Always call Police Headquarters when you want an ambulance.

The location and telephone number and name of the nearest: Hospital—physician—drug store—city express office.

The name and location of the nearest: Post Office—telegraph office—pay station telephone.

550 No deliveries of any kind are to be received through the main entrance except drugs.

551 Servants are not permitted to use the main entrance except when accompanying a tenant.

552 Book and tradesmen's deliveries must be made through the basement doors until the hour for closing them (10 P.M.).

553 In case of fire, notify the janitor at once.

554 Unnecessary noise is prohibited. The building is a place of residence—keep it quiet.

555 Book agents, canvassers and peddlers are not allowed in the building.

556 Children are not allowed to play in the halls.

557 Complete house service must be given from 8 A.M to 7 P.M.

558 Don't waste light. In houses having no hall service: at 10 P.M. turn off outside and vestibule lights, lower the main hall lights and close the main entrance, vestibule and roof doors.

559 In houses having hall service: The main entrance, vestibule and roof doors should be closed at the hour the attendants go off duty.

560 Employees must be neat, obliging, polite and prompt.

561 All cleaning on the main floor should be completed by 8:30 A.M.

562 The main hall must be kept clean at all times.

563 The brass work must be kept polished — the glass and mirrors kept clean, and all rugs, mats and carpets shaken and swept daily.

564 All furniture and wood-work should be dusted daily and the entire main floor swept daily and scoured weekly.

565 Eating or dressing in the halls or vacant apartments is prohibited.

566 The front doors of vacant apartments are to be kept closed at all times, the back doors should be kept locked.

567 The use of a vacant apartment for storage of any kind is prohibited.

568 It is the purpose of the management to make residence in the property as pleasant as possible for the employees and help of its tenants. Every consideration must be shown them by the house force.

569 Tenants' employees and help must be given elevator service whenever and during such hours as it is supplied for tenants, and every reasonable assistance in their work.

570

BACK HALL RULES

571 It is the purpose of the management to make residence in the property as pleasant as possible for the employees and help of its tenants. Every consideration must be shown them by the house force.

572 Tenants' employees and help must be given elevator service whenever and during such hours as it is supplied for tenants.

573 Employees must be polite, obliging and prompt.

574 Employees are not permitted to receive mail, parcels, or supplies for tenants.

575 The building is a place of residence — unnecessary noise is prohibited.

576 It is the janitor's duty to deliver and return store-room effects to and from the apartments.

577 Van and wagon deliveries are to be made by the men accompanying the wagon and must be made directly

to and from the apartments to the wagon. Obstructing the passageways or sidewalks is prohibited.

578 The back hall must be swept daily and scoured weekly. All windows must be kept clean.

579 All toilets must be cleaned and scoured daily and disinfected weekly.

580 Using the halls for storage of any kind is prohibited.

581 Tenants' help are to be given elevator service during the same hours and whenever it is supplied for tenants.

582 Visitors to tenants' help should leave the premises at 10:30 P.M.

583 Tenants' help must be shown every courtesy, and should be given all reasonable assistance by the house force.

584 At 10 P.M. lower all lights.

585

BASEMENT RULES

586 In the dressing-room for the house help the following equipment is to be maintained at all times:

Mirror, soap, towel, hair-brush, comb, blacking brush, blacking, whisk-broom.

587 The storage of excelsior, paper, straw, hay or other inflammable material in or about the premises is prohibited—it must be sent away or burned daily.

588 Paper and refuse that will burn which is sent down from apartments must be kept away from the dumbwaiter shaft and must not be stored on the line of travel to the dumbwaiter.

589 All trash must be removed from the elevator and

dumbwaiter pits and from the outside and inside areas and courts daily.

590 Garbage, ashes, and refuse must be removed from the premises every day.

591 Nothing that will burn must be stored on top of or near the furnace, boiler, smoke pipes or flues.

592 Children are not allowed in the basement.

593 In the laundry, post a register of the apartments showing the laundry day for each apartment.

594 All storerooms must be whitewashed before being delivered to a new tenant.

595 The house does not store furniture in its general storeroom. Only trunks and other forms of baggage are to be stored in it.

596 Storerooms and coal-bins must be kept locked and broom clean when vacant and should be wire screened to keep animals out.

597 Basement toilets must be cleaned daily and disinfected weekly.

598 The basement must be disinfected monthly in winter and weekly in summer, and must be ventilated often enough to keep the air good.

599 All basement windows and doors should have proper fastenings.

600 Basement entrance doors should be equipped with automatic closing devices.

601 Broken basement glass must be replaced promptly.

602 A warm basement means a warm house.

603 The burning of garbage on the premises is prohibited.

604 Excelsior, hay, straw, etc., are to be burned in the furnace ash-pit, not in the fire-box.

605 Complete house service is to be given from 8 A.M. to 7 P.M. daily.

606 Front basement doors are to be opened at 6 A.M. and closed at 8 P.M., except on Saturdays and on days before holidays. On these days all basement doors are to be closed at 11 P.M.

607 Rear basement doors are to be opened at 6 A.M. and closed at 8 P.M., except on Saturdays and days before holidays.

608 Tradesmen's delivery men should be allowed to have access to a basement toilet. (Post a notice of its location above each dumbwaiter door.)

609

ROOF RULES

610 Children are not allowed on the roof.

611 Drying racks and floors must be kept in good repair.

612 A register of the apartments, fixing the drying day for each apartment, should be posted in the front and back hall near the roof doors.

613 A register of the apartments, fixing the laundry day for each apartment, should be posted in the laundry.

614 All parts of the roof should be kept clean of refuse at all times and must be swept every week, especially under the drying racks.

615 Roof doors should be kept closed at all times and should fit tight to prevent drafts.

616 The house water-tank should be equipped with an overflow and a clean-out valve; discharges from both should be piped to the open roof.

617 The house water-tank must be emptied and scoured every month.

618 A telltale should be carried from the tank to some location in the basement where it will be seen frequently.

619 The roof and roof bulk-heads and all sky-light metal should be painted in June of each year.

620 Broken glass must be replaced at once.

621 The roof must be kept clear of everything which could cause injury if blown off.

622 Stacks and pipes must be kept in good condition, secure and properly guyed.

623 OUTSIDE RULES

624 Chute and coal-hole covers must be kept securely fastened from below.

625 All outside shades must be of color approved by the management.

626 All sidewalks, outside areas, and yards must be cleaned daily.

627 Ice and snow must be removed from sidewalks and steps promptly.

628 Slippery walks and steps must be kept sanded or sprinkled with sawdust.

629 Express and van men must not be permitted to block the sidewalks or entrances. All deliveries must be made directly from the wagon into the apartment or store-room.

630 Children are not allowed to use the sidewalk near main entrance or the main hall for a playground.

631 A failure of the City to promptly clean the street crossings or streets should be reported to the office.

632 Failure of the City to remove garbage and ashes daily must be reported to the office promptly.

633 Garbage and ash cans must be removed from the sidewalk and stored inside the building as soon as emptied.

634 Outside areas must not be used for storage purposes.

635 Fire escapes must be kept clear.

636 The placing of flower pots, bottles or boxes on window sills is prohibited.

637 The placing of signs is prohibited except when approved by the management.

638 The house sign must be kept clean and fresh at all times.

639 The hanging of rugs, bed clothing or other articles out of windows is prohibited.

640 Sidewalks must be swept and washed promptly after coal is delivered.

641 Cesspool and house drains must be kept clear.

RULES FOR EMPLOYEES

700 Every employee is expected to know all the rules for the house service.

701 No employee is permitted to leave his position during his working hours without giving notice to the management. When he must leave he should report to the janitor or superintendent, who will provide a substitute.

702 Where there is a double shift, no employee is permitted to go off duty until his relief arrives and is in uniform.

703 While on duty the uniform must be worn at all times.

704 Uniforms are never to be worn away from the building.

705 Uniforms should be scoured and cleaned every month.

706 Employees must be very neat in their personal appearance. Cuffs, collars and linen should be kept clean, shoes blacked, and uniforms clean and in perfect order and repair at all times.

707 For employees doing house work frequent bathing is absolutely necessary.

708 Never fail to get a bath at least once a week. Very often the cause of a discharge is the failure of an employee to keep his person fresh and clean. No matter how good the man, if he is not pleasant to have about he will be discharged.

709 All employees are expected to be polite, prompt, and obliging and to keep in mind that unnecessary noise is to be prevented.

710 There is no objection to reading, but books, papers, and magazines should never be allowed to lie around the reception rooms, halls or elevators.

711 Employees are not permitted to run errands for tenants or to work for them during working hours.

712 Employees are not permitted to receive parcels for the tenants.

713 Never give information about tenants; refer all such inquiries to the management.

714 Do not talk with tenants except to reply to them.

715 Never talk back to tenants; if you are not properly treated notify the management.

716 Do not gossip — the less you know of the private affairs of your tenants the better for you.

717 Never remain seated when tenants' visitors or guests pass you.

718 Always open and close the main hall doors for visitors or tenants.

719 Hall, elevator, and telephone men and all main hall help are expected to know the price, size and location of all apartments which are for rent and the date on which they can be delivered. They must also be able to show the apartment at all times without having to look up the janitor.

720 Wherever possible get the name and address of the

applicant and the particulars of price and size apartment desired.

721 Mail must not be kept in the reception-room, cars, or hall. Undelivered mail should be turned over to the janitor and a notice that he has it should be slipped under the front door of the apartment.

722 The air in the halls should be kept sweet and they should be properly ventilated at all times.

723 Visitors should be announced by 'phone, speaking tube, or elevator.

724 Deliver cards left by visitors for the absent tenants as you do the mail — slip them under the front door of the apartment.

725 Write down at once all messages for tenants and deliver them as you do the mail.

725A When you first report, get a complete list of the tenants, of their guests, and of their employees.

INSTRUCTIONS FOR HALL BOYS

726 In case of fire notify the janitor immediately.

727 In houses having one hall boy the working hours are 7 A.M. to 7 P.M.

728 In houses having two hall boys and which provide service from 7 A.M. to midnight, hall boy No. 1 works from 7 A.M. to 3 P.M., daily except Sundays, and from 7 A.M. to noon on Sundays; hall boy No. 2 works from 3 P.M. to midnight daily and from noon to midnight on Sundays. Nos. 1 and 2 change places weekly.

729 Where the hall service is continuous the change hours are 7 A.M. and 7 P.M.

730 It is the hall boy's duty to keep steps, vestibule and main hall and stairs up to the second floor clean. The brass should be polished; glass cleaned, wood-work dusted, and main floor carpets, rugs and furniture cleaned before 8:30 A.M. daily.

731 When sidewalks or steps become slippery, notify the janitor to sand them.

732 When the sidewalk needs sweeping, notify the janitor or superintendent.

733 As soon as garbage or ash cans are emptied, notify the janitor to get them off the sidewalk.

734 Book agents, peddlers and canvassers are not allowed in the building.

735 You should be thoroughly familiar with the work of the elevator operator and telephone attendant, but should never operate the car except on the written order of the management.

736 You are responsible for the vestibule and main hall lights. Have plenty of light, but do not waste it. If it is not needed turn it off.

737 At 11 P.M., or when the door man goes off duty, lock the outside doors and lower all lights.

738 Close all roof doors, sky-lights or windows before you go off duty.

739 Make mail deliveries promptly.

740 Never accept parcel deliveries for tenants.

741 Never accept telegrams for tenants. Slip the telegraph notice under the front door of the apartment.

742 Keep clean.

743 Learn all the rules for the government of the house.

744 Notify the superintendent or janitor when you have a call for an apartment. If they are absent show the apartment yourself.

745 Main hall help should keep on hand a supply of printed matter describing the property, and the business cards of the management office.

746 Always be able to show what you have to rent. The front doors of vacant apartments should be kept unlocked or you should have keys for each vacant one.

Never allow any one to find you unable to show something that is for rent. Do not depend on the janitor or superintendent to open apartments; keep them open or keep keys to them.

747 Keep a complete list of tenants' guests and employees.

748 Learn where tenants want newspapers and mail delivered—whether at front or back door.

INSTRUCTIONS TO ELEVATOR OPERATORS

749 In houses providing Elevator Service from 7 A.M. to midnight, operator No. 1 works from 7 A.M. to 3 P.M. daily, and from 7 A.M. to noon on Sundays; operator No. 2 works from 3 P.M. to midnight daily, and from noon to midnight on Sundays.

750 The operators change places every week.

751 Where the service is continuous, the change hours are 7 A.M. and 7 P.M.

752 In New York State operators must be 18 years of age.

753 When you first report get a complete list of the tenants, of their guests and of their employees.

754 Never carry servants on the same trip with tenants or with tenants' guests, unless they accompany children or a member of a tenant's family.

755 Get into your car before you allow any one else to do so.

756 Leave your car last; let every one get out before you get out.

757 Allow no one except the regular operators, the engineers or the janitor to run your car.

758 Never start your car until the shaft door and all of the car doors are closed.

759 If the elevator gets out of order shut it down at once.

760 Never leave the car door open unless you are in the car. Keep it locked; if there is no lock or key notify the management.

761 Stop the car before you open the door. See that the car floor is level with the house floor before you open gate.

762 Read and study the instructions in the manual for the care of elevator cars and machinery.

763 Servants are to have elevator service whenever it is provided for the tenants; after the service elevator operator leaves, the passenger car operator is to run both the service and passenger cars.

764 Drug deliveries may be made by the front entrance and car—all other deliveries must be made through the basement or rear entrance.

765 Peddlers, book agents and canvassers are not allowed in the building.

766 Set an example to the other main hall employees—keep the hall in attractive condition and yourself neatly dressed. Be very polite and obliging—you can do a great deal to make the management popular.

767 When the sidewalk or steps get slippery, notify the janitor to sand them.

768 When the sidewalk needs sweeping, notify the superintendent or janitor.

769 As soon as the garbage or ash-cans are emptied, notify the janitor to take them off the sidewalk.

770 You should thoroughly understand the work of the hall boy and 'phone attendant and should know all the rules for the government of the house.

SERVICE ELEVATOR OPERATORS

771 In case of fire, notify the janitor at once.

772 Service elevator men work from 7 A.M. to 7 P.M.

773 Service cars should be kept on the basement floor when not in use.

774 Allow no unnecessary noise.

775 Don't overload the car.

776 Don't lose time on landings or in kitchens.

777 Answer bells promptly.

778 Be prompt and obliging.

779 You make deliveries between storerooms and apartments, but have nothing to do with outside or van deliveries.

780 Canvassers, peddlers and book agents are not allowed in the building.

781 Tradesmen's, express, and parcel deliveries are to be made directly to the apartment. Employees are forbidden to receive such deliveries.

782 In making ice deliveries, use a pan in the car.

783 The best hour for coal and wood deliveries is 5 P.M.

784 Notify new tenants of the hour for removing ashes and garbage.

785 When you first report get a complete list of the tenants, of their guests, and of their employees.

786 Report unclean toilets or odors from them to the janitor or superintendent.

787 You are responsible for the lighting of the back hall and of the cellar and basement about your car. Do not waste light; if it is not needed — turn it off.

788 Get into your car before you allow anyone else to do so. Get everyone out of the car before you get out of it.

790 Keep your storerooms clean, whitewashed, and free of packing material (excelsior, hay, straw, etc.). It is dangerous and is prohibited.

791 Tag every article that goes into your general store-room; enter the date and name of tenants on the tag.

792 If the elevator gets out of order shut it down at once.

793 You are charged with the care and cleaning of the basement and cellar approaches to your car.

794 Close all roof sky-lights, windows and doors before you go off duty.

795 Keep cats and dogs out of your basement.

795A Read and study the instructions in the Manual for Passenger Elevator Operators for the care of elevator cars and machinery, the house rules and instructions to employees.

795B Servants are to have elevator service whenever it is provided for the tenants.

INSTRUCTIONS TO TELEPHONE OPERATORS

796 Telephone attendants work from 8 A.M. to 7 P.M.

797 In case of fire notify the janitor at once.

798 Be polite, prompt, attentive, and obliging.

799 Speak plainly and slowly.

800 Keep quiet — permit no useless noise.

801 Enter and call back the numbers asked for before you make connections; it will prevent mistakes and save time.

802 When you report for the first time get a list of the tenants' names, the names of their guests and of their employees, and of the apartments they occupy and of the employees of the house.

803 If there is a special switch attached to your telephone, it is probably to enable you to connect with some apartment. Learn who the tenant is in order that you may give the service promptly.

804 Don't give long rings when you ring up a tenant; press the button only once; you will get an answer just as quickly from one ring as you will from prolonged ringing.

805 Write down all messages as you receive them; see that they are delivered promptly.

806 Telephone Central, get the right time, and set your clock by it as soon as you go on duty.

807 If you do not understand the telephone system, telephone Central to send some one to explain it to you. The Telephone Company will cheerfully explain its working to you.

808 If your duties include the running of the elevator, always turn up the buzzer switch before you answer an elevator call so that you may hear the telephone while you are on your car.

809 The Telephone Company charge you with every call you make. If you get a wrong number, to prevent its being charged, you must notify Central that you got the wrong number.

810 You should keep a complete record of your day's work on the charge sheet; the date, the hour you went on duty, the hour you went off duty, your name, and the name or street address of the property, and the following particulars about each message should appear on it:

811 The time of the call, the number called, the amount of the charge, the person to whom the message is to be charged and the name of the sender. Never use the same charge sheet for two days' work. The Telephone Company or the management office will supply as many as you need. Use a separate sheet for each day's work.

812 In addition to the record of messages on your charge sheet, you should make a separate ticket for each

charge. This ticket should show the date, the number called, the amount of the charge, by whom it was sent and the person to whom it is to be charged.

813 Require payment in cash from all strangers, and from tenants get a signed ticket if possible.

814 When the message is to be charged to the house or to the management office, the ticket should state the nature of the message, and by whom it was sent, and should be signed by the employee who uses the 'phone.

815 Turn over your charge sheet, cash and tickets to the office or to the janitor daily before leaving the building, and get a receipt for them.

816 City messages are ten cents.

817 Brooklyn messages are fifteen cents.

818 Out of town messages are at various rates.

819 A local message permits the use of the telephone for five minutes or less.

820 A long distance message permits the use of the telephone for three minutes or less.

821 Have a good clock on your desk and keep time on every local message.

822 Ask Long Distance the amount to charge on every long distance call.

823 Central keeps the time on long distance calls. It does not keep the time on local calls.

824 Long distance calls made between 6 P.M. and 6 A.M. are charged at day rates.

SUPPLIES

825 Keep on hand at all times:

A telephone directory.

A business telephone directory.

A clock.

A pencil.

Messages-received forms.

Daily charge sheet forms.

Charge tickets.

A calender.

826 On a card hung up by your 'phone always have:

The telephone number of Police Headquarters—"3100 Spring."

The location of the nearest fire-alarm box.

The name, address and 'phone number of the nearest physician.

The name, address and 'phone number of the nearest hospital.

The name, address and 'phone number of the nearest police station.

827 You should be thoroughly familiar with all the rules for the government of the house and with the work and the instructions in the MANUAL for Elevator men and Hall boys—but you should never operate the elevator without a written order from the management.

CARE OF PLANT AND PROPERTY

DUMBWAITERS

1001 If any one operating the dumbwaiter can stand under the car, fix a guard to prevent it—the car might fall.

1002 Keep the bells and tubes in perfect working order.

1003 Post at the basement door an index of tenants' names.

1004 Put a roller in the basement door opening about six inches below the top. It will save wear on your hoisting ropes and will make it easier to work the car.

1005 Cars should be scoured with hot water weekly and kept sweet and clean at all times.

1006 Clean and disinfect shaft pits weekly. White-wash it monthly.

1007 Keep the machinery well oiled and the guides well greased.

1008 Once a month inspect the shaft and machinery, examine the ropes carefully. Bear in mind that the wear on a rope is on the inside.

ELEVATORS

1010 Regulate the operating cable every day. Do not let it get too loose.

1011 Inspect all cables and the safety devices every day. Look for wear on the cables and see that all are fast.

1012 Oil all bearings and clean the shaft pit every day and see that all cables passing through the pit are clear.

1013 Oil bearings at the top of the shaft every Friday and fill all oil cups daily.

1014 Keep a common fireplace bellows on hand for use in blowing dust out of motors and generators.

1015 SUGGESTIONS FOR THE CARE AND
 OPERATION OF THE
 OTIS HYDRAULIC ELEVATORS

*By the Otis Elevator Company,
17 Battery Place, New York*

1016 When the cherry guides are properly cleaned, put a coat of lubricating compound on them. The best is seven-eighths cylinder oil and one-eighth plumbago, well mixed. It is advisable to occasionally use a little kerosene oil for cleaning off the guides.

Keep cables well oiled with raw linseed oil and tar oil (seven parts linseed oil and three parts of tar oil). When

they have once become well soaked, it will probably be sufficient to oil them only about every three or four months. Do not allow them to become dirty and gummy.

Examine cables frequently for broken wires.

Keep tensions on cables alike, adjusting them at the fastenings to the overhead work or traveling sheave, at which place there should be lock nuts.

See that hand cable is kept properly adjusted, neither too tight nor too loose.

Keep safety plank and top of car clean, and do not allow the grease to collect.

Keep all bearings properly oiled.

Keep the guide springs on the girdle above, and the safety plank below, the car adjusted so that the car will not wobble, but not tight enough to bind against guides.

When cables are drawing alike, the equalizing bars on a passenger elevator should be horizontal, as shown in cut on page 110, and the set-screws free from contact with the finger shaft, but adjusted so that one of them will come in contact with the finger shaft when the equalizing bar is tipped a certain amount either way.

The main cables should not be allowed to stretch so much that the car cannot reach the top landing, as the piston will strike the bottom cylinder head.

If the safety wedges should be thrown in, or rattle, when descending, the cause would be from the stretching or breaking of one of the cables, the action of the governor,

or from weakness of either the spring on the finger shaft, safety wedge or gummy guides.

In the first case, if occasioned by the cable stretching, the cable should be examined thoroughly, and, if it shows a weakness, a new one put on, otherwise it can be shortened up, as stated above.

In the second case, the car had probably attained excessive speed, and the governor simply performed its proper function.

In the third case, new springs should be put on, and the guides kept clean, for it often happens that the guides are so dirty that the springs cannot well prevent the wedges catching.

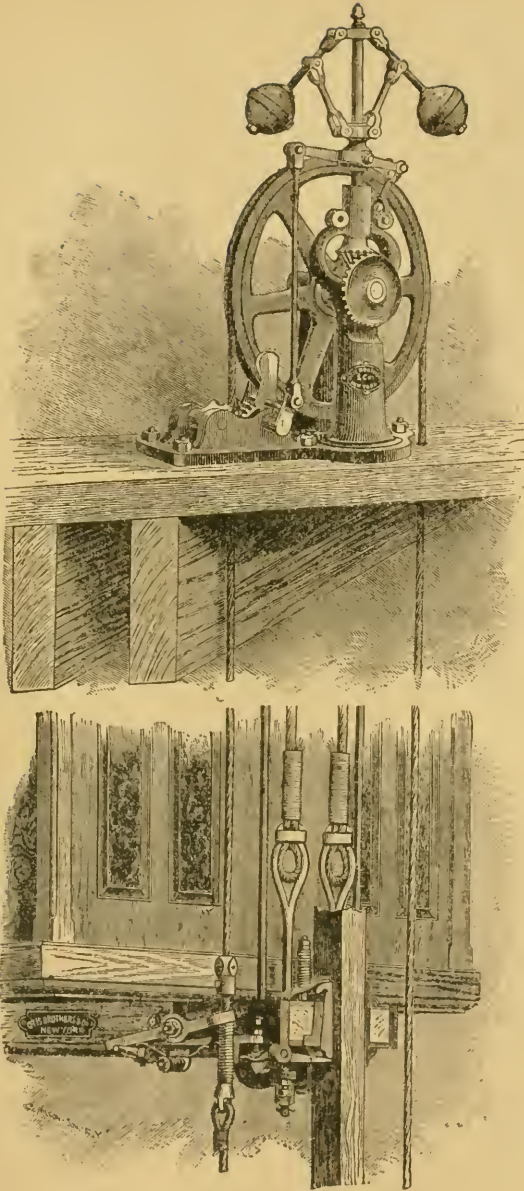
All the safeties should be kept clean and in good order, so that they will quickly respond when called upon to perform their duty.

To loosen the wedges when thrown in, throw the valve for the car to ascend.

If the wedges are thrown in above the top landing, remove the button on the hand cable, and run the car up until the piston strikes the bottom of the cylinder. If this is not sufficient to loosen the wedges, the car will have to be raised by a tackle.

Keep all nuts properly tightened.

If traveling or auxiliary sheave bushing is worn so that sheave binds, or the bushing is nearly worn through, turn it half round, and thus obtain a new bearing. If it has been once turned, put in a new bushing.



OTIS GOVERNOR SAFETY
Attached to Gravity Wedge Safety.

W. O. F. C.

See that the piston rods draw alike. If they do not, it can be discerned by trying to turn the rods with the hands, or by a groaning noise in the cylinder. However, this groaning may also be caused by the packing being worn out, in which case the car would not stand stationary.

See that all supports remain secure, and in good condition.

If car settles, the most probable cause is that the valve or piston needs repacking. If packing is all right, then the air valve "18" in the piston does not properly seat.

If the car springs up and down when stopping, there is air in the cylinder. When there is not much air, it can often be let out by opening the air cock and running a few trips, but when there is considerable air, run the car to near the top, then place the valve for the car to descend. While in this position open the air cock and allow the air to escape. This may have to be repeated several times before the air is all removed.

Keep the cylinders and connections protected from frost. Where exposed, the easiest way to protect the cylinders is by an air-tight box, open at the bottom, at which point keep a gas jet burning during cold weather. Where there is steam in the building, run a coil near the cylinder.

Keep stop buttons on hand cable properly adjusted, so that the car will stop at a few inches beyond

either landing before the piston strikes the head of the cylinder.

Regulate the speed desired for the car by adjusting the back stop buttons, so that the valve can only be opened either way sufficiently to give this speed.

Occasionally try the governor to see that it works properly.

Keep the machinery clean and in good order.

The inside of cylinder should be properly lubricated every two weeks with cylinder oil.

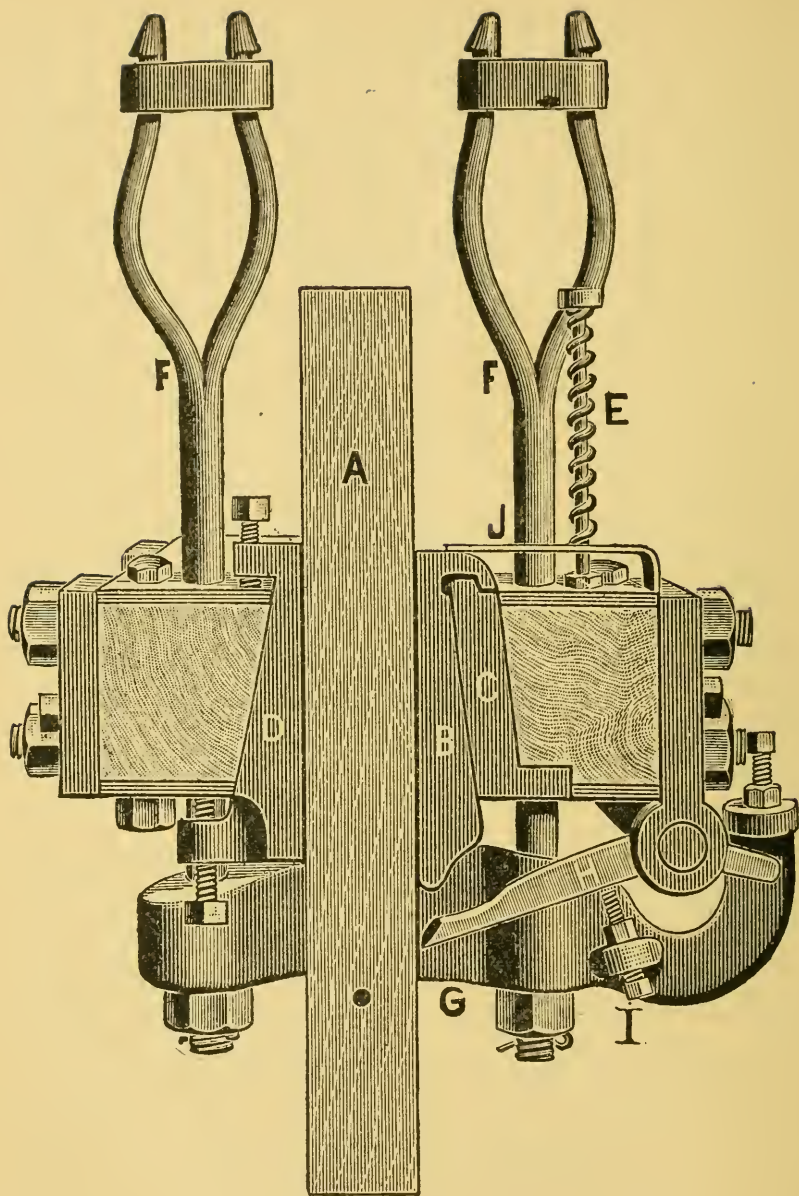
An oil cup, near the bottom of cylinder, is provided for this purpose. Open the two circulating cocks after the oil cup is filled, and allow the oil to run in cylinder; after half an hour's time close the two cocks.

Under no circumstances neglect to close cocks, otherwise the car will settle.

1017 EXPLANATION OF OTIS GRAVITY WEDGE SAFETY

A Guide	G Equalizing Bar
B Safety Wedge	H Finger Shaft
C Safety Wedge Shoe	I Set-screws on Equalizing Bar
D Adjustable Gib	which come in contact with
E Safety Wedge Spring and Bolt	Finger Shaft.
F Shackle Rods	J Safety Wedge Spring Plate

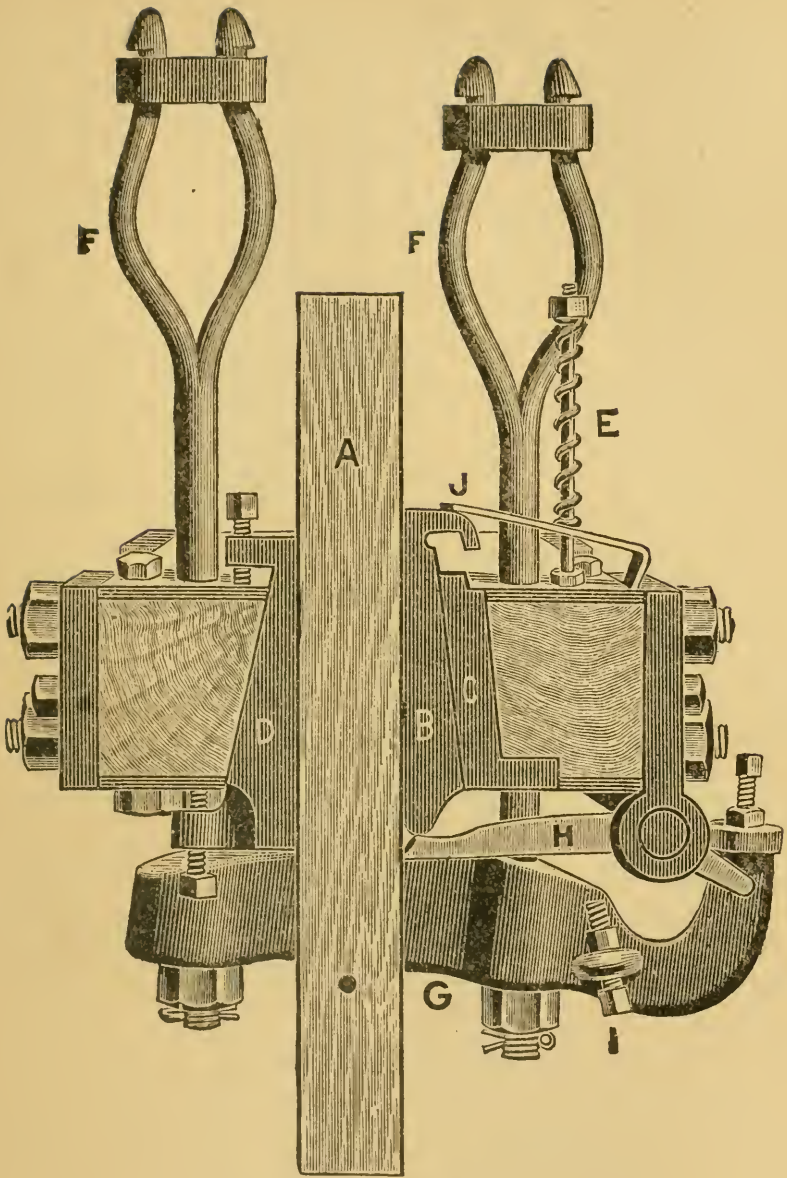
For illustrations see following pages.



OTIS GRAVITY WEDGE SAFETY

Showing Cables properly adjusted and the Safety Wedge in position for Car to run.

For Explanation see preceding page.



OTIS GRAVITY WEDGE SAFETY

Showing Safety Wedge thrown in by the breaking or stretching of one of the Cables.

For Explanation see page 101.

1018 EXPLANATION OF OTIS ELEVATOR CYLINDER AND
VALVE

1	Traveling Sheave	22	Cylinder Legs
2	Traveling Sheave Bushing	23	Drain from bottom of Cylinder
3	Traveling Sheave Pin		
4	Traveling Sheave Guard	24	Water Chest
5	Traveling Sheave Strap	25	Relief Valve, to relieve ram of water when the valve is suddenly closed during the ascent of Car.
6	Oil Cup		
7	Piston Rod Cross-head	26	Valve Chamber
8	Stuffing Boxes	27	Valve Plunger, consisting of:
9	Air Cock	a.	Rack Follower
10	Drip Pipe	b.	Valve Stem
11	Curve on top of cylinder	c.	Top to Valve Piston Cup
12	Piston Rod	d.	Bottom to Valve Piston Cup
13	Cylinder	e.	Spider
14	Circulating Pipe	f.	Valve Cup Packing
15	Piston	28	Valve Rack
16	Top Follower	29	Valve Rack Shoe
17	Bottom Follower	30	Valve Pinion Shaft
18	Piston Air Valve	31	Valve Cap
19	Piston Cup	32	Valve Glands on Pinion Shaft
20	$\frac{3}{8}$ inch Square Rubber packing	33	Valve Sheave
21	Set-screws for starting Top Follower when removing it to pack.	34	Check Valve

1019 HOW TO PACK ELEVATORS

How to Pack Piston from Bottom

1020 Remove the top stop button on hand rope, and run the car up until the piston strikes the bottom head in cylinder. Secure the car in this position by passing a strong rope under the girdle or cross-head, and over the sheave timbers. When secured, close the gate valve in the

supply pipe, open the air cock at the head of the cylinder, and throw the operating valve for the car to go up. Also open the valve in the drain pipe, from the side of the cylinder, and from the lower head of the cylinder, thus allowing the water to drain out of the cylinder. When the cylinder is empty, throw the valve for the car to descend in order to drain the water from the circulating pipe. In cases of tank pressure, where level of water in lower tank is above the bottom of the cylinder, the gate valve in the discharge pipe will have to be closed as soon as the water in the cylinder is on a level with that in the tank, allowing the rest to pass through the drain pipe to the sewer. When water is all drained off, remove the lower head of the cylinder and the piston will be accessible. Remove the bolts in the piston follower by means of the socket wrench which is furnished for that purpose. Before removing the piston head, mark its exact position, then there will be no difficulty in replacing it; also be careful and not let the piston get turned in the cylinder, so as to twist the piston rods. On removing the piston follower you will find a leather cup turned upward, with coils of five-eighths inch square rubber packing on the outside. This you will remove and clean out the dirt, also clean out the holes through which the water acts upon the cups. If you find the leather cup in good condition you may replace it, but see that piston rods draw evenly before replacing it, and on the outside place three new coils of five-eighths inch square rubber packing, being careful that they break

joints, with a lap of about two inches, and also that the thickness of the three coils up and down does not fill the space by one-quarter inch, as in such case the water might swell the packing sufficiently to cramp it in this space, thus destroying its power to expand. If too light, strip off a few thicknesses of canvas. Replace the piston follower and cylinder head, and the cylinder is ready to refill. Close the valves in the drain pipes, leave the air cock open at the head of the cylinder, and the operating valve in the position to rise. Slowly open the gate valve in the supply pipe, allowing the cylinder to fill gradually, and the air to escape at the head of the cylinder. When the cylinder is full of water, close the air cock, and open gate valve full; put the operating valve on the center. The car can then be untied, the top button reset, the gate valve in discharge opened; then the elevator is ready to use.

1021

Packing Piston from Top

Run the car to the bottom, and close the gate valve in the supply pipe. Open the air cock at the head of the cylinder, and also keep open the valve in the drain pipe from the side of the cylinder long enough to drain the water in the cylinder down to the level of the top of the piston. Now remove the top head of the cylinder, slipping it up the piston rods out of the way, and fasten there. If the piston is not near enough to the top of the cylinder to be accessible, attach a rope or small tackle to the main

cables (not the counterbalance cables), a few feet above the car, and draw them down sufficiently to bring the piston within reach. Remove the bolts in the piston follower by means of the socket wrench furnished for that purpose. Mark the exact position of the piston follower before removing it, so that there will be no difficulty in replacing it. On removing the piston follower you will find a leather cup turned upward, with coils of five-eighths inch square rubber packing on the outside. This you will remove and clean out the dirt, also clean out the holes through which the water acts upon the cups. If the leather cup is in good condition, replace it, and on the outside place three new coils of five-eighths inch square rubber packing. Rubber packing must be put in about one-half inch longer than circumference, being careful that they break joints, and also that the thickness of the three coils up and down does not fill the space by one-quarter inch, as in such case the water might swell the packing sufficiently to cramp it in this space, thus destroying its power to expand. If too tight, strip off a few thicknesses of canvas. Replace the piston follower, and see that the air valve in the piston is in good working order, and then let the piston down to its right position. Replace the cylinder head and gradually open the gate valve in the supply pipe, first being sure that the operating valve is on the center. As soon as the air has escaped, close the air cock and open gate valve full; then the elevator is ready to run. In case the leather cup has been destroyed, a new one can be put

on by cutting the leather on a good bevel, then sew it up after it is placed around the rods.

1022

Packing the Valve

To pack the valve, run the car to the top and secure it. Then drain the circulating pipe only, take out the valve (always soak the valves about one hour in cold water before using), repack it, and put same back. Open pet cock on top of cylinder and allow air to escape while running the car slowly, then close the air cock.

1023

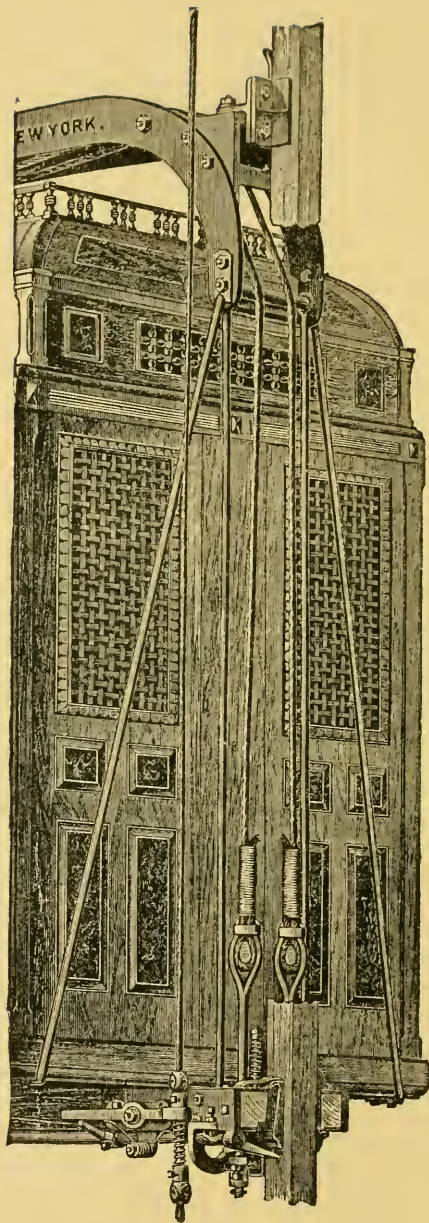
Packing Piston Rods

Close the gate valve in the supply pipe and open air cock, to make sure that there is no pressure in cylinder. Remove the followers and glands to the stuffing boxes and clean out the old packing. Repack with about eight turns of one-quarter inch flax packing to each rod, and replace glands and followers. Screw down the followers only tight enough to prevent leaking.

1024

SAFETIES

(1) Under the car is a heavy hardwood Safety Plank, on each end of which is an iron adjustable jaw, inclosing the guide on the guide post. In this jaw is an iron wedge, withheld from contact with the guide in regular duty. Under the wedge is a rocker-arm or equalizing bar, with one of the lifting cables attached independently at each extremity. The four lifting cables, after



being thus attached, pass over a wrought-iron girdle at the top of the car. Each cable carries an equal strain, and the breaking of any one cable puts the load on the other cables, which throws the rocker out of the horizontal position, and forces the wedges on both sides instantly and immovably between the iron jaws of the safety plank and the sides of the guides, stopping the car. It may be raised to any position by the unbroken cables, though it cannot be lowered until a new cable is put on.

(2) Any cable will always stretch before it breaks, which will lower one end of the equalizing safety bar and force the wedges on both sides into position. No other safety device will give warning in advance.

(3) Our improved Automatic Governor, located on the overhead cross-beam at the top of the building, is operated by an endless cable passing over its driving wheel, with a weighted sheave at bottom of hatchway, and is connected to the gravity wedges under the car, so as to arrest its descent the moment excessive speed is attained from any cause.

See that the weighted sheave does not rest on the ground, as that will slacken or throw the cable off the sheave.

1025 DIRECTIONS FOR THE CARE AND USE OF OTIS
ELECTRIC ELEVATORS OPERATED BY
HAND ROPE

*By the Otis Elevator Company,
17 Battery Place, New York City*

Open the main line switch before you begin cleaning, oiling or adjusting any part of motor or regulator. Keep brake on while cleaning. If the brake is to be removed, have car at top of shaft and secure the drum before loosening the brake band.

1026 *Oiling*

The worm gear casing must be filled to the overflow valve with castor oil.

A small amount of castor oil must be fed every day to make sure that the reservoir is full.

Every second or third month the reservoir must be emptied and filled with fresh oil.

1027 *Oiling the Elevator*

The motor bearings must be examined frequently and kept full of best dynamo oil.

Drum bearings, sheaves and guides, must be inspected frequently and kept clean and well lubricated.

1028 *Motor and Regulator*

The motor commutator must be kept clean by rubbing it with a cloth slightly moist with oil. After cleaning,

remove all oil with a dry cloth. The commutator will wear best if it is kept perfectly clean.

The commutator brushes are set and must be kept in such position that there is no sparking to be observed under all changes of load.

The current reverser, breaking switch, magnet brush and contacts must be cleaned like the motor commutator, and in case the contacts become rough they must be smoothed with sandpaper. The magnet brush must drop freely to the top segment with operating device in position for full speed.

The carbon brushes on armature commutator can be reversed after one side is worn. Do not let these wear too low, for if you should allow the brass support to touch, the commutator would become rough at once, and would require turning up in a lathe.

1029

Operating the Elevator

See that operating device is in central position before closing main line switch.

When running the elevator, move the operating device gently; that is, avoid all sudden and violent movements.

To get full speed, move to the limit of motion without, however, straining the gear.

If the car will not start with an over-load, bring the operating device to stop position and reduce the load.

If the car should stop suddenly when going down, reverse your operating device just sufficient to give motor

power to turn slowly in order to take up any possible slack of ropes, get car to next landing, and examine ropes on drum to insure their being in their proper grooves.

If the stop was caused by safeties throwing in, have them adjusted.

If the car refuses to start under the usual load, look to the fuses and examine the bearings. A bearing running dry will get hot and a hot bearing will stop the elevator and necessitate repairs.

Before leaving the car to ascertain the cause of any trouble always bring operating device to stop position.

Adjust the brake to allow a prompt stop, not more.

The brake is too tight if car can be stopped without breaking the current in regulator box.

If the car by any derangement of operating device or switch cannot be stopped, let it make its full trip, as the automatic stop will take care of it at either end of its travel. *Never try to leave the car while it is running.*

In ordinary runs the operator should stop the car before the automatic stop is reached.

If the power should fail, stopping the car between the floors, lift the brake and move the car by turning the brake wheel by hand to the next landing to let the passengers out.

The operating cable must be kept moderately taut by means of the turnbuckles. A new rope will stretch considerably. When necessary it should be shortened until it has its permanent set.

The stuffing box on the worm shaft should be just tight enough to keep the oil from running out of the worm-chamber.

To make sure that car and machinery run easily, lift the brake and rotate worm shaft by pulling the brake wheel; the empty car should ascend without much exertion.

1030 *General Directions*

Lubricate all bearings.

Do not lubricate the commutator.

Make sure that operating device is in central or stop position before closing main line switch.

Keep brushes and rubbing surfaces in good condition.

Inspect all bearings and rubbing parts frequently.

1031 DIRECTIONS FOR THE CARE AND USE
 OF OTIS ELECTRIC ELEVATORS
 OPERATED BY SWITCH
 DEVICE

*By the Otis Elevator Company,
17 Battery Place, New York*

Open the main line switch before you begin cleaning, oiling or adjusting any part of motor or controller.

Keep brake on while cleaning.

If the brake is to be removed, have car at top of shaft and secure the drum before loosening the brake bands.

1032

Cleaning and Oiling

Keep all parts of the machine and magnet controller scrupulously clean.

Drum bearings, sheaves, and guides should be inspected frequently and kept well lubricated.

For guides, machine oil, Albany grease, or a mixture of the two, may be used. For bearings of motor and drum shaft, and for automatic stop motion gears, use best machine oil.

In the gear case, use special oil, obtained from the Otis Elevator Company, or a mixture of cylinder and castor oil, in proportion of 2 to 3. Always keep oil well above top of worm.

For vibrator sheaves use grease candles like those furnished with the grease cups. Keep boxes of overhead sheaves packed with Albany grease.

1033

Brake

Adjust brake bands so that they just clear coupling when released. Be sure that nuts and cotter pins are in place.

Adjust the brake spring to suit working load.

1034

Automatic Stop Motion Switch

Automatic stop motion switch should be adjusted to stop car level with top floor, with normal load, and level with bottom landing, with no load. This must be kept properly adjusted.

1035 *Commutator and Brushes*

Keep commutator clean and smooth.

Do not use sandpaper unless surface of commutator becomes very rough and pitted.

Do not let the carbon brushes wear too low, as brush holders must not touch commutator. Brushes, when properly set, will not spark, under normal conditions.

If sparking occurs continuously, commutator or brushes are probably rough and dirty.

If sparking occurs between two segments of commutator, an open circuit in the armature is indicated.

Be careful not to allow oil or any foreign substance to accumulate between the brush holder arms and insulating washers.

In cleaning commutator, use pad of cloth, but never waste.

1036 *Stuffing Boxes*

Stuffing box on worm shaft should be just tight enough to keep oil from running out of gear case. Be careful when tightening not to screw up bolt on one side more than that on the other.

1037 *Limit Switches*

Contacts of limit switches should be examined and cleaned frequently to prevent dirt or grit getting on them and breaking contact.

1038

Controller

Contact discs of magnets and contacts themselves must be kept free from pits or blisters; they should be frequently smoothed with emery cloth.

Set all carbon contacts the same height above discs, and one-eighth inch below metal contacts, so that circuits are broken between discs and carbons, instead of between discs and metal contacts.

Keep all connections tight, and see that springs under disc bear firmly against the latter. .

Plungers of magnets should be bright and smooth, and magnets should be tried frequently by hand, to make sure that they do not stick.

1039

Car Switch

The cover of car switch should be removed once a week, to see that the contacts are in good condition.

If necessary, rub a little clean machine oil on these contacts.

1040

Operation

To start the car, move car switch half-way down, in which position up or down magnet and potential switch will rise, and accelerating magnets automatically cut out armature resistance and series field, as the speed of motor increases.

Accelerating magnets should act consecutively, at equal intervals, and, under normal load, will all rise within three or four seconds, if properly adjusted.

After accelerating magnets have operated, move car switch all the way down, which will operate fast-speed magnet and bring car to full speed.

To stop, move car switch to slow-speed contact when car is at least three feet from landing, then allow level to fall back against the stop.

1041 *Never bring car switch to central position until car is at a standstill.*

Always keep car switch in central position when car is out of service.

If car fails to start from car switch, move knife switch on magnet controller down and try operation from push buttons on controller board.

If car runs from push buttons and not from car switch, trouble is either in car switch or cable between car and controller.

If car will not respond to either car switch or push buttons, look for open circuit at fuses, contacts under discs, slack cable switch, automatic stop motion switch, and limit switches.

If car refuses to lift normal load, but motor starts, examine controller to see if it operates properly, examine the bearings to see if any are dry or hot, and look at gears and thrust bearings.

If car should stop suddenly when descending, reverse car switch on slow speed and bring car back to nearest upper landing. Then examine machine and make sure that ropes are in proper grooves on drum. Inspect safety

clutches, and if they have operated, determine the cause and have them properly adjusted.

If the car should fail to stop when car switch is in stop position, open safety switch or let car travel to top or bottom of the shaft, as the case may be, when it will be stopped by the automatic devices. Then examine the controller and find the cause of the trouble.

Never attempt to leave the car while it is in motion.

Always stop car at top and bottom landing from the car switch, and do not allow it to run far enough to be stopped by the automatic device.

1042 DIRECTIONS FOR THE CARE AND OPERATION
OF
WARNER ELECTRIC ELEVATORS

*By the
Warner Elevator Manufacturing Company,
Park Row Building, New York*

An electric elevator, being as a rule a high-grade piece of machinery, needs some attention in order to secure the best service from it. Proper attention will prolong its life considerably, while neglect may necessitate extensive repairs. Therefore, care should be taken to keep the machine clean, oiled and in good condition generally. To accomplish this, it should be given daily attention.

Open the wall switch before attempting to clean, oil or adjust the machine; this will prevent accidents.

1043

Care of Controller

Look at the controller occasionally and see that the bearings and cams are kept oiled. *Wipe off all excess of oil*, as it will *impair the insulation* if allowed to come in contact with it.

Notice the contacts and see that they are kept bright. Use a piece of fine sandpaper to rub them up should they need it. By keeping these contacts smooth and their rubbing surfaces slightly lubricated by wiping with an oily cloth, their life will be much increased.

Blow or clean out any dust or dirt that may accumulate in the controller.

Keep the air admitted to the dash pot so adjusted that the rheostat arm will *descend in from five to seven seconds*.

1044

Care of Motor

Keep the commutator free from grease and dirt and wipe occasionally with a cloth slightly moistened with oil.

See that the bearings are kept well supplied with the best machine or dynamo oil. The oil should stand about half-way up in the glass oil gauge or so high that the self-oiling ring, within the box, dips well into it.

Drain off all oil through stop cock, wash out bearings with benzene and renew with fresh oil at least once a month.

Do not run bearings over and get oil upon the fields and armature of motor; the oil will ruin the insulation and lead to costly repairs.

Should the brushes not bear properly, place a strip of

fine sandpaper (with paper side toward commutator) under them, and then, putting a little pressure on the brushes, work the strip of sandpaper back and forth, letting it follow the shape of the commutator. In this way the brush will be ground to the shape of the commutator and have a good bearing. Sandpapering off the sharp corners and edges of the brushes will often obviate sparking. Blow away the carbon dust which has formed and wipe off commutator.

Keep all parts of motor free from dust and dirt.

1045 *Brake Adjustment*

A proper braking device with proper adjustment is the prime requisite for the smooth and successful operation of an electric elevator. Poor adjustment of the brake is the seat of many evils. Therefore, the condition of the brake should be investigated from time to time.

To adjust the brake: Open the wall switch, and by shifting the Operating Device through the various positions, see that the brake satisfies the following conditions:

On center the brake should be, of course, tight.

Now shift slowly until the controller switch snaps in, then the brake should be perfectly free.

Now shift again very slowly back toward center until the switch just snaps out. *At this point the brake should be starting to come on*, or should be but *lightly on*.

The degree of tightness of the brake can be determined

by turning or trying to turn the brake pulley by hand or by a monkey wrench gripped on the rim. The pulley will generally turn more freely one way than the other, according as the car or counterweight is the heavier, and when the brake is released it should turn very freely in the one direction, if everything is in good working order.

1046

Worm Gear

The worm gear runs in oil, and it is important that the right kind and quantity of oil is used. Warner's worm gear oil is prepared especially for the purpose, and is the best that can be used. A good substitute is heavy cylinder oil, or, better still, cylinder oil containing about one-quarter pound of flake graphite to the gallon. Sufficient should be used to cover the worm.

This oil should be strained and renewed at least once a month, and a little added to make up for leakage at least once a week.

Drain out all oil, wash out thoroughly, and clean the housing and gears with benzene or coal oil at least every six months.

Examine the worm and worm wheel occasionally through the hand holes in the housing, to see that they are well lubricated, and that no grit gets into the oil.

They should show no wear.

The stuffing box on the worm shaft should be only tight enough to keep the oil from leaking out of the worm chamber.

1047

Thrust Bearings

The end thrust bearing should be filled with thin machine oil and should be thoroughly cleaned and refilled once a month.

Should there be too much end play to the worm shaft, remove the cast-iron cap and examine the ball bearing.

If the large hard steel collars show wear they can be turned side for side and will give service for some time longer. When both sides of these collars are worn, the only way of taking up the end play is by putting in new collars.

The large clamp nut on the end of the shaft has a left-hand thread and should be drawn up snugly when cotter pin is put through. Should it not come tight in position for cotter pin, back up with paper washers.

1048 *Drum, Idlers, Overhead Work and Guides*

Keep the drum, idler and overhead journals oiled with good heavy oil. It is a good idea to put a piece of waste in each of the boxes to prevent the oil from running out too rapidly. This oiling should be done each and every day the elevator is used.

Oil all small parts with good machine oil.

The car and counterweights should, for passenger elevators, be greased at least once a week; for freight machines at least once a month. *Warner's Guide Grease* is made especially for the purpose, and keeps the guides with a

clean appearance. Good cylinder oil, applied with a brush, also makes a good lubricant when the running of the oil and the darkening of the guides are not objectionable.

The wire cables should have a coat of raw linseed oil about twice a year, and should be examined frequently to see that they are in good condition.

1049

Operation

Always be sure that the operating device is on center before throwing in the wall switch.

In running, shift the operating device to the full extent of its stroke. Otherwise the car travels slowly, and may waste considerable electrical energy; except with our type C and type I controllers.

Try to hit the floors at the first stop, not run past then back up, or stop too soon and have to stop and start again.

We mention this in order to show our customers how they can save in operating expense. It is a physical law that it takes more energy to start a machine into motion than it does to keep it in motion after it is once started, and from the fact that it is necessary to insert resistance into the circuit of the motor at starting, the loss is increased somewhat. Hence the object in avoiding these starts as much as possible by hitting the floors at the first stop; also the life of the controller contacts will be lengthened, for it is in turning off the current when the motor has barely started or is running very slowly, that the greatest

flashing is produced, while with normal and careful usage there is practically no sparking.

Should the car stop from any cause whatever, always and immediately shift the operating device to center.

Now if, upon shifting again, the elevator should fail to start in either direction, this indicates that the car or counterweight has met with some obstruction and that the slack cable device has operated; or that the power has been turned off; or that the fuse has blown out; or that there is a poor contact in the switch or connections. In any case, one should go and examine the engine.

If the slack cable device has been tripped: *First*: Be sure that the operating device (hand rope, pilot wheel or lever) is on center. *Second*: Throw in slack cable switch and hold it there. *Third*: Shift to start engine in direction to wind up the cable that has been slacked. *Fourth*: Stop just before the rope becomes taut, so that it can be readily placed properly in the chase of the drum. *Fifth*: Start again until the rope is brought into tension. *Sixth*: Examine and find what caused the cable to slack, and remove the cause.

Should the power fail, stopping the car between floors, open the wall switch, release the brake, and turn the worm shaft by pulling on the brake pulley, or with a wrench on the end of the armature shaft, thus running the car to a floor landing to let out passengers. (The cap on the outer motor bearing can be unscrewed, exposing the square end of the armature shaft.)

If the car, from any cause, cannot be stopped, let it make the full run, as the automatic stop will take care of it at either end of the travel.

Never try to leave the car while it is in motion.

Always pull out the wall switch upon leaving the elevator for the night, or any other time when it is to be left idle.

It is advisable to have a careful and responsible operator for the elevator, and not let everybody run it.

1050 ELEVATOR BUILDERS IN NEW YORK CITY

*Compiled by S. E. Hendricks & Company
of
76 Elm Street, New York, Publishers of
Hendricks Register of the United States
for
Buyers and Sellers*

New York-American Elevator Company, 113 Cedar Street.

Becker, W. F., 290 West Broadway.

Bradshaw Elevator Works, 15 Cortlandt Street.

Clay Elevator & Machine Company (Freight, etc.), 201 East 16th Street.

Clernand & Company, 206 Centre Street.

Collins & Tracy, 181 Greenwich Street.

Couch, Samuel & Sons, 214 Centre Street.

Darrin, D. H., & Company, 131 Liberty Street.

Dowdall, Chas. E., 152 West Broadway.

Elektron Manufacturing Company (Electric), 156 Fifth Avenue.

Elevator Supply & Repair Company (Signaling apparatus installed), 136 Liberty Street.

Empire Elevator Repair & Supply Company, 1931 B'dw'y.

Graham Brothers & Company, 662 Hudson Street.

Howard Iron Works (Hydraulic), 131 Liberty Street.

Kane, M. J., & Company, 136 Liberty Street.

Kier, John, 108 Liberty Street.

McAdams & Cartwright Elevator Company, 258 Eleventh Avenue.

MacLean Elevator Company, 66 Trinity Place.

Marine Engine & Machine Company (Electric and Hydraulic), 1123 Broadway.

Meagher, T. H., 103 Walker Street.

Moline Elevator Company, 378 West Broadway.

Morse, Williams & Company, 108 Liberty Street.

National Elevator & Construction Company, 52 University Place.

New York Elevator Supply & Repair Company, 152 Centre Street.

Otis Elevator Company (Hydraulic, etc.), 17 Battery Place.

Pearson, McGlynn & Company, 92 Centre Street.

Plunger Elevator Company, 156 Fifth Avenue.

Portland Company (Plunger), 1133 Broadway.

Reedy Elevator Company, 31 Tenth Avenue.

Salem Elevator & Machine Works, 21 Park Row.

Sedgwick Machine Works (Hand and Belt Power), 110 Liberty Street.

See, A. B., Manufacturing Company, 220 Broadway.

Sommerville, John, 146 West 28th Street.

Standard Plunger Elevator Company (Plunger), 1 Broadway.

Storm Manufacturing Company (Hand Power, etc.), 113 Chambers Street.

Tracy Brothers, 65 Dey Street.

Warner Elevator Manufacturing Company (Electric, Hydraulic, and Hand Power, Passenger and Freight), 15 Park Row.

Webb, A. P., 305 Pearl Street.

Welsh Machine Works, 276-77 West New York.

Winslow Elevator and Machine Company (Hydraulic, Electric, etc.), 149 Broadway.

1052 WIRE ROPE AND CABLE MAKERS IN NEW YORK CITY

American Steel & Wire Company, Battery Park Building, New York.

Broederick & Bascom Rope Company, 33 South Street.

Hazard Manufacturing Company, 50 Dey Street.

Leschen, A., & Sons Rope Company, 163 Washington Street.

Macomber & Wythe Rope Company, 131 Worth Street.

Macomber-Wythe-Moon Company, 131 Worth Street.

National Steel & Wire Company, 114 Liberty Street.

Roebing's, John A., Sons Company, 117 Liberty Street.

Trenton Iron Company, 17 Burling Slip.

Waterbury & Company, 69 South Street.

BOILERS

1053 DIRECTIONS FOR THE USE AND OPERATION OF HIGH-PRESSURE BOILERS

To remove scale, feed about ten gallons of a good boiler compound through the water column into the boiler after you have filled it with water to a point six inches above the top tubes. Allow this to remain in the boiler all summer when practicable, or as long as possible. Drain it off before firing the boiler.

Carry at least two gauges of water at all times. Never start firing until you have this amount in your boiler.

If at any time your gauge shows no water, take no chances; do not feed it with water. Open your fire-box and ash-pit and the back door connections immediately and bank your fire with ashes at once. When you locate and cure the trouble, feed water to the boiler very slowly until you get it properly supplied.

Do not burn wood or refuse in your fire-box; burn it in the ash-pit.

Blow off your boiler every Saturday to rid it of sediment. On low-pressure plants clean the tubes monthly. On high-pressure plants, daily if possible, and never less often than once a week.

Grate bars for small sizes of coal are best on high-pressure plants.

In low-pressure plants the use of coal of large sizes is economical.

Repair grate bars and fire-box thoroughly in June of every year.

Close-fitting fire doors and ash-pit doors save fuel.

You must keep your tubes clean; see that you have proper tools for cleaning them and that you have facilities for cleaning tubes quickly and easily. Work out some plan of your own if the location of your furnace or boiler makes it difficult to get at your tubes.

RULES FOR THE MANAGEMENT AND CARE OF HIGH-PRESSURE STEAM BOILERS

By the Hartford Steam Boiler Inspection and Insurance Company

1054 *Condition of Water:* The first duty of an engineer, when he enters his boiler-room in the morning, is to ascertain, by blowing out water column or trying gauge cocks, how many gauges of water there are in his boiler. *Never start or unbank the fires until this is done.* Accidents have occurred, and many boilers have been entirely ruined, from neglect of this precaution.

Low Water: In case of low water, immediately cover the fire with ashes, or, if no ashes are at hand, use *fresh coal* and close ash-pit doors, and leave fire doors open. If oil or gas is used as fuel, shut off the supply from burners. Don't turn on the feed under any circumstances, nor

tamper with or open the safety-valve. Let the steam outlets remain as they are.

In Case of Foaming: Close throttle, and keep closed long enough to show true level of water. If that level is sufficiently high, feeding and blowing will usually suffice to correct the evil. In case of violent foaming, caused by dirty water, or change from salt to fresh, or *vice versa*, in addition to the action above stated, check draft, and cover fires with fresh coal, or shut off the supply from burners where oil or gas is used for fuel.

Leaks: When leaks are discovered they should be repaired as soon as possible; if leaking occurs at longitudinal seams, notify the insurance inspector at once.

Blowing Off: Clean furnace and bridge wall of all coal and ashes. Allow brickwork to cool down for two hours at least before opening blow. A pressure exceeding 20 pounds should not be allowed when boilers are blown out, and where practical to run water out without pressure, the boilers should be cooled down thoroughly before emptying, which will render the washing out of scale and deposit easier.

Generally boilers should be blown down two gauges once or twice a day, and entirely emptied once a week, unless the condition of feed water renders more frequent emptying necessary. When surface blow cocks are used, they should be often opened for a few moments at a time.

Filling up the Boiler: After blowing down allow the

boiler to become cool before filling again. Cold water pumped into hot boilers is very injurious from sudden contraction.

Exterior of Boiler: Care should be taken that no water comes in contact with the exterior of the boiler, either from leaky joints or other causes. Particular care should be taken to keep sheets and parts of boilers exposed to the fire perfectly clean, also all tubes, flues and connections should be well swept. This is particularly necessary where wood or soft coal is used for fuel.

Removing Deposit and Sediment: To prevent danger from overheating, causing distortion or cracking of sheets, and to aid in the economical production of steam, the internal surfaces should be kept free from scale or deposit, and the boiler should be opened frequently for examination and cleaning. The condition of feed water determines the time that may elapse between cleanings.

Safety-Valves: Safety-valves should be tried daily, as they are liable to become fast in their seats, and useless for the purpose intended.

Safety-Valve and Pressure Gauge: Should the gauge at any time indicate the limit of pressure allowed by the insurance company, see that the safety-valves are blowing off. In case of difference notify the insurance inspector.

Gauge Cocks; Glass Gauge: Keep gauge cocks clear, and in constant use. Glass gauges should not be relied on altogether.

Blisters: When a blister or lamination appears there

must be no delay in having it carefully examined, and, if severe, notify the insurance inspector.

General Care of Boilers and Connections: Under all circumstances keep the gauges, cocks, etc., clean and in good order, and things generally in and about the engine- and boiler-room in a neat condition.

Getting up Steam: In preparing to get up steam after boilers have been open or out of service, great care should be exercised in making the man- and hand-hole joints. The boilers should be vented through the safety-valve or gauge cocks, and water run in until it shows at second gauge. After this is done, fuel may be placed upon the grate, dampers opened, and fires started. If chimney or stack is cold and does not draw properly, burn some oily waste or light kindlings at the base. Start fire in ample time, so that it will not be necessary to urge them unduly. When steam issues from the vent, close it and note pressure and behavior of steam gauge while raising steam. If oil or gas is the fuel used, it is very important that steam be raised slowly; that is, no faster than would be possible with coal as fuel. If this precaution is not observed, serious damage to the boiler is liable to result. Where a boiler is to be cut in with others already in operation, watch the one recently fired up until pressure is up to that of the other boilers to which it is to be connected; and, when that pressure is attained, open bleeder valves long enough to thoroughly drain all water from the steam pipes, and then open the stop valves very slowly and carefully.

Gas or Oil Fuel: When gas or oil is used as fuel, care should be used in adjusting the burners, so that the flame cannot impinge directly on the heating surface, and the checker-work, where used in such furnaces, should be arranged so that it will not concentrate the flame upon the boiler surfaces.

Suitable peep-holes should be provided for observing the fire surfaces during operation of the boiler.

Before lighting the fire, the greatest caution should be observed to see that the drafts are open for a sufficient length of time to remove the gas that may have accumulated in the setting. Never turn on the fuel supply when starting up, or after snapping out of burner, without first introducing a lighted torch or burning waste into the furnace. Disregard of these precautions is liable to result in a serious accident.

Inspectors will give special instructions in cases not covered by these rules. If the boiler shows distress or unusual behavior, notify the insurance company's agent at once.

RULES FOR JANITORS AND FIREMEN HAVING CHARGE OF LOW-PRESSURE STEAM HEATING BOILERS

*By the Hartford Steam Boiler Inspection and Insurance Company,
100 William Street, New York City*

1055 *Getting Ready to Start:* The attendant should see that all joints are properly packed, and that none leak

on filling the boiler with water. The gauge cocks, water gauge, and safety-valve should be carefully examined, to see that all are free and in good order. All valves in piping and radiators and air valves should be examined and seen to be in order, and that all necessary packing or repairs have been done.

Condition of Water: The first duty of an engineer when he enters his boiler-room in the morning is to ascertain how many gauges of water there are in his boilers. Never unbank or replenish the fires until this is done. Accidents have occurred and many boilers have been ruined from neglect of this precaution.

Raising Steam and Management of Valves: All steam and return pipes should be closed before fires are started. When steam has been raised to working pressure, the steam valves should be opened very slowly. After the boiler pressure is established in the pipes, the return valves can be opened, allowing the water of condensation to flow back to the boiler. Whenever necessary to shut off at the boiler or any section of heating system, the return or drip valves should be closed first and then the steam valves. In letting on the steam, the supply or steam valves should be first opened and then the return or drip valves. This caution is important.

Low Water: In case of low water, immediately cover the fires with ashes, or if no ashes are at hand, use fresh coal, and shut the ash-pit and open the fire doors. Do not turn on the feed under any circumstances or tamper

with or open the safety-valves. Let the steam outlets remain as they are.

Feeding: When necessary to take fresh water the boiler should be fed as slowly as possible to avoid unnecessary contractions and leakage at joints.

Gauge Cocks and Water Gauge: Keep gauge cocks clean and in constant use. Glass gauges should not be relied upon altogether.

Safety-Valves: Raise the safety-valves cautiously and frequently, as they are liable to become fast in their seats.

Safety-Valve, Automatic Regulator, and Steam-Gauge: Should the gauge at any time indicate the limit of pressure to which the regulator is adjusted without its controlling the draft, the regulator should be examined and disconnected from the damper or draft door. If the regulator works quickly and well, the trouble is in the damper or draft door, and it should at once be cleaned and made to work freely. Should the regulator fail to work, or work very slowly, the pipe connection to the boiler is choked and should be cleaned. See that pressure gauge, regulator, and safety-valve agree; in case of difference, notify the company's inspectors.

Clean Plates and Heating Surfaces: Particular attention should be taken to keep plates and parts of boilers exposed to the fire perfectly clean. Also, all tubes, flues, and connections should be well swept. This is particularly necessary in many types of small heating boilers with large

heating surfaces and small heat passages, as they soon foul if neglected. Strict attention to this rule is necessary for full economy and capacity of boilers.

Blowing Off: If necessary to blow down during the season, the fires should be hauled and furnaces and bridge wall cleaned at least two hours before blowing down. Allow the boiler to stand until cool before filling with cold water.

Laying up Boilers for the Season: Haul fires, clean furnaces, and run off the water while hot. Thoroughly clean all heating surfaces at once. Remove hand- and man-hole plates, dry out water if any remains, and leave the boiler thoroughly clean and dry. Drain all water from return drip pipes. All good systems are provided with drip cocks at lowest point in return pipes for this purpose. During the summer see that no water can drip or moisture collect in or around the boiler.

Piping, Radiators, and Settings: Mark all joints that have shown signs of leakage and need packing; also air cocks and valves and anything that may need repairs before using another season. If repairs are needed to boiler settings, see what they are and have them made while the boiler is idle.

Inspectors will give special instructions in cases not covered by these rules.

If the boiler shows distress or unusual behavior, notify the insurance company at once.

DIRECTIONS FOR THE CARE AND USE
OF THE

1055a IDEAL STEAM BOILERS

*Copyrighted by the American Radiator Company, of 104 to 108
West 42nd Street, New York*

GENERAL ADVICE

No set rules can be given for caring for every boiler alike — chimney flues are not alike — some have strong draft, some are average and some are weak. There is much more difference in the heat-making qualities of coal than is commonly known, and it is important that the right size coal for draft be used. These rules apply to most all fuels. A little trying of this way or that way of leaving the dampers (when regulators are not used) often discovers the better way. It is well to vary from the rules a little if any of them do not seem to bring about the best result.

With good, average chimney flue draft and the right kind of fuel, these rules will govern the large majority of cases.

In many cases a boiler with sluggish draft will burn more coal than a boiler with good draft. In the first case the fuel may be said to “rot”; lacking air supply, the gases pass off unburned. The “nagging” which a boiler has to take under these conditions increases the waste of fuel. A boiler under sharp, strong draft maintains a clear intense fire and burns the gases — getting the larger amount of heat from the coal.

1056

FIRING RULES

For firing Ideal boilers, etc., at the very least, these general rules should be remembered and applied:

Put but little coal on a low fire.

When adding coal to the boiler, open the smoke-pipe damper (inside the smoke-pipe), and close the cold-air check damper. This will make a draft through the feed doorway inward and prevent the escape of dust or gas into the cellar when the feed door is open to take fuel. Put these parts back into their regular places after feeding.

When it can be done, in feeding a large amount of coal (as for night), leave a part of the fire or flame exposed, so that the gases may be burned as they arise.

When regulator is not used, learn to use the dampers correctly and according to the force of the chimney draft. Learn to use cold-air check damper. Often, when closing the ash-pit, the draft damper does not check the fire enough; opening the cold-air check damper will check it about right. Increasing or lessening the pressure of a steam boiler must be done by changing the weight on the regulator bar.

Carry a deep fire or a high fire; let the live coals come up to the feed door, even in mild weather, when from four to six inches of ashes stand on the grate.

In severe weather give the heater the most careful attention the last thing at night.

Do not overshake or poke the fire in mild weather; once in a while shake enough to give place for a little more fuel.

Do not let ashes bank up under the grate in ash-pit. Our bars are very hardy, but it is possible to warp them with this carelessness. Taking up the ashes once a day is the best rule, even if but little has fallen into the pit.

Keep the boiler surfaces and flues clean; a crust of soot one-quarter inch in thickness causes the boiler to require half as much more fuel than when the surfaces are clean.

If convenient, have a water hose to spray the ashes when cleaning out the pit.

Attend the boiler from two to four times per day. In mild weather, running with a checked fire, morning and night is usually often enough. In severe weather, once in early morning, again at mid-day, again at five or six o'clock, and finally thorough attention at from nine to eleven o'clock in the evening.

If, through burning poor coal, the fire-pot gets full of ashes, or slate and clinkers massed together, the quickest way to get a good active fire is to dump the grate and then build a new fire—from the kindling up.

If a *hard clinker* lodges between the grate bars, do not force the shaking, but first dislodge the mass with a poker or slicing bar. Then the grate will operate without damage.

In *severe weather* keep the fire-pot full of coal, and run the heater by the dampers of regulator (if one is used). Thoroughly clean the grate twice a day. Let the top of the fire in front be level with the feed-door sill. Bank up the coal higher to the rear.

In *moderate weather* there should be from two to six inches of ashes between the live coal and the grate. As the weather grows colder keep the grate and the fire-pot a little cleaner—sometimes it helps to run the poker or slicing bar over it through the clinker door. With some fuels this is never necessary.

1057

NIGHT FIRING

This is a very important under-subject.

In very *cold weather*, when the house should be kept warm all night, clean the grate well at a late hour—the last thing. Clear the bottom of the fire-pot of all ashes and clinkers so that the grate is covered with clear burning, red-hot coals, then fill the pot full of fuel. If possible, leave some of the flame exposed to burn the gases. Leave the drafts on long enough to burn off some of the gas, then check the heater for the night. Thus there is plenty of coal to burn during the night and some on which to commence early in the morning. Some drafts do not make it necessary to leave the dampers on to burn off the gas after feeding.

With the ash-pit draft damper closed and the cold-air check damper open at night, but part of the coal is burned and there is much of it not burned in the morning. So, by reversing the dampers in the early morning the fire starts up quickly and often the house may be well warmed before any coal is put into the fire-pot.

Some boilers are run the other way—a very poor way.

If the grate is cleared off in very cold weather and some coal added at five or six o'clock in the afternoon, by eleven o'clock at night nearly one-half of the coal is burned and the grate is covered over with a mass of ashes and clinkers. If no more coal is added during the evening, by morning about all the coal is burned out. So, with little or no coal remaining, shaking the grate nearly puts the fire out, and then putting fresh coal on a low fire causes the water to chill and the next thing is a house, which was cold all night, growing colder.

Often in cold weather, with this poor way of night firing, it takes one or more hours of forced firing to warm the house in the morning, and all the coal saved the night before is more than used to get the house or building "heated up"—while the people who should be comfortable have to get up, bathe and take breakfast in chilly rooms.

At no time in the day is heat more wanted than about the time of getting up and starting the day. A fire well cared for late in the evening makes a warm house all night. And so it follows that it is much easier to add a little more heat in the morning. And surely less coal is burned, for the forcing of a fire part of the time often overheats and wastes coal.

In the morning of *moderate winter weather*, with the ash-pit draft damper open, before adding any coal allow the fire to brighten up if it seems to be low; then (for such

conditions) spread over a thin layer of fresh coal and set the drafts for a brisk fire. After the new fire is well started add as much coal as may be necessary to last until next firing. Do not shake much, if any—just enough to give space for more coal. Then by setting the regulator (if one is used), or by closing the ash-pit draft damper and opening the cold-air check damper a little, the boiler should keep up its work until the next firing time.

In *severe weather*, if the boiler has been attended to at night as directed in the section on "Night Firing," the drafts can be turned on and the boiler run for half an hour before adding coal. Or, if more convenient to give it immediate attention, the grate can be thoroughly shaken and enough coal added to last until mid-day. Often the cold-air check damper will need to be entirely closed and the ash-pit draft damper partly open if the heater is a water boiler. If a steam boiler, the regulator should then be set to maintain the number of pounds of pressure wanted and so left.

1059

OTHER DAY FIRING

In *severe weather* more coal should be added about noon; sometimes the draft may be left on for a few minutes and then checked. And in such weather it is often well to give the boiler further attention at five or six o'clock. In severest weather the boiler should not be attended more than four times a day; and generally not less than three times.

Often much coal is wasted by "nagging" the fire — poking, shaking and feeding it until it becomes "dyspeptic." A sure cure is a little common sense in regular feeding, etc.

1060

BOILER ECONOMY AND FUELS

In running many boilers for *moderate weather* better results follow if the grate is not shaken too much or too often. Sometimes in *moderate* weather a body of ashes on the grate checks the fire and there is enough heat without a useless burning of fuel. Many houses are overheated in *moderate* weather and too much coal burned by running the boiler as for zero weather.

So we repeat — *It is not wise to overshake or overfeed a boiler in moderate weather.* The fire should be in such shape that if a change comes at night there is a basis for a good fire to start on. When the grate is shaken but once during the twenty-four hours (during *moderate* weather), late at night is the best time.

When one stops to think that heating is needed during about seven months out of the year, and that *a greater portion of this time is usually moderate weather* when a very little heat is needed, it must be seen that the science of running the heater to save coal is to apply common sense rules of limiting the feeding and the attention in such periods. In *severe weather* we believe in giving the boiler a liberal quantity of fuel regularly and at the right time. The time to save coal is when there is no need for burning

it. This is where a great many people make errors in running the boiler — in forgetting to “let up” on the shaking and feeding in moderate weather.

With some drafts, and for boilers using hard coal or coke, good economical results often are secured by opening the feed door a little when it is desired to check the fire in moderate weather. This depends on the draft.

1061 OTHER RULES FOR STEAM BOILERS

To Fill Boiler : Open the feed cock when the heater is connected with city or town water supply; if not, fill through the funnel. Let the water run until the gauge glass shows about half full of water.

In the first filling, after the water has boiled, get up a pressure of at least ten pounds, draw the fire and blow off the boiler under pressure through draw-off cock to remove oil and sediment, after which refill with fresh water to the water line. This is best done usually by the steam-fitter.

The damper regulator will control the pressure of steam, closing the damper when the pressure is raised beyond the desired point and opening the damper when the pressure falls below that point. By removing the weight on the lever, different degrees of pressure can be kept up. The regulator should be allowed to control the drafts without interference.

Examine the water glass often to see that the *water line* is at the proper height. If lower than normal, open the

supply pipe until the water runs in and stands at the proper level. It is best, when no water stands in the glass, nor shows at the bottom of the try cock, to quickly dump the grate, and do not put water into the boiler again until it is cooled off.

If there are one or more valves shut off on the main or return pipes; before starting a fire see that one line of piping at least (main and return) is open to circulate the steam.

1062 *To Control Radiators*

When it is desired to shut off steam from any radiator (if the regular radiator valves are used) close the valve *tight*; and when it is turned on, see that the valve is *wide open*. A valve partly turned off will cause the radiator to fill with water. This rule applies only to one-pipe heating systems.

1063 *The Air Valves*

If little keyed air valves (sometimes called "pet cocks") are used, follow generally the same directions as outlined for hot water radiators, only, of course, in releasing the air from the radiator, open the valve with the key provided and close it just as soon as the steam, unmixed with air, comes through the nose of the valve.

If "automatic" air valves are used, they must be carefully adjusted by the steam-fitter and then left to operate without undue interference.

1064

End of the Season

At the close of the heating season fill the steam boiler with water to the safety-valve and let it thus stand through the summer.

Also thoroughly clean all the fire and flue surfaces of the boiler, and at the opening of the next season withdraw the water and refill with fresh water to the water line, starting the boiler as before.

It is advisable to have a competent steam-fitter blow off the boiler under pressure and thus give the inside a thorough cleaning when the boiler is first set up and ready for fire.

A low-pressure boiler, using good water, rarely needs blowing off after it is once cleaned at time of setting up.

1065 DIRECTIONS FOR THE USE AND CARE
OF THE
ROYAL SECTIONAL STEAM HEATER

By the Hart & Crouse Company, 235 Water Street, New York

Before starting a fire in the heater, see that the gauge glass is half full of water. Also, open the lower try cock to make sure that it operates as it should. Adjust the weight of the damper regulator to suit the pressure at which the apparatus is to be used, usually two to five pounds. Fill the condenser with a quart of water to prevent damaging the rubber diaphragm. The gauge glass should always be about half full of water when the apparatus is in operation. Should the water, by any means, get

below the gauge glass, the fire should be drawn, and the apparatus allowed to cool before fresh water is turned into the system. If the water is attended to at the same time as the fire, a great amount of trouble will be saved.

See that the smoke pipe and chimney flue are clean and that the draft is good.

Build the fire in the usual way. If anthracite coal is used, use stove size or smaller.

The fire-pot should be kept full of coal, and all ashes and clinkers should be shaken down and removed as often as the state of the fire requires it. A few slight motions of the upright shaker from front to rear are all that is necessary to clear the grate thoroughly. Be sure, however, to leave the shaker shank or socket in a vertical position; otherwise the grate bars will lie in a sidewise position and will be likely to warp. Ashes or cinders must not be allowed to remain in the ash-pit, but should be removed carefully, and at stated intervals, to prevent burning out the grate bars.

The fire is effectually controlled by the automatic damper regulator attached to the bevel dampers in ash-pit door and smoke back. Open the slide in the feed door to supply air for perfect combustion. The feed door should not be opened to regulate the temperature, as this can better be accomplished by the use of the dampers. The draft and check dampers must be regulated to suit the draft chimney, and no rule can be laid down about this matter, as no two chimneys draw alike. Each apparatus must be regulated as experience teaches and requirements demand.

The cleaning doors on the front of the heater above the feed door should be opened only to clean off whatever deposit may form on the flues. A wire flue brush is furnished with each heater, and to obtain the best results, this brush should be used once a week, when the heater is in use, or oftener, depending upon the quality of fuel used. At all other times the cleaning doors should be closed.

A little time devoted to the understanding and working of this apparatus will amply repay the trouble. The system is simple, and when once understood there is no form of heater which can be operated with so little trouble or attention.

DIRECTIONS FOR THE CARE AND USE
OF THE
ABENDROTH SECTIONAL HEATERS

1066a *By Abendroth Brothers, 109 Beekman Street,
New York*

To start fire, open slide damper in smoke pipe, and slide damper in ash-pit door; after fire is well ignited close the slide damper in ash-pit door. The slide damper in smoke pipe must be regulated to suit draft of chimney. No set rule can be given, as no two chimneys draw alike. Each apparatus must be regulated as experience teaches.

In steam heaters—before building fire see that you have enough water in boiler to show half-way up the gauge glass. The draft door and dampers are regulated automatically.

Ashes should be removed from ash-pit every day, otherwise there will be imperfect circulation of air, and grates will burn out. A slight motion of upright shaker, backward and forward, is all that is necessary to clean the grate thoroughly.

We recommend nut or stove coal, of the best quality, for all sizes of heaters.

1066 DIRECTIONS FOR THE USE OF THE
BOYNTON STEAM BOILER

By the Boynton Furnace Company, 207 Water Street, New York

Before starting a fire be sure there is *ample water in boiler*. The water line should appear about half-way between bottom and top of glass gauge. *Do not* rely entirely on the glass, but try the cocks which are on the water barrel, also be sure the valves on top and bottom of glass gauge are open.

Kindle a fire in the ordinary way, and see that the grate bars are entirely covered with a bright even fire.

Be careful and keep the ash-pit clean and free from ashes; that is important, as a set of bars can be destroyed in a short time if ashes are allowed to accumulate.

Try the safety-valve on top of boiler each day to guard against it being caught in any way.

Regulate the draft by means of the damper regulator. By adding weight you increase pressure, and *vice versa*.

Keep the flues clean — this saves fuel.

See that the radiators are free from air; this is accomplished by means of air valve which is on each radiator.

The valves on radiators *must* be either open or shut tight. If two valves are on radiators, *both* must be either open or closed.

Caution

Should the water fail to show in either glass gauge or try cocks, *immediately* cover the fire and check all drafts (use either ashes or coal to cover fire), and send for a competent steam-fitter. *Never attempt to put water in boiler unless you are sure the water is in glass or try cocks.*

1067 DIRECTIONS FOR THE USE OF THE GURNEY STEAM BOILERS

*By the Gurney Heater Manufacturing Company, 111 Fifth Avenue,
New York*

Fill the boiler with water until the level is between the first and second gauge cocks. Never let the water fall below the lower gauge cock. See that both valves on the gauge glass are wide open. Open the small cock at the bottom of gauge glass and note if the water runs freely without emptying the glass. If glass empties, it indicates that the water in the boiler is low, or that the gauge valves are closed. Examine the water gauge frequently to see that the boiler is supplied with water.

All supply and return valves on mains and radiators should always be left in the same condition, namely, either wide open or completely closed.

When letting steam into radiators, first open the supply and air valves, then the return valve; when shutting off steam, close the return valve first, then the supply.

Frequently lift the safety-valve to see that it opens easily.

Always keep a deep, clean fire. Ashes should be removed from the ash-pit daily, or there will be danger of burning out the grate.

The ordinary pressure carried on the boiler when the apparatus is in operation varies from one to five pounds. These pressures will be found ample to meet the requirements of cold or moderate weather. To increase the steam pressure move the ball weight farther out on the lever of the damper regulator, or if weights are used, put on extra ones. To reduce the pressure move the ball weight nearer the boiler, or take off one or more weights as occasion requires.

Keep the boiler free from soot by cleaning regularly with brush provided for that purpose; easy access to every part of the boiler is provided by clean-out doors.

When preparing the boiler for the night clear the grate of ashes, fill the fire-pot with coal, unhook chain from lower damper, and set the dampers so as to keep a good fire from eight to ten hours.

If, from carelessness or any other cause, the water should get out of the boiler, dump the fire and allow the boiler to cool off before refilling.

Should the apparatus be left without fire in cold weather,

the water should be drawn off to prevent damage from freezing.

The following are sizes of coal recommended with ordinary conditions of draft:

Doric Nos. 0, 1, 2—stove coal; Nos. 3, 4, 5—small egg coal. “400 series” Nos. 415 to 445 — stove coal; Nos. 455 to 485 — small egg coal. *Bright idea* Nos. 1000 to 1002 — small egg coal; Nos. 1104 to 1210—egg coal.

The boiler should have a separate flue with good draft, and the smoke pipe should, at the beginning of each season, be cleaned and put in good order.

If there is anything you do not understand, or any information you require, confer with us and we will advise you promptly. We are always interested in the success of our boilers, and shall esteem it a favor if you will consider our interest as in no way diminished by the fact of your having the boiler in use for some time. The axiom that a “merchant’s interest in his goods ceases when paid for” does not apply in our case.

1068 DIRECTIONS FOR THE USE OF THE MERCER STEAM BOILER

By the H. B. Smith Company, 133 Centre Street, New York

Water: The boiler is supplied with water by turning a stop cock in the water supply pipe usually connected to one of the lower drums. The combination column should be set so that the lower try cock will be one inch below the top of flues. If the column is set this way, shut off the

water when it shows in the gauge glass half-way or about one inch above the top of upper flues. The gauge cocks at top and bottom of glass are always opened (turned to the left). Should glass become broken close these gauge cocks (turn to the right) until glass can be replaced. Test height of the water line by operating upper and lower try cocks opposite the gauge glass. The upper try cock should indicate *steam*, the lower try cock *water*. If by accident the water should be withdrawn from the boiler, draw the fire and allow it to cool before refilling with cold water, as cold water coming in contact with the overheated surface probably would rupture the sections. In winter, when not in use, draw all water off to prevent freezing. The main pipes should be covered to insure best results. If cellar is very cold the exposed return pipes on cellar bottom, being filled with water, should be covered to prevent freezing. At the close of winter draw off stale water in boiler and fill with fresh water until it runs from pop safety-valve when open. When wanted for use in the fall draw the water down until glass gauge indicates the proper water line.

1069 *Draft Regulation*: The draft regulator is operated by a steam pressure of one-half to three pounds. When pressure increases above the point necessary to overbalance the weight on lever arm (one-half pound or more), it raises the lever, closes the draft door in front, and opens the check draft at rear. The draft door and check draft door are connected by chain to lever-arm, and should be so carefully adjusted that the slightest increase or decrease in pressure

will operate them. This is necessary for the economical consumption of the fuel. A straight-arm lever is used, extending the length of the boiler and connecting direct (without the use of pulleys) to draft door in front and check draft door at rear. The pop safety-valve is set and allows steam to escape at 10 pounds pressure.

1070 *Dampers* : The smoke pipe at rear has a damper not connected to the automatic regulator for use to graduate draft when unusually strong. In many cases it can be kept partly closed, but must be so adjusted that it will not affect the working of the regulator. There is a slide damper in front draft door which is not necessarily used if the automatic regulator works with a slight pressure, and properly controls the fire without causing waste of fuel. A little experimenting will determine the correct (minimum) amount of draft required for keeping a good bright fire and operating the regulator with the least possible pressure. The fire door must not be allowed to remain open.

1071 *Coal and Firing* : Hard Lehigh coal, stove size, usually gives best results. Small egg may be used with a top dressing of pea size; do not mix sizes before using. Pea size may be used entirely; but does not hold fire so well as when used as top dressing for a body of larger size coal. The fire is made deep to avoid the necessity of frequent replenishing. Do not feed fire frequently, using a little coal each time, as it forms a crust on top without enough "body" to make it effective. Keep a deep, even fire, having the top of fire even or slightly above the bot-

tom of fire door, and several inches higher at rear. After refiring, shake the grate with both the shaking attachments, shaking first one and then the other, until light shines from the fire into the ash-pit. *Remove ashes from ash-pit after shaking the grate.*

1072 *With bituminous coal* the fire requires attention oftener than with hard coal, though steam is quickly made and the apparatus works perfectly. When fire is low replenish with a good heavy body of coal. Maintain a body of fire of uniform thickness and use poker occasionally to break down the top crust; also use slice bar to loosen and remove clinkers; and cover with fresh coal any "dead places" (spots burned out) in the fire bed.

At night clean the fire thoroughly before banking it. Remove clinkers and cinders. Level the bed of coals over the entire grate and put on a little coal, allowing it to thoroughly ignite; then bank with a heavy body for the night. Remove ashes from ash-pit after cleaning the fire.

1073 *Clean Flues*: Flues should be thoroughly cleaned at least once each week where hard coal is used, and oftener with soft coal. To clean flues, open the front flue door and pass the brush through each flue until the brush strikes the rear section of boiler, then open the back draft door *and remove soot from the smoke bonnet*. With the scraper clean the flues at back end of fire-pot. *These instructions apply to boilers made without the sliding damper between upper and lower set of flues and which provides for a direct draft at rear.*

1074 *Sliding Flue Damper—Clean Flues:* One pattern of "Mercer" boiler has a sliding damper at rear which controls the draft space between the upper and lower set of flues, and makes a direct connection between fire-box and chimney. The damper has a handle extending outside of boiler, and may be opened (by pulling out) when fire is kindled or when the upper flues are cleaned, allowing soot to drop into fire-box instead of being removed through smoke bonnet door at rear. *Damper must be closed* at other times. *This damper is generally used with soft-coal fuel.*

1075 *Radiator Valves:* It is important that the radiator valves in the various rooms where heat is required should be opened full by turning to the left or tightly closed by turning to the right.

1076 *Air Valves:* If radiators are cold when steam is on, open the air valves until all air is expelled. If valves are automatic, adjustment should be made by turning the screw a little when valves are warm. Air valve should be closed only enough to stop the flow of steam when pressure is on.

1077 DIRECTIONS FOR THE USE OF THE
"THATCHER"
SECTIONAL STEAM BOILER

By the Thatcher Furnace Company, 240 Water Street, New York

Before starting a fire in heater open glass gauge valves and try cocks and fill boiler with water until gauge glass is one-half full, shut try cocks, and then turn off

water. The gauge glass should always be about half full of water when the apparatus is in operation. Attention given to this in the morning when taking care of fire will obviate any trouble. Should the water by any means get below the gauge glass, the fire should be drawn and the apparatus allowed to cool down before the water is turned on.

See that smoke pipe and chimney flue are clean and that the flue has a good draft.

Build fire in usual way, using a good quality of hard coal, "stove" size.

The fire-box should be kept full of coal to feed doors and all ashes and cinders should be shaken down and removed as often as the state of the fire requires it.

To shake grates throw lever forward and back, leaving square head turned up. This leaves grate in proper position.

Ashes and cinders must be removed from under grates at least once a day, and in severe weather *twice*, to prevent burning out of grates.

Clean flues at least once a week by running flue brush through them. *Be sure to keep your flues clean. This is important.*

The fire is automatically controlled by damper regulator attached to draft and check dampers. See that the damper regulating chains are adjusted properly. They should be so attached that when the draft damper in ash-pit door is open about two inches the check draft on smoke pipe is closed.

Try the safety-valve occasionally to see that it works properly.

The water should not be drawn off from the apparatus during the summer months, and when not in use should be completely filled with water. It is not necessary to renew the water in apparatus oftener than once a year. The water should be drawn off and the apparatus refilled with fresh water just before starting the fire in the fall. If the building is left unoccupied in cold weather see that all the water is drawn out of the system.

1078 DIRECTIONS FOR THE USE OF
"COMFORT" AND "ROSSMORE" STEAM BOILERS

*By the Thatcher Furnace Company, 110 Beekman Street
New York*

Before starting fire in boiler open gauge glass valves and try cocks and fill boiler with water until gauge glass shows two inches in glass; shut try cocks and then turn off water. The gauge glass should always show two inches of water when the apparatus is in operation. Attention given to this in the morning when taking care of fire will obviate any trouble. Should the water by any means get below the gauge glass, the fire should be drawn and the apparatus allowed to cool down before the water is turned on.

See that smoke pipe and chimney flue are clean and flue has a good draft.

Build fire in usual way, using a good quality of hard coal, "stove" size.

The fire-box should be kept full of coal to feed door and all ashes and cinders should be shaken down and removed as often as the state of the fire requires it.

To shake grate put shaker on and give one-third turn. The grate bars are in proper position when shaker handle is perpendicular. Do not shake too much.

Ashes and cinders must be removed at once after grate is shaken, to prevent burning out of grates.

The fire is automatically controlled by damper regulator attached to draft and check dampers. See that the damper regulating chains are properly adjusted. They should be so attached that when the draft damper in ash-pit door is closed the check draft in smoke pipe is closed.

Try the safety-valve occasionally to see that it works properly.

To clean boiler open clean-out door on front and clean-off top of boiler and open check damper and clean flue in dome. *Be sure to keep your boiler clean.*

The water should not be drawn off from the apparatus during the summer months, and when not in use it should be completely filled with water. It is not necessary to renew the water in an apparatus oftener than once a year. The water should be drawn off and the apparatus refilled with fresh water just before starting the fire in the fall. If the building is left unoccupied in cold weather see that all the water is drawn out of the system.

DIRECTIONS FOR THE USE AND CARE
OF THE
ABENDROTH SECTIONAL HOT WATER HEATERS

1079 *By Abendroth Brothers, 109 Beekman Street, New York*

In Water Heaters : Before building fire see that the expansion tank is full of water, after drawing out air at air valves.

To Start Fire : Open slide damper in smoke pipe, and slide damper in ash-pit door; after fire is well ignited close the slide damper in ash-pit door. The slide damper in smoke pipe must be regulated to suit draft of chimney. No set rule can be given, as no two chimneys draw alike. Each apparatus must be regulated as experience teaches.

Ashes should be removed from ash-pit every day, otherwise there will be imperfect circulation of air, and grates will burn out. A slight motion of upright shaker, backward and forward, is all that is necessary to clean the grate thoroughly.

We recommend nut and stove coal of the best quality for all sizes of heaters.

DIRECTIONS FOR THE CARE AND USE
OF THE
IDEAL WATER BOILERS

1080 *Copyrighted by the American Radiator Company, 104-108 West 42nd Street, New York*

1081 GENERAL ADVICE

No set rules can be given for caring for every boiler alike. Chimney flues are not alike; some have strong draft, some are average and some are weak. There is

much more difference in the heat-making qualities of coal than is commonly known, and it is important that the right size coal for draft be used. These rules apply to most all fuels. A little trying of this way or that way of leaving the dampers (when regulators are not used) often discovers the better way. It is well to vary from the rules a little if any of them do not seem to bring about the best result.

With good, average chimney flue draft and the right kind of fuel, these rules will govern the large majority of cases.

In many cases a boiler with sluggish draft will burn more coal than a boiler with good draft. In the first case the fuel may be said to "rot"; lacking air supply, the gases pass off unburned. The "nagging" which a boiler has to take under these conditions increases the waste of fuel. A boiler under sharp, strong draft maintains a clear intense fire and burns the gases—getting the larger amount of heat from the coal.

1082

FIRING RULES

For firing Ideal boilers, etc., at the very least these general rules should be remembered and applied:

Put but little coal on a low fire.

When adding coal to the boiler, open the smoke-pipe damper (inside the smoke pipe), and close the cold-air check damper. This will make a draft through the feed doorway inward and prevent the escape of dust or

gas into the cellar when the feed door is open to take fuel. Put these parts back to their regular places after feeding.

When it can be done, in feeding a large amount of coal (as for night), leave a part of the fire or flame exposed, so that gases may be burned as they arise.

When regulator is not used, learn to use the dampers correctly and according to the force of the chimney draft. Learn to use cold-air check damper. Often, when closing the ash-pit, draft damper does not check the fire enough; opening the cold-air check damper will check it about right. Increasing or lessening the pressure of a steam boiler must be done by changing the weight on the regulator bar.

Carry a deep fire or high fire; let the live coals come up to the feed doors, even in mild weather, when from four to six inches of ashes stand on the grate.

In severe weather give the heater the most careful attention the last thing at night.

Do not overshake or poke the fire in mild weather; once in a while, shake enough to give place for a little more fuel.

Do not let ashes bank up under the grate in ash-pit. Our bars are very hardy, but it is possible to warp them with this carelessness. Taking up the ashes once a day is the best rule, even if but little has fallen into the pit.

Keep the boiler surfaces and flues clean; a crust of soot one-quarter inch in thickness causes the boiler to re-

quire half as much more fuel than when the surfaces are clean.

If convenient, have a water hose to spray the ashes when cleaning out the pit.

Attend the boiler from two to four times per day. In mild weather, running with a checked fire morning and night is usually often enough. In severe weather, once in early morning, again at mid-day, again at five or six o'clock, and finally thorough attention at from nine to eleven o'clock in the evening.

If, through burning poor coal, the fire-pot gets full of ashes, or slate and clinkers massed together, the quickest way to get a good active fire is to dump the grate and then build a new fire — from the kindling up.

If a *hard clinker* lodges between the grate bars, do not force the shaking, but first dislodge the mass with a poker or slicing bar. Then the grate will operate without damage.

In *severe weather* keep the fire-pot full of coal, and run the heating by the dampers or regulator (if one is used). Thoroughly clean the grate twice a day. Let the top of the fire in front be level with the feed door sill. Bank the coal up higher to the rear.

In *moderate weather* there should be from two to six inches of ashes between the live coal and the grate. As the weather grows colder keep the grate and the fire-pot a little cleaner — sometimes it helps to run the poker or slicing bar over it through the clinker door. With some fuels this is never necessary.

1083.

NIGHT FIRING

This is a very important under-subject.

In *very cold weather*, when the house should be kept warm all night, clean the grate well at a late hour — the last thing. Clear the bottom of the fire-pot of all ashes and clinkers so that the grate is covered with clear burning, red-hot coals, then fill the pot full of fuel. If possible, leave some of the flame exposed to burn the gases. Leave the drafts on long enough to burn off some of the gas, then check the heater for the night. Thus there is plenty of coal to burn during the night and some on which to commence early in the morning. Some drafts do not make it necessary to leave the dampers on to burn off the gas after feeding.

With the ash-pit draft damper closed and the cold-air check damper open at night, but part of the coal is burned and there is much of it not burned in the morning. So, by reversing the dampers in the early morning, the fire starts up quickly and often the house may be well warmed before any coal is put into the fire-pot.

Some boilers are run the other way — a very poor way. If the grate is cleared off in very cold weather and some coal added at five or six o'clock in the afternoon, by eleven o'clock at night nearly one-half of the coal is burned and the grate is covered over with a mass of ashes and clinkers. If no more coal is added during the evening, by morning about all the coal is burned out. So, with little or no coal remaining, shaking the grate nearly puts the fire out, and

then putting fresh coal on a low fire causes the water to chill, and the next thing is a house, which was cold all night, growing colder.

Often in cold weather with this poor way of night firing, it takes one or more hours of forced firing to warm the house in the morning, and all the coal saved the night before is more than used to get the house or building "heated up"—while the people who should be comfortable have to get up, bathe and take breakfast in chilly rooms.

At no time in the day is heat more wanted than about the time of getting up and starting the day. A fire well cared for late in the evening makes a warm house all night. And so it follows that it is much easier to add a little more heat in the morning. And surely less coal is burned, for the forcing of a fire part of the time often overheats and wastes coal.

1084

FIRST DAY FIRING

In the morning of *moderate winter weather*, with the ash-pit draft damper open, before adding any coal, allow the fire to brighten up if it seems to be low; then (for such conditions) spread over a thin layer of fresh coal and set the drafts for a brisk fire. After the new fire is well started, add as much coal as may be necessary to last until next firing. Do not shake much, if any—just enough to give space for more coal. Then by setting the regulator (if one is used), or by closing the ash-pit damper draft

and opening the cold-air check damper a little, the boiler should keep up its work until the next firing time.

In *severe weather*, if the boiler has been attended to at night as directed in the section on "Night Firing," the drafts can be turned on and the boiler run for half an hour before adding coal. Or, if more convenient to give it immediate attention, the grate can be thoroughly shaken and enough coal added to last until mid-day. Often the cold-air check damper will need to be entirely closed and the ash-pit draft damper partly open if the heater is a water boiler. If a steam boiler, the regulator should then be set to maintain the number of pounds of pressure wanted and so left.

1085

OTHER DAY FIRING

In *severe weather* more coal should be added about noon; sometimes the draft may be left on for a few minutes and then checked. And in such weather it is often well to give the boiler further attention at five or six o'clock. In severest weather the boiler should not be attended more than four times a day; and generally not less than three times.

Often much coal is wasted by "nagging" the fire—poking, shaking and feeding it until it becomes "dyspeptic." A sure cure is a little common sense in regular feeding, etc.

1086

ECONOMY AND FUELS

In running many boilers for *moderate weather*, better results follow if the grate is not shaken too much or too

often. Sometimes in *moderate* weather a body of ashes on the grate checks the fire and there is enough heat without a useless burning of fuel. Many houses are overheated in *moderate* weather and too much coal burned by running the boiler as for zero weather.

So we repeat — *it is not wise to overshake or overfeed a boiler in moderate weather.* The fire should be in such shape that if a change comes at night there is a basis for a good fire to start on. When the grate is shaken but once during the twenty-four hours (during *moderate* weather), late at night is the best time.

When one stops to think that heating is needed during about seven months out of the year, and that *a greater portion of this time is usually moderate weather*, when a very little heat is needed, it must be seen that the science of running the heater to save coal is to apply common sense rules of limiting the feeding and the attention in such periods. In *severe weather* we believe in giving the boiler a liberal quantity of fuel regularly and at the right time. The time to save coal is when there is no need for burning it. This is where a great many people make errors in running the boiler—in forgetting to “let up” on the shaking and feeding in moderate weather.

With some drafts and for boilers using hard coal or coke, good economical results often are secured by opening the feed door a little when it is desired to check the fire in moderate weather. This depends on the draft.

OTHER RULES FOR WATER BOILERS

1087 *To Fill System* : Open the feed cock when the heater is connected with a city or town water supply; if not, fill by funnel at the expansion tank. Fill until the gauge glass on the expansion tank shows about half full of water. In filling the system see that all air cocks on the radiators are closed. Then, beginning with the lower floor, open the air cocks, on each radiator, one at a time, until each radiator is filled; then close the air cock and take the next radiators on upper floors until all are filled, after which let the water run until it shows in the gauge glass of the water tank. After the water is heated and in circulation, vent the radiators by opening the air valves as before. Then, again, allow the water to run into the system until it rises to the proper level in the expansion tank gauge glass.

Always keep the apparatus *full of water*, unless the building be vacant during the winter months, when the water should be drawn off to prevent freezing. *Never draw water off with fire in the heater.*

To draw off water, open the draw-off cock at the lowest point in the system, and then open air cocks on all radiators as fast as the water lowers — beginning with the highest radiator.

1088 *Air-vent Valves on Radiators*

In order to secure the full benefit of the heating surface of a hot water radiator, the inside of the section must be free of air. When a radiator is "air bound," it

means that parts of the sections are filled with air in pockets which remain until the air is allowed to pass off through the vent valve.

Air will gather from time to time at the highest points inside the radiators, especially in those placed in the upper stories of the building. These air accumulations inside cut down the working power of a radiator exactly in proportion as they rob the inside of the casting of proper contact with heated water. Air pockets not only reduce effective heating surface, but they also prevent the circulation of hot water.

Therefore, it is well once in a while to take the little key provided by the heating contractor and open the air valves on radiators to allow the air (if any) to escape. When a radiator does not work as well as usual, open the air valves until the water flows, which indicates that the air has been fully released. Then close the valve.

1089

Valves on Cellar Mains

If cut-off valves have been placed on the main and return pipes in the cellar, see that the valves on one line of main and return pipes (at least) are open when the boiler is under operation. Be sure that the system is open to circulate water through the supply and return pipes before building a fire in the boiler.

1090

End of the Season

At the close of the heating season clean all the fire and flue surfaces of the boiler. Let the water remain in

the system during the summer months. No bad results will follow if the system is not refilled more often than once in two or three years. But, generally, it is thought that best results are secured by emptying the system once a year (after fire is out) and refilling with fresh water.

It is a very good idea to take down the smoke pipe in the spring, thoroughly clean, and put it back in place. Leave all doors open on the boiler in the summer-time.

1091 DIRECTIONS FOR THE CARE AND USE
OF THE
ROYAL HOT WATER HEATER

By the Hart & Crouse Company, 235 Water Street, New York

In filling the apparatus with water, open the air valves on the different radiators to allow the air in the pipes to escape. Leave the air valves open until the water runs out of them. Then close them tightly.

Should any of the radiators not circulate, see first that the radiator valve is open. Open the air valve on radiator affected until the water runs out. Then close it. Also refill the expansion tank after drawing off from the valves.

Before starting a fire, see that the expansion tank contains water. As long as it can be seen in the gauge glass it is sufficient, but it is better to keep the tank half full of water, refilling it as often as necessary.

The directions given for building fire, shaking grate, removing ashes, controlling fire, cleaning flues, in the steam boiler, are equally applicable to the hot water heater.

The fire in a hot water heater should not be checked too much at night. Many run their heaters stronger at night than during the day, getting better results by doing so, to avoid the necessity of raising the temperature of the water in the morning, ensuring greater economy.

The water can be drawn off from the apparatus during the summer months. In any event, the system should be filled with fresh water just before starting the fire in the fall. It is not necessary to change the water oftener than once a year.

Both steam and hot water systems are simple to operate. A little time, however, is required to understand the workings of them. When once these points are learned and the local conditions understood, a few minutes' attention only each day is required to operate them in the coldest weather.

1092 DIRECTIONS FOR THE USE OF THE
"THATCHER" SECTIONAL HOT WATER BOILER

By the Thatcher Furnace Company, 240 Water Street, New York

Before starting a fire see that the apparatus is filled with water so that it shows about three inches in the gauge glass of the expansion tank. If you have an altitude gauge on the apparatus the red hand should be set to indicate the height of water in the tank, when at its proper level. Any change can then be noted by the movement of the black hand.

See that smoke pipe and chimney flue are clean and that the flue has a good draft.

Build fire in usual way, using a good quality of hard coal, "stove" size.

The fire-box should be kept full of coal to feed door, and all ashes and clinkers should be shaken down and removed as often as the state of the fire requires it. Do not shake too much.

To shake grates throw lever forward and back, leaving *shaker shank vertical*. This leaves grate in proper position.

Ashes and cinders must be removed from under grates at least twice a day, and in severe weather oftener, to prevent burning out of grates.

Clean flues at least once each week by running flue brush through them. Be sure and keep flues clean. This is important.

To control the fire use draft damper in ash-pit door and damper in smoke pipe. Use slide in feed door to supply air for perfect combustion. The feed door should not be opened to regulate the temperature; this can be better accomplished by use of the damper. To keep fire, the draft damper must be regulated to suit draft of chimney. No rule can be laid down in this matter, as no two chimneys draw alike, and each apparatus must be regulated as experiments and requirements call for.

The water should not be drawn off from the apparatus during the summer months and it is not necessary to renew the water in an apparatus oftener than once a year. The water should be drawn off and the apparatus refilled with fresh water just before starting the fire in the fall.

Look at supply of water in expansion tank about twice a week.

In filling the apparatus open the air valves on all radiators to allow the air in pipes to escape. Leave the air valves open until water runs out, then close them tightly. Always refill expansion tank after drawing off water at air valves.

If the building is left unoccupied in cold weather see that all the water is drawn out of the system; to do this it is necessary to open all the air valves, leaving them open until the system is refilled.

Should any of the radiators not get warm, first see that the radiator valve is open, then open the air valve until the water runs out, then close it tight.

1093 DIRECTIONS FOR THE USE OF THE "EMPIRE" HOT WATER HEATER

By the Thatcher Furnace Company, 110 Beekman Street, New York

Before starting a fire see that the apparatus is filled with water, so that it shows about three inches in the gauge glass of the expansion tank. If you have an altitude gauge on the apparatus, the red hand should be set to indicate the height of water in the tank, when at its proper level. Any change can be noted by the movement of the other hand.

See that smoke and chimney flue are clean and that the flue has a good draft.

Build fire in usual way, using a good quality of hard coal, "stove" size.

The fire-box should be kept full of coal to feed door, and

all ashes and clinkers should be shaken down and removed as often as the state of the fire requires it. Do not shake too much.

To shake grate put on shaker and give one-third turn. The grates are in proper position when shaker handle is perpendicular.

Ashes and cinders must be removed from under grates at least twice a day, and in severe weather oftener, to prevent burning out of grates.

To clean heater open clean-out door in front and clean off top of heater, and open check damper and clean flue in dome. Be sure to keep your heater clean.

To control the fire use draft damper in ash-pit and damper in smoke pipe. Use slide in feed door to supply air for perfect combustion. The feed door should not be opened to regulate the temperature; this can be better accomplished by use of the damper. To keep fire, the draft damper must be regulated to suit draft of chimney. No rule can be laid down in this matter, as no two chimneys draw alike, and each apparatus must be regulated as experience and requirements dictate.

The water should not be drawn off from the apparatus during the summer months, and it is not necessary to renew the water in an apparatus oftener than once a year. The water should be drawn off and the apparatus refilled with fresh water just before starting the fire in the fall.

Look at supply of water in expansion tank about twice a week.

In filling the apparatus, open the air valves on all radiators to allow the air in pipes to escape. Leave air valves open until water runs out, then close them tightly. Always refill expansion tank after drawing off water in air valve.

If the building is left unoccupied in cold weather see that all the water is drawn out of the system; to do this it is necessary to open all the air valves, leaving them open until the system is refilled.

Should any of the radiators not get warm, first see that the radiator valve is open, then open the air valve until the water runs out, then close it tight.

1094 DIRECTIONS FOR THE USE OF THE MERCER HOT WATER BOILER

By the H. B. Smith Company, 133 Centre Street, New York

Water : To fill the system with water, open the stop cock until water supply shows in glass gauge on the expansion tank; this is placed at any convenient point above the highest radiator or supply pipe in the system, where there is no danger of freezing.

The expansion tank has an overflow pipe to prevent overflowing. Fire must not be started until system is filled.

Examine tank weekly and open stop cock a few seconds to let in water to replace the small quantity evaporated. An altitude gauge, if connected to heater, will indicate height of water in tank.

Draw off the water in winter if the apparatus is not in use.

Air Cocks : Open the air cocks at the top of each radiator until water appears (when filling the system), commencing with first-floor radiators. Open the air cocks whenever the radiators fail to get hot all over with a good fire in the heater.

Radiator Valves : The radiator valves may be full open, or part way open, as desired.

If there is a liability of freezing, do not entirely close the radiator valves.

Dampers : The fire should be started the same as in any ordinary furnace or stove.

The fire should be controlled by the dampers, so that the temperature of the water may be increased or diminished in accordance with the heat required for varying outside temperatures.

The dampers are, *ash-pit draft damper*, *smoke bonnet check draft door*, and *smoke pipe damper*.

In extreme cold weather it may be necessary to fire with *draft damper open* much of the time, and the *check draft* closed.

If the draft is very strong, the check draft may often be kept partly or entirely open and the smoke pipe damper nearly closed. *Keep fire door closed.*

The dampers must be properly used; too little air causes imperfect combustion and consumes coal without producing heat.

At night shake fire thoroughly, put on a heavy body of

coal and allow it to ignite, then arrange dampers so the draft will keep it burning slowly until morning. In the morning, to start a quick circulation, close the smoke bonnet check draft; open wide the front draft door and the smoke pipe damper.

Coal and Firing : Hard Lehigh coal, "stove" size, usually gives best results, or small egg may be used with a top dressing of "pea" size; do not mix sizes before using. "Pea" size may be used entirely; but does not hold fire so well as when used as top dressing for a body of larger size coal. The fire is made deep to avoid the necessity of frequent replenishing. Do not feed fire frequently, using a little coal each time, as it forms a crust on the top without enough "body" to make it effective. Keep a *deep, even fire*, having the top of fire even with, or slightly above, the bottom of fire door and several inches higher at the rear. When refiring, shake the grate with both the shaking attachments, shaking first one and then the other, until light shines from the fire into the ash-pit. Remove ashes from the ash-pit after shaking the grate.

Clean Flues : To clean flues, open the front flue door, and pass the brush through each flue until the brush strikes the rear end of boiler, carefully pressing brush against the top and lower part and sides of flue, then open the back draft door and remove the soot from smoke bonnet. This should be done at least each week where hard coal is used, and oftener with soft coal.

FLUES

THINGS WORTH KNOWING ABOUT FLUES

By the Boynton Furnace Company, 207 Water Street, New York

1100 A range, a stove or heating apparatus has no more draft than a square box.

It is the chimney that creates the draft.

The taller the chimney the better the draft.

It should be higher than any other part of the building.

It should not be less than eight by eight inches inside, and smooth.

It will carry but one smoke pipe.

Every other flue or opening in this chimney must be closed.

The space below where the pipe enters should be cut off.

New flues are often left half filled with brick and mortar.

Old flues are often cracked outside and full of soot.

Such conditions obstruct the draft.

The pipe entering chimney must be the same size as the collar on the range.

The fire-box should not be filled above the top of linings.

FLUES

*Copyrighted by American Radiator Company,
104-108 West 42nd Street, New York*

1101 No boiler has what is called a "draft." It is the chimney which produces the draft, and the taller the chimney the stronger the draft.

The chimney should be as straight as possible, free from bends or offsets. This is violated frequently. Where solely for the purpose of lending attractiveness to the architectural design, the chimney is inclined to some special

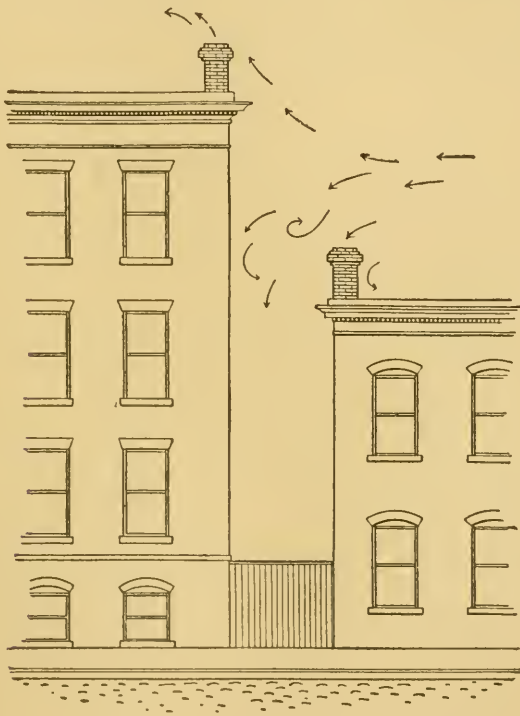


Fig. G

and abrupt angle, or else the size of the flue is inadvertently decreased by recessed or panel designs.

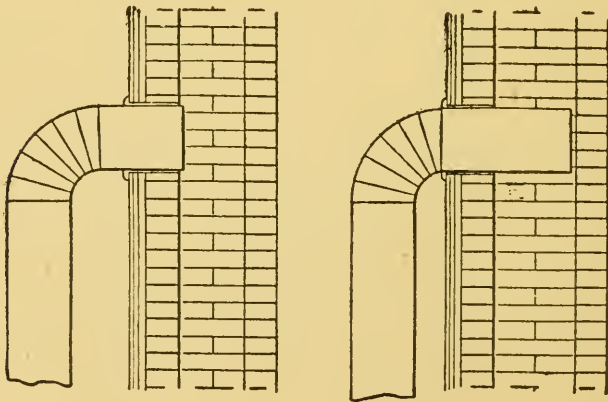
Round or oval is the best form, as smoke and gases pass up with less resistance in a round flue than in a square one.

The square flue is much more effective than the rectangu-

lar form, on account of the previously mentioned cause—friction. As, for example, a flue 12 x 12, having an area of 144 square inches, has a perimeter of only 48 inches, while a flue 8 x 18, having an area of 144 square inches, has a perimeter of 52 inches, giving 4 inches additional surface for friction. For requirements of an ordinary house heating apparatus, the flue should not be less than 8 x 12, or 96 square inches.

When we consider that every pound of coal burned in a cast-iron house-heating boiler requires for its perfect combustion 300 cubic feet of air, we will realize that volume also is as essential as draft.

The pipe entering the chimney must go through the



Figs. A and B

thickness of the brick, but must not go any farther, as such would injure the draft. (See Figures A and B.) Lead the pipe into the chimney in the most direct way. Use only

one elbow, if possible; every turn in the pipe injures the draft. Round elbows are much better than square elbows. Be quite sure that the opening around the pipe where it enters the chimney is closed up tight. If the chimney opening is too small to admit the smoke pipe of boiler, see to it that the chimney flue be made larger. Don't reduce the size of the pipe. If there is an opening into the flue below the point where the smoke pipe enters chimney, care should be taken to see that the door or cover is made tight. For guidance of those engaged in the installation of steam and hot water boilers, we illustrate hereinafter a few of the causes why boilers are condemned when the fault is solely in the chimney.

First: Complaint may be made that the boiler will not operate, although the smoke pipe is carefully fitted into a chimney that has a good draft, and which has been in use for many years. Investigation

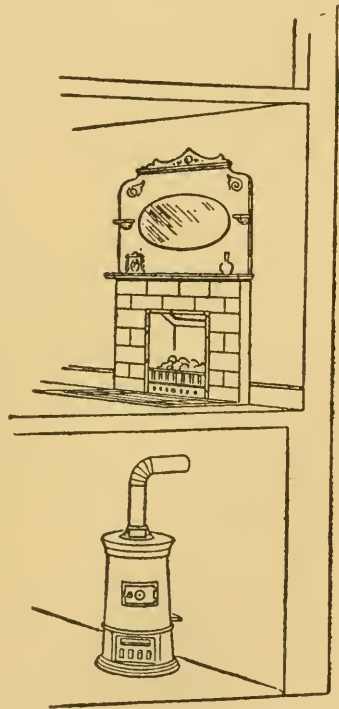


Fig. C

shows that it is attached to a chimney which has more than one opening. (See Figure C.) It is essential that all openings into the flue, no matter of what kind, excepting

the one to which the boiler is attached, should be securely closed. This applies with equal force to openings which are sometimes made in chimneys for ventilating.

Second : The chimney, into the flue of which the boiler

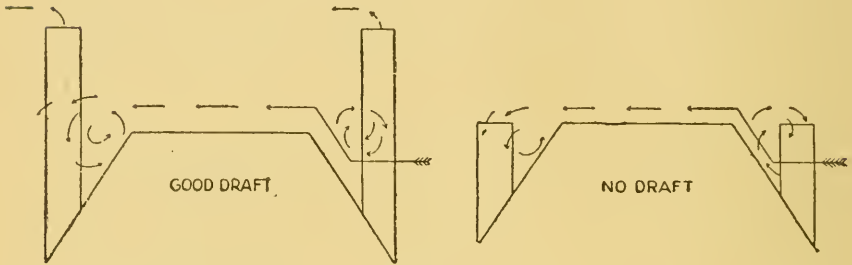


Fig. E

is connected, may be much lower than the main part of the house, or below the comb of the roof. The wind blowing over the comb of the house falls like water over a dam, sometimes almost perpendicularly, on the top of the chimney, thus beating down the smoke contained therein. (See Figures E, F and G.) The remedy is to build up the chim-

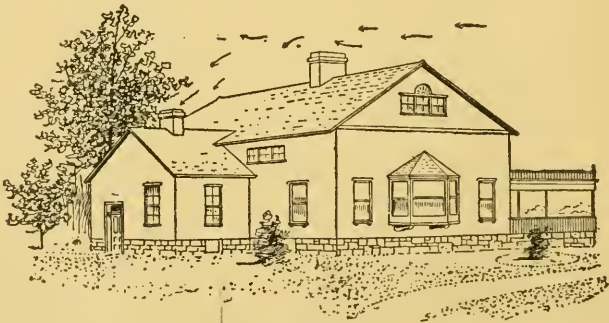


Fig. F

ney, or add a smoke stack of galvanized iron, so that its top shall be above the main building. In adding a smoke stack or patent cap to the top of the chimney, care must be taken to see that such addition does not decrease the area of the flue (see Figure H); for it will be conceded that the effectiveness of a flue is only as great as its smallest area.

Third : A tall tree, or an adjacent building higher than the one in which the boiler is to be installed, may be so near the chimney that the wind passing over it would blow down the chimney, as in preceding illustrations. (See Figures F and G.)

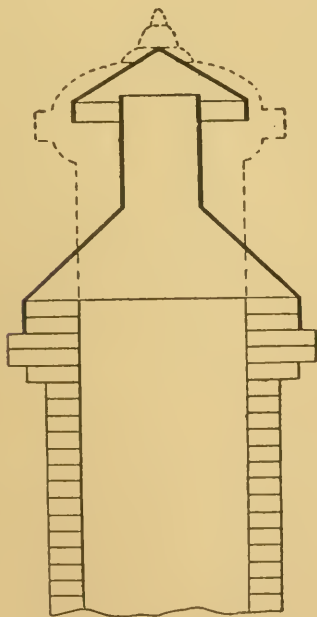


Fig. H

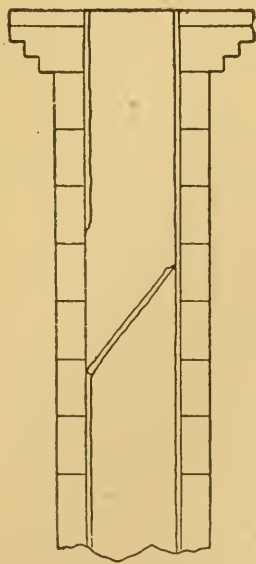


Fig. I

Fourth : A new or damp chimney will not have a perfect draft. A chimney will not draw perfectly until it is thoroughly dry, which sometimes requires several weeks.

Fifth : In building a chimney, mortar may be dropped from time to time and lodge out of sight, so as to partially close the chimney. (See Figure I.) A heavy weight may be let down by a rope and worked against the sides of the flue to force a clear opening.

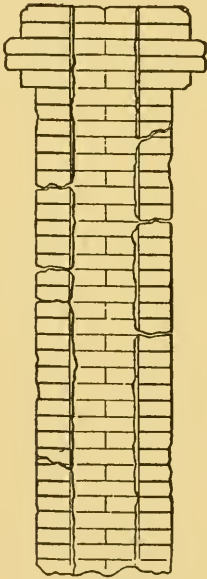


Fig. J

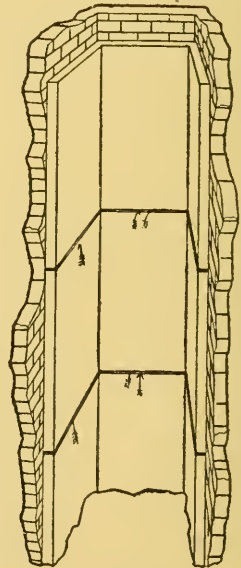


Fig. K

Sixth : In an old chimney the mortar may have crumbled between the bricks (see Figure J), so that it leaks air and spoils the draft. In a chimney lined with tile, it is important to see that the joints between the tiles are carefully "pointed" or filled in. (See Figure K.)

Seventh : It is not infrequent to find that a chimney which has a flue, say 8 x 12, or 96 square inches, is surmounted by an ornamental capstone through which are cut two openings, say 6 x 5, or 60 square inches. The owner is apparently all unmindful of the fact that unwittingly he has thereby reduced the area of the chimney flue 37½ per cent. It is as though a person were to attempt to breathe through a piece of paper perforated by several pin pricks.

Eighth : To summarize: All the air that passes through the chimney should first pass through the fire, unless used to check draft.

There are occasional instances where it is found that a draft is too strong. A condition of this kind causes an unnecessary, wasteful consumption of fuel, and the effect also is to produce an unsteady water line, to carry water in a steam boiler up into the system, and cause water-hammer or "pounding in the pipes." The difficulty is easily remedied by placing a damper, to check the draft, in the smoke pipe of the boiler.

ELECTRICAL MACHINERY

1105 INSTRUCTIONS FOR THE CARE AND OPERATION OF ELECTRICAL MACHINERY

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1106 GENERAL INFORMATION

There are two general classes of electrical apparatus, one known as direct-current and the other as alternating-current apparatus. A current of electricity that is considered as flowing continuously in one direction, from the positive (+) brush of a generator out through the circuit and back to the negative (—) brush, is called a direct-current. An alternating-current reverses its direction of flow a great many times a second; *e.g.*, a 60-cycle current would reverse its direction of flow in a circuit 120 times a second. A direct-current system requires only two wires to complete its circuit, whereas the alternating-current requires two wires if of the single-phase system, three wires if of the three-phase, and three or four wires if of the two-phase system.

1107 The *point of commutation* applies to a direct-

current machine and means the position of the brushes on the commutator at which the brushes will pass the current into or out of the armature without sparking. A *short circuit* means that the wires have become crossed or connected, so that the current is allowed to escape without doing useful work and usually results in a large rush of current, causing the protective devices, such as circuit-breakers or fuses, to open the circuit. A *ground* means that at least one of the wires has come in contact with the ground or some electrical conductor which is in connection with the ground, such as the iron frame of a machine, or a water pipe, etc.

1108 *Fuses* are strips of lead or a fusible alloy which are placed in a circuit at one or more points. If the current increases above the capacity of the fuse, it will melt and thereby open the circuit. The best fuses are inclosed in a protecting cartridge, which prevents molten metal being scattered around when it melts. Fuses are marked with the number of amperes they will safely carry. The automatic circuit-breaker is a device which may be used in place of a fuse; it automatically opens the circuit if the current exceeds that for which the instrument is set. It may be adjusted for different currents, and by simply closing is again ready for action.

1109 A *voltmeter* is employed to indicate the voltage or potential difference between the wires of a circuit. An *ammeter* is employed to indicate the current flowing in a circuit. An *indicating wattmeter* indicates, from instant

to instant, the actual power in a circuit, and a *recording wattmeter* records, usually in kilowatt hours, the energy being consumed in a circuit. The terminal of an instrument marked plus (+) must always be connected to the positive wire of a circuit.

1110 A *dynamo* or *generator* is an electrical machine designed to be driven by some prime mover, such as an engine or a water wheel, for the purpose of producing electricity, while a motor is an electrical machine designed to consume electric energy and drive some other mechanical device to which it is connected. There is but little difference in construction between a direct-current generator and motor, and ordinarily, either machine can be used in place of the other, in case of emergency; but in alternating-current machinery, the motors are usually quite different from the generators and cannot be interchanged.

1111 *Motors* may be used to drive any mechanical device, to which they may be connected directly on the same shaft or by gear or silent-chain or belt. Provided the bearings are so designed, the motor will operate equally well, whether supported on the floor, wall or ceiling.

1112 In direct-current machinery, the most delicate part, and that requiring the most attention, is the commutator. This must be kept clean and free from dust, and water dripping on it is sure to result in flashing, damage or shut-down. Aside from the instruments for indicating and recording the electrical energy, the starting box of a motor or the field rheostat of a generator, either of the

alternating- or direct-current type, are the only other parts that are likely to get out of order or appear mysterious to one who is accustomed to operating other ordinary machinery.

1113 A *field rheostat* consists of resistance wire connected at different points to the contacts on the front of the box, with which sliding contact is made, thus permitting the cutting in or out of a part of the resistance and causing the field current to become larger or smaller, depending on the amount of resistance it is required to pass through, and thereby controlling the voltage of a generator or the speed of a shunt or compound motor. The *starting box* of a direct-current motor is practically of the same construction as a field rheostat; on the starting position all the resistance is in circuit and the current is reduced to a small amount, so that the motor will start easily; as the motor gains speed, the resistance is gradually cut out until at the last point all is out and the motor is up to speed. Such a starting box is usually provided with an automatic device which will cut in the resistance, to be ready for starting again, in case current is temporarily cut off the circuit or the motor is shut down. A direct-current series motor is designed for special work, such as hoists and street cars, and is operated by means of a controller. A direct-current compound motor is a shunt motor with an additional winding on the field and its use is usually restricted to elevator work.

1114 The *starting-box* or auto-starter, employed with

the usual form of alternating-current motor, is either of a type similar to that used for direct-current motors or it is a type of transformer consisting of a coil wound on an iron core, and by its use the voltage of the circuit is cut down when the lever is on the starting-point, and as the handle is moved over, the voltage is gradually increased, bringing the motor up to full speed on the last notch. One form of alternating-current motor is provided with a handle on the end of the shaft, which is pushed in slowly, thus starting the motor and bringing it up to speed, in place of the more usual and separate starting box.

1115 As a rule, all machinery will operate better and give more satisfactory results if kept clean and in good order. This relates particularly to electrical apparatus, which should be kept free from dust, dirt, steam, and particularly water.

1116 *Cleanliness is essential to continuous operation.* The maxim to be always observed is: "*Keep the machines clean and the bearings well oiled.*"

1117 Loose pieces of iron of all descriptions, including nails, bolts and tools, should be kept away from electrical machinery. Oil should not be allowed to run out of the bearings down in the field windings or into the armature, as it is likely to rot the insulation and will certainly collect dirt that will result in damage. It is best not to open the field circuit of a machine, for the inductive discharge from the field winding is likely to strain the insulation and possibly destroy it. If the field circuit must be opened

with current on, open the circuit slowly, drawing out the arc which will form.

1118 Switches should all be open when a machine is not running. Automatic circuit breakers should be adjusted to open at a circuit somewhat greater than the rated capacity of the machine they protect.

1119 The name-plate on every machine gives the voltage, current and speed at which it very safely and continuously operates.

1120 Get a copy of the book of "Rules and Requirements" of the National Board of Fire Underwriters (it can be had for the asking) from the nearest office of the Underwriters' National Electrical Association and *study them and observe them.*

1121

SETTING UP MACHINES

In order to avoid future trouble for the operator and prolong the life of the apparatus, it is important, when selecting the location for electrical apparatus, that a site should be chosen which is free from dirt and dust, such as coal and ashes; also that it is dry, and removed from dripping pipes, or escaping steam, and at the same time fairly cool and well ventilated. Do not box a machine up if you expect it to work up to its capacity. Substantial foundations should be provided in order to prevent vibration. Concrete foundations are best, but for small machines a framework of timber is satisfactory. It is preferable to insulate the frame of the machine from the

ground, and the bolts used in holding the machine to its foundations should not come in contact with any other metal than that of the machine. The timber framework may well be covered with some insulating paint or compound, which will also serve to keep out moisture. See that the machine is solid on its foundations and properly lined up, so the belt will run in the middle of the pulleys or the gears engage properly. Put on the belt, made endless, with the machine so placed on its slide rails that the distance between pulley centers is a minimum. Whenever possible, a new machine should be run for several hours without load and with the field slightly charged to give it a chance to dry out. Give the bearing plenty of oil, *at first*, by filling the oil chambers somewhat above the mark shown on the oil gauge. Before starting the machine, see that all nuts and screws are tight. Turn the armature by hand to make sure that it runs freely and does not rub or bind at any point. See that the connections, particularly of the field coils and to the brushes, are secure and make good contact. Before starting be sure your wiring circuits are correct, according to manufacturer's diagram, and switches are open or starting box at the "off" position. Start the machine slowly and see that the oil rings in the bearings are in motion and distribute the oil properly. As soon as it is in running order, cut out the field rheostat and see that the generator excites itself and comes up to full voltage. If it does not, trace out the connections and see that they agree with the diagram; also test the polarity.

The trouble will probably be found in improper field connections. Watch carefully during the first few days of running for hot bearings or sparking, and make certain that everything is adjusted correctly. Read carefully and follow exactly the instructions given in the "Book of Instructions" which will be furnished by the manufacturer or may be had upon request with every new machine.

THE OPERATION OF A SINGLE GENERATOR

1122 *Starting*: First, see that the bearings are properly filled with oil and that the brushes of a direct-current generator or the exciter of an alternating-current generator bear on the commutator at the proper points, and adjust the spring tension so that the brushes bear properly on the commutator or collector rings.

Second, start slowly, see that the oil rings revolve freely, and then bring the machine up to speed.

Third, cut out the resistance of the field circuit by means of the field rheostat until the voltage has been raised to the proper value.

Fourth, close the circuit breaker, if one is provided, trip and close again; then close the switch which connects the generator with switchboard or load.

Fifth, occasionally feel all bearings, joints and contacts. If any part is found to be unusually warm, it indicates a defect which should be immediately remedied.

Stopping: First, throw out the circuit breaker, if there is one, then open the switch.

Second, throw in all resistance with the field rheostat.

Third, stop the engine or driving machine; thoroughly wipe off all oil and dirt from the generator and put in order for the next start.

1123

GENERATORS IN PARALLEL

Compound wound direct-current generators may be operated in parallel to supply energy to a given circuit. In order to have each one do work proportionately to its capacity, they should be connected together in three places, at the regular terminals of the machines, and at the beginning of the series field windings. The connection from the beginning of the series winding is called the equalizing wire, and is used only to connect together the beginning of the series windings of the several machines, and it should have a cross-section as large as the main lead of the largest machine.

If the generators are of the same size and make, the only point requiring special attention is that the wires which run from the switchboard to the terminals of the series coils must have equal resistance. If the generators differ in design or size, the matter becomes more complicated; in this case, the difference of potential or drop in voltage between that end of the series coil which is connected directly to one of the brushes and the bus-bar, to which the other end of the same series coil is connected, should be exactly the same for every generator when each is carrying its equal share of the load. To make this drop the same

for each generator, it will be necessary to put resistance in circuit with the series coils of the machines whose drop is least. This matter of connecting generators for multiple operation is somewhat complicated and had best not be undertaken except by competent engineers. When the connections are once installed, however, the operation of the machines is comparatively simple.

When a generator is to be run in parallel with the other generators and the polarity is found to be opposite to that desired, raise the brushes and excite the fields by closing the main switch from the bus-bars.

When putting direct-current machines in parallel, it is only necessary to be sure that the connections are so arranged that the positive and negative brushes of the one machine will be connected respectively to the positive and negative brushes of the other machine or machines, and that the voltages of several machines are the same, before they are thrown together.

Alternating-current generators can also be operated in parallel without trouble, if they are designed for the same number of phases, cycles and voltage, particularly if the machines are of the same manufacture. Care must not only be taken to connect the same phases of the several machines together, but each time the machines are thrown on the same circuit it is necessary to synchronize them, which is done by means of lamps or a special indicating instrument called a synchronizer. As the synchronizing of alternators is somewhat complicated, it had best not be

attempted by any one not accustomed to such work, and further explanation of the matter is, therefore, purposely omitted.

1124 OPERATION OF SHUNT AND COMPOUND
WOUND DIRECT-CURRENT MOTORS
AND CONSTANT SPEED
ALTERNATING-CURRENT MOTORS

Starting : First, see that the bearings contain sufficient oil and that the brushes of direct-current motors bear on the commutator at the proper point.

Second, if it is a direct-current machine with a field rheostat, see that the resistance is all cut *out*; always start a motor with its field resistance *out*.

Third, if a circuit breaker is used, close it and then close the main switch.

Great care should be taken not to open the field circuit of a direct-current motor while it is running, as so doing will immediately increase speed to a dangerous degree and cause serious damage to the motor. The field circuit should not be opened suddenly with current on it, even if the motor is not running, as there is danger of breaking down the insulation of the field winding. When absolutely necessary to break the field circuit, it should be done slowly, allowing the arc formed to die out gradually.

Fourth, rotate the handle of the starting box of auto-starter slowly as far as it will go; hold it in this position until its magnet (if it is of the automatic type) becomes

sufficiently strong to hold the lever. If it is a direct-current motor and slightly below speed, cut resistance slowly into the field circuit by using the field rheostat, until the desired speed is attained. The speed of an alternating-current motor cannot be so changed. If a motor is to operate at a variable speed, it must be specially designed and a special controller must be used.

Care should be taken in starting the motor that the handle of the starting box or auto-starter is not rotated too rapidly. Small motors should be allowed 10–20 seconds in getting up to speed and large ones 30–50 seconds. Do not leave the starting box or auto-starter handle on the starting notches too long or the boxes will burn out, as the resistances are designed for starting, not for running. It is desirable that motors should be started up slowly, as by so doing the current drawn from the line will be kept down nearer to full-load current. If a direct-current motor is started more rapidly than it is indicated above, flashing at the brushes may occur. Do not be alarmed if an alternating-current motor takes 3–4 times its full-load current while starting, as that is its normal condition.

Fifth, see that the oil rings are revolving freely, occasionally feel all bearings, joints and contacts; if any part is found to be unduly warm, a defect is indicated which should be remedied immediately,

1125 *Stopping*: First, with a direct-current motor, open the circuit breaker or the switch. This will automatically cut in the resistance of the auto-starting box.

With an alternating-current motor, open the switch first and then the auto-starter.

Never attempt to stop a direct-current motor by forcibly pulling open the starting box. Disregard of this instruction may cause burning out of the field coils.

Second, clean the motor and make ready for the next start.

1126 *Rotation*: In case the armature of a direct-current shunt wound motor rotates in the direction opposite to that desired, when the current is thrown on, shut down and reverse the armature connections at the brushes, that is, disconnect both leads at the brushes and connect each lead to a brush of a polarity the opposite of that to which the lead was previously connected. With single-phase motors reverse the brush connections as above. With two-phase motors reverse the two wires of one phase supplying current to the motor. With three-phase motors reverse two of the three wires supplying current to the motors. All modern motors will run equally well in either direction.

CARE OF MACHINERY

1127 *General*: If a motor does not start quickly, if the speed is excessive, or if there is excessive sparking, stop the motor immediately and look for the trouble. When a circuit breaker has opened or a fuse has blown, first open the switch in that circuit, then close the breaker, trip it and close again, or replace the fuse, then close the

switch and, if the machine is a motor, start in the usual way.

If the machine is a generator and the breaker again opens immediately upon closing the switch, or if the fuse is again blown, there is something wrong on the line, either a short circuit or heavy overload, which must be located and corrected. If the machine is a motor and again opens the breaker or blows the fuse, the motor is either overloaded, or there is probably a short circuit in the motor or its leads. If a short circuit occurs at or near a generator, or if an arc should form and hold at or near a switch or fuse, quickly reduce the voltage by throwing all resistance in with the field rheostat, and if the arc still holds on, shut down. If necessary to remove a brush while the machine is running, do so very carefully, first making certain that other brushes of the same polarity are making contact with the commutator, otherwise the removal of the brush will open the circuit and cause the machine to flash over.

If a bearing becomes heated, first feed heavy lubricant copiously; then slacken the belt. If relief is not afforded, shut down the machine, keeping, if possible, the armature revolving slowly until the bearing is cool, in order to prevent "freezing" or sticking.

1128 *Sparking*: Sparking at the brushes may be due to one of the following causes:

(a) The brushes may not be set exactly at the point of commutation. A position can always be found where

there is no appreciable sparking, and at this point the brushes should be set and secured.

(b) The brushes may not be fitted to the circumference of the commutator.

(c) The brushes may be wedged in the holders.

(d) The brushes may not bear on the commutator with sufficient pressure.

(e) The brushes may be burnt on the ends.

(f) The commutator may be rough.

(g) A commutator bar may be loose or may project beyond the others.

(h) The commutator may be dirty, oily or worn out.

(i) The machine may be overloaded.

These are the more common causes, but sparking may be due to an open circuit or loose connection in the armature. This trouble is indicated by a bright spark which appears to pass completely around the commutator, and may be recognized by the scarring of the commutator at the point of open circuit.

The commutator should run smoothly and true, with a dark, glossy surface.

1129 *Excitation*: When starting up, a motor may fail to have its field magnets excited or a generator may fail to excite itself. This may occur even when the motor or generator was all right when shut down the day before. It will generally be found that this trouble is caused by a loose connection or break in the field circuit, by poor contact at the brushes due to a dirty commutator, or it may

be in the starting box or field rheostat. Examine all connections; look for a broken or burnt-out resistance coil in the rheostat. An open circuit in the field winding may be traced with the aid of a magnetic bell, but this is not an infallible test, as some magnetos will not ring through a circuit with so high a resistance, even though it be intact. If no open circuit is found in the starting box or in the field winding, the trouble is probably in the armature. But if it be found that nothing is wrong with the connections or the winding, it may be necessary in the case of a generator to excite its fields from another generator or some other outside source, as a battery.

These remarks apply to machines which have been operating successfully and then refuse to generate. If a new machine refuses to excite and the connections seem all right, reverse the connections, connect the wire which leads from the positive brush to the negative brush and the wire which leads from the negative brush to the positive brush. If this change of connections does no good, change back and locate the fault as previously advised.

1130 *Grounds*: Grounds may occur on the feeders or supply circuit or on the machine itself. In order to determine in what part of a generating system the ground is located, proceed as follows:

For a 125-volt or 250-volt generator connect one terminal of a 110-volt or two 110-volt incandescent lamps in series to a good ground, and connect the other terminal first to the positive and then to the negative brush. If the

lamps light up, there is a ground on the feeders. By repeating this process and attaching the terminal to the frame of the machine instead of to the ground, grounding of the armature or field coils may be detected. A ground on the machine is rather unusual.

1131 *Repairs* : If a defect in insulation appears on the armature or on the outside of the field coil, it can often be repaired by raising the injured wire and applying fresh insulation. In the majority of cases, however, repairs require skilled labor and should not be attempted by an unskilled person.

A simple method of making temporary repairs in an armature in case of a short circuit or open circuit of one of the coils is to cut out that coil by means of cutting the leads which connect the coil with the commutator bar and then short circuiting the bar thus cut out with the following bar. By this means an armature may be kept in commission until there is a convenient opportunity for replacing the damaged coil.

1132 *Belts* : The belts must be tight enough to run without slipping, but the tension should not be too great or the bearings will heat. A belt should be only just tight enough to drive the load without slipping. Belts should be run *with*, not *against*, the lapping. Joints should be dressed smooth so that there will be no jarring of the machine as they pass over the pulley, and only belts made endless should be used. A wave motion or flopping is usually caused by a slip between certain portions of the

belt and pulleys, resulting from grease spots or other causes. This fault may sometimes be corrected by increasing the tension, but a better remedy is to clean the belt. A lateral movement of the belt on the pulley is usually caused by unequal stretching of the edges of the belt. If the shafts are parallel, but the pulleys not directly opposite, the belt will tend to run more to one side or the other side of the large pulley. If the pulleys are opposite and the shafts not parallel, the belt will run to the side of the small pulley. Belts must be kept dry. Where belt dressing is used it should be applied sparingly.

1133 *Bearings* : All modern machines have self-oiling bearings, which should be filled to such a height that the rings supply sufficient oil to the shaft to keep it properly lubricated. If the bearings are too full, oil will be thrown out along the shaft. A warm bearing is usually due to one of the following causes:

- (a) Excessive belt tension.
- (b) Failure of rings to revolve with shaft.
- (c) Rough bearing surfaces.
- (d) Bent shaft.
- (e) Oil is not being properly supplied to the shaft.
- (f) Use of a poor-grade oil.
- (g) End thrust due to improper leveling.

New oil should occasionally be added to the bearings to raise the level until the rings flush the shaft freely, care being taken not to overflow the bearings. From time to time, or whenever the bearings show signs of heating, the

plug at the bottom of the bearings should be removed and the oil drawn off and replaced by new.

Use only the best quality of oil. Cheap oil will not be found to be economical in the long run. New oil should be run through a strainer if it appears to contain any foreign substance.

If it is desired to use oil a second time, it should first be filtered, and, if warm, allowed to cool.

1134 *Armature* : Never support the weight of the armature by the commutator nor allow the commutator to rest on any blocking, nor pass a rope around it for the purpose of lifting the armature. The commutator should not be subjected to any strain whatever. When handling the armature, always support it by a rope "sling" about the shaft or core.

Be careful not to mar or scratch the shaft, as roughness may cause it to cut and heat the bearings while running. In placing the armature in the frame, care should be exercised not to scratch the bearings or bend or break the oil rings. The rings may be held up with a wire hook while the armature is being put in the bearings.

In small machines it is usually possible to remove the armature simply by taking off the pulley, removing the key and slipping off the pulley-end bearing. The armature can then be withdrawn, endways, without disturbing the field. It should be handled carefully to avoid injury. In larger machines it is first necessary to disconnect the field coils and remove the bolts that hold the halves of the field

yoke together. Then the upper half of the field may be removed and the armature lifted out.

The armatures of larger machines are frequently built on spiders, and it is therefore possible to move the shaft without disturbing the commutator or windings. The armature should be placed in a press and blocks placed in position bearing on the hub of the spider at the rear end of the armature. Pressure should then be applied to the commutator end, care being taken that the armature is properly lined up in the press to prevent slipping and consequent damage to the spider, commutator or windings.

1135 *The Commutator* : A commutator is the important part of a direct-current machine and requires careful and intelligent attention. If at any time a commutator begins to flash or spark, it should be given immediate attention, as any delay will only aggravate the trouble and produce others, such as the burning of insulation and melting of solder. The segments of a commutator, especially in a new machine, may tend to become loose, and it will be necessary to then tighten up the bolts passing through the cast-iron rings at the ends of the commutator.

Flat spots sometimes occur on commutators; these are usually caused by excessive wear, too much end play, bad belt splice, or a flash produced by short-circuit on the line. Commutators should be wiped off occasionally with a piece of clean canvas or cloth (never use waste), lightly covered with vaseline or some other lubricant applied sparingly. If slightly cut or roughened, it may be neces-

sary to use No. 0 or No. 00 sandpaper (never use emery cloth) applied midway between the brushes. A better method is to raise the brushes and use a block of wood hollowed out to fit the surface of the commutator in which the sandpaper can be held and the whole moved back and forth laterally over the surface. If the commutator becomes quite rough and the mica insulation projects above the bars, a piece of ordinary sand-stone, having its surface ground to the approximate curvature of the commutator, may be held firmly against the surface of the commutator while the armature revolves slowly, thus grinding down the high spots. If the unevenness is quite serious, it may be necessary to turn off the commutator in a lathe; but lathe work on commutators should not be attempted by one unaccustomed to turning copper, as the work is very special and needs an experienced man, who should take off only the lightest cuts possible. It is necessary to remove all traces of a lathe tool by the use of fine sandpaper, the grit from which should be carefully wiped off with a cloth.

After long usage and much wear, the commutator will sometimes run hot when carrying only the normal load of the machine; this usually indicates that it has been worn down as far as is safe, and the commutator should be replaced by a new one.

1136 *Collecting Rings*: The collecting rings of an alternator, while not nearly as delicate or requiring as much attention as a commutator, should nevertheless be kept true and properly lubricated, the same as a commutator.

11 7 *Brushes* : Modern machines, except induction motors which require no brushes, usually employ brushes made of carbon. Direct-current generators usually have their brushes set a little in advance, "forward lead," and motors which are not reversed, a little back, "backward lead," of the neutral point on the commutator. The proper position for brushes is that at which the machine will operate with least sparking. This position is usually indicated by marks on the frame and brush-holder yoke, and in good machines no change in the position of the brushes is necessary from no load to full load. On some machines a slight shifting of the brushes is required when the direction of rotation is reversed, such machines having two marked positions for the yoke. The ends of all brushes should be fitted to the commutator so that they make contact over their whole surface; this should be done by putting each brush in its holder and grinding it with a piece of sandpaper placed between the brush and the commutator (keeping the paper pressed down close against the commutator as it is pulled back and forth), until the brush fits the curvature of the commutator surface. If the brushes are copper-plated, their edges should be slightly beveled so that the copper does not come in contact with the commutator. Be sure the brush properly fits its holder, it should be snug so as to be firmly supported, but it should not stick and should have a little play.

If a brush is called upon to carry too much current, it will get red hot; the trouble will usually be found to be

that the other brushes in the same holder are not making proper contact and are not carrying their share of current.

1138 *Static Discharges*: A belt will sometimes be found to be charged with static electricity, evidenced by sparks to nearby objects. This ordinarily does no harm and does not indicate anything is wrong with the machine, but it may in time weaken or puncture the insulation on the armature wires. To guard against this it is advisable to rig up a wire rake with its teeth projecting toward and within about an inch of the surface of the belt, connecting the rake by a wire to a good ground, such as a water pipe.

FURNACES

GENERAL DIRECTIONS FOR CARE AND OPERATION

1210 The Stove Manufacturers' Repair Association of 230 Water Street, New York, will supply parts for almost any make of furnace.

Keep fire brick clean and in good condition to prevent burning the fire-pot.

Do not burn rubbish in the furnace; it will clinker your fire brick.

To clean the furnace, remove back connection door and clean by hand with a brush or swab made of bagging attached to a wire.

Take down and clean smoke flues when you do not get draft or heat.

See that your cold-air box is clear and is feeding cold air to the furnace. Keep the damper drawn out its full length, except in very cold weather.

As soon as you lay the furnace off for the summer, clean all its parts thoroughly and remove the soot and dust from air passages and pipes and from the cold-air box. Then close all dampers in the basement to prevent drafts through the furnace into the house.

Take down flue pipes and clean off soot in June.

Allow nothing that can burn to be stored on the top of the furnace or under the smoke pipe.

Keep the window which feeds your cold-air box open when the furnace is in use.

Keep this window closed when the furnace is not in use.

Keep your ash-pit clean; you will burn your grate bars if you don't.

Have your coal supply at the furnace door before you begin to fire or feed coal. Do not keep the furnace door open longer than necessary.

DIRECTIONS FOR THE CARE AND USE OF THE HARVEY FURNACE

By the Harvey Furnace Company, 649 Sixth Avenue, New York

1212 Pull out the damper when kindling or fixing the fire; it will not smoke when kindling if the lower door is kept closed and the damper open.

Push in the damper as soon as well kindled; this will send the fire through the radiator, heating the entire furnace, and will save coal.

Never fill the fire-pot more than level full. In mild weather one-half or two-thirds full is enough; to have a fire with a very small amount of coal in the pot, use range coal.

To get heat you must have·

First : Pot only level full of clean coal. (Not ashes or cinders.)

Second : Ash-pit perfectly clear from ashes. (So the grates will not burn out and allow the pit to heat.)

Third : Fire shining bright under the grate. (Which will heat the ash-pit.)

If the fire will not remain bright under the grate after shaking, it is because there are too many clinkers. To remove ashes or clinkers, make a complete revolution of the grate, or a partial revolution, and poke out the clinkers, then shake the fire down until it is bright under the grate, making sure the dump grate is in position.

Keep plenty of water in the pan. The air will be better and it will not shrink the wood-work of your house. Wash out the pan occasionally to keep it sweet.

Always rake or shake the fire before putting on fresh coal.

Never shut all the registers at once while you have a strong fire, as it would drive the hot air back into the cold-air box.

To keep fire all night : Fill the pot full of clear coal (not ashes and cinders), close the damper, ash and shake doors, open the slide in feed door; also partly close the slide in the cold-air box; the fire will get low before morning, and it will not heat so much cold air.

To cool off the furnace when too hot : Open the damper, and shut it all up tight below, then open the feed door as far as you can, without allowing gas to escape. If gas escapes from the upper door, it finds its way into the cold-air box and main door, and thence up-stairs through the registers. This furnace is perfectly gas tight, and gas cannot escape except through the door and by careless management.

Use white-ash coal, it is by far the best for a furnace. It will give more heat than red ash, will last longer, and will not clinker. If the draft is poor, use Lackawanna instead. Use egg size for large furnaces, range size for medium-sized furnaces, nut size for small furnaces.

Any kind of furnace should be cleaned once a year, or it will not give satisfaction. The best time to have it done is in the spring.

To dump the grate : Make a half revolution of the grate, then shake out the ashes, etc.

The window or grating at the end of the cold-air box must always be open to give a free circulation of pure cold air into the box. Now pull the slide in the box until the lower or basement register gives heat. Let this be your guide in managing the cold air.

Regulate the draft by the damper in the smoke pipe, but always have full draft on before opening the feed door.

1215 DIRECTIONS FOR THE USE OF MOTT'S "COMET" 1889 FURNACE

By J. L. Mott Iron Works, 84 Beekman Street, New York

First : When kindling, open the check damper in the smoke pipe, and the draft slide in ash-pit door, and see that the handle of the dust damper over the slicing door is turned flat. Kindle as in an ordinary stove. When the fire is well started, add more coal and regulate by smoke-pipe damper and ash-pit door slide.

Second : To fix the fire for the day, open the damper in

smoke pipe, close ash-pit door slide, open dust damper by turning handle upright, shake down well, remove the clinkers from the grate by means of the poker through the slicing door, add more coal, close dust damper and slicing door, and regulate as before by damper in smoke pipe and ash-pit door slide.

Third : Regulating. To check the fire, close ash-pit door slide and damper in smoke pipe; this damper should be at least one-half inch less in diameter than the pipe. If this is not sufficient open wheel damper in feed door.

Fourth : Coal. Use hard white-ash coal, stove size for Nos. 36, 40, 40-A and 44-A; for Nos. 48-A and 52-A, use egg size.

Fifth : Cold-Air Box. In order to insure proper heat in the upper apartments, it is of great importance that there should be a good supply of cold air from the outside through the cold-air box; therefore the damper in the same should never be closed during the winter while the furnace is in use. The more cold air allowed to pass in, the more heat will be obtained.

1220 DIRECTIONS FOR THE USE OF THE RICHARDSON & BOYNTON COMPANY'S FURNACES

*By the Richardson & Boynton Company, 232 Water Street,
New York*

Fire : Best fuel is white-ash Lehigh coal—small egg size. Start fire as usual; keep smoke damper open and the ash-pit door slides open. When fire is well under way

add required amount of fuel, close up ash-pit door slides and check the smoke-pipe damper as much as the draft will allow. *If draft is strong, check considerably. If draft is poor, check very little.*

Furnace should receive attention three times daily in cold weather; grate to be shaken morning and night. Put poker through feed door and overhaul the fire by breaking up clinker apt to form from poor coal; this more thoroughly frees the inside of pot from ashes. *Heat* can only be obtained from good fresh fuel.

Do not use ashes or siftings. No heat can be produced and much clinker is made when this is done.

Dampers. Regulating damper in smoke pipe should always be open first, before fuel is put in furnace or grate shaken or ashes removed. The *upper* and *lower doors* should *never be kept open* at the *same time*.


Cold-Air Boxes : Air boxes must be kept open; must not be obstructed either by the outer end being closed or covered or the slide in the box pushed in. This air supply should be regulated *according* to the *weather* and the *wind*. Slide in box can be pushed in when fire is banked for the night.

Pure warm air can only be supplied by a supply of cold air from outside the building. If furnace does not obtain the necessary supply of air through the cold-air box, it will *draw* it from the *registers*; consequently such rooms cannot be heated.

Ashes: Should be removed from the ash-pit daily,

otherwise drafts will be obstructed and grates burned out.

Dust Flue: See that the *dust-flue damper* is closed always, except when shaking grate or removing ashes; otherwise draft or smoke pipe will be interfered with.

Grates : The grate bar should be always kept flat side up, which is designated by the opening at the end of the bar thus ; and when let go, the bars are flat and in proper position for use. *Only remove shaker* when it is in an *upright position*. Ash-pit *must* be kept free from ashes; *otherwise the grates will be destroyed*.

A quick movement of the shaker handle right and left about 3 to 6 inches either way is sufficient to clear the ashes at any time. In moderate weather shake but little and not often. In colder weather shake *twice daily, always leaving grate in flat position* as above.

1225 DIRECTIONS FOR THE USE OF THE "THATCHER" TUBULAR FURNACE

*By the Thatcher Furnace Company, 110 Beekman Street,
New York*

Coal : For Nos. 32, 36, 40 and 44, use stove size. For Nos. 48 and 52, use small egg size. For Nos. 56 and 60 use large egg size. *Never fill the fire-pot more than even full.*

To Make New Fire : Kindle as with any stove; close feed door, open bottom draft, open turn damper and close the lift damper, if any, in smoke pipe.

Regulating : To check fire, close draft doors in front, and if smoke pipe has lift damper, raise it to suit draft or

the requirements. If draft is too strong to check furnace with lift damper open, then give additional check with turn damper. It is better not to check fire by opening the feed door, as it cools off furnace too quickly, and is liable to force gas into cellar. To increase the fire, reverse the above directions.

When putting on coal, shut draft doors at bottom of furnace, close lift damper and open turn damper in smoke pipe; otherwise gas will escape into cellar when feed door is opened. Very fine coal or coal dust should not be used.

To Remove Clinkers : Open the clinker door and with hook draw out the dump grate, which drops the clinker resting on same, then push in the draw grate and by means of the clinker hook carefully work out the clinker around sides of grate and pot, either by pushing it down into center or working it out from sides. It is quite desirable to work the matter into center, as large clinkers frequently form which will not work out between grates. When the space in center is filled up, draw slide again and drop it out, repeating this until you have removed all that can be reached, or until crust breaks. When crust falls, if it is matted together too closely, push the clinker hook through it to break it up. If crust has not fallen after all has been removed which can be reached with clinker hook, then shake the upper grate. The revolving grate can be shaken in mild weather when less heat is required.

Cleaning Radiator : To preserve radiator and to insure a proper draft, the upper radiator should be cleaned every

spring. This is done from openings in the fire chamber, and also from smoke collar in radiator ring.

To Prevent Gas : See that feed-door frame is properly fastened and cemented to furnace, and also that the smoke pipe fits tight to radiator collar. The feed-door frame and smoke pipe should be examined occasionally, and, if necessary, cemented, as the cement is apt to work out from jarring of door.

Cold-Air Box : To insure heat and fill all pipes with warm air, it is important that the cold-air box should be almost equal in area to the warm-air pipes from furnace. Keep the box open, except when strong wind is blowing, then partially close to suit requirements. When wind fails, open box. It is well to have a door in box, and take air from cellar during windy weather, or at night especially.

1230 DIRECTIONS FOR THE USE OF THE THATCHER FURNACES

*By the Thatcher Furnace Company, 110 Beekman Street
New York*

Coal : For Nos. 208, 302, 306, 400 and 404 Meteor furnace, use stove size. For Nos. 408 and 502 Meteor, use small egg size. For No. 448 Winner furnace, use small egg size. For Nos. 132, 136, 140 and 144 Scorcher furnace, use stove size. See that coal is free from dust.

Never fill the fire-pot more than even full.

To Make New Fire : Kindle and regulate drafts as in ordinary stove.

Regulating : To check the fire, close drafts in front, and if smoke pipe has draw or patent damper opening into cellar, open it. When the draft in chimney is strong, it may be well to have an additional common turn damper in the pipe. To increase the fire, reverse the above directions.

When putting on coal, shut all the drafts at bottom of furnace, and fix damper in smoke pipe so gas will escape up the chimney and not into the cellar. Very fine coal or coal dust should not be used.

Clearing fire in Scorcher and Meteor furnaces. The best time to clean out clinkers is in the morning. Turn the crank from a vertical to a horizontal position and repeat until fresh fire begins to appear. Should a hard clinker catch between bars, do not try to break it, but turn bar back, which will probably let it drop out. See that shaker is in a vertical position before removing from bar. When shaking out ashes only during day, do not turn grate too far; give a short quick shake instead, as this will not drop out live fire.

Directions for Cleaning Meteor Radiator : The soot and ashes in radiating ring should be cleaned out at least once a season, spring being the best time. To do this, remove the clean-out cover in front, insert a bent rod with scraper on end and draw the ashes to front, when they are lifted out. It will be difficult to remove the ashes from more than front half from front opening. The back section can be cleaned in the same manner, from smoke collar at back.

Directions for Cleaning Scorcher Radiator : The radiator

of Scorcher has a division in center. The upper section can be cleaned from front clean-out cover only. The lower section can be cleaned from both back and front. Use a suitable rod with a scraper.

Top radiating ring of Winner can be cleaned from smoke collar at back or clean-out opening in front.

To Regulate at Night : Clean the fire, put on coal (as directed), and check the drafts.

Cold-Air Box : To insure heat and fill the pipes with warm air, it is *important* that the cold-air box should be equal in area to warm-air pipes from furnace, and keep the box open. At night when furnace is checked, partially close it. It is quite important to have a door in air box underneath slide and of full area of box, so that air can be taken from cellar at night or when wind has shifted to opposite side of house.

The feed-door frame should be tightly fitted and cemented to furnace. Remove ashes from ash-pit every day.

1235 DIRECTIONS FOR THE USE OF THE BOYNTON HEATING FURNACES

By the Boynton Furnace Company, 207 Water Street, New York

To Kindle Fire : Close draft regulator in smoke pipe; open the slide in ash-pit door; put on a small quantity of light, dry kindling wood.

Light the fire on the top and when the wood is well kindled add more until a good body of wood fire is obtained.

Put on coal in small quantities at first; when the coal is well ignited and the fire burning brightly, close the slide in ash-pit door as the draft may require.

To Check the Fire : Close the slide in ash-pit door; open the draft regulator in smoke pipe as much as the regulator will admit.

To Remove Clinkers and Ashes from Shaking Slide Center Grate : Close the draft regulator in smoke pipe; open dust damper, pull out the slide grate and with the poker remove any clinkers that may have formed, after which close the ash-pit door and also the slide grate and shake until a bright fire is obtained.

To Remove Clinkers and Ashes from Triangular Revolving Grate : Close the draft regulator in smoke pipe; open the dust damper, and turn the crank applied to grates until a few live coals drop into the ash-pit, which is an indication that the ashes have been removed, after which remove the grate crank and close the dust damper.

Ash-pit door and damper in the door should be kept closed when clearing ashes, and when opening the feed door to put in fuel.

Dust damper should *always* be kept closed, *except* when shaking grate and removing ashes.

Ashes : Remove the ashes regularly and often; *it costs less than new grates.*

The cold-air box must never be obstructed or closed, but should be provided with a slide for regulating the supply of cold air according to the conditions of the

weather. To obtain a large volume of pure, warm air, the cold air must be obtained from the outside of the building.

The evaporating pan should be *thoroughly cleansed* once a week and should be kept full of *clean water*.

The proper kind of fuel is Lehigh white-ash coal, stove size, for the small furnaces, and egg for the medium and large furnaces.

Furnaces should receive attention morning and evening in ordinary weather and at least once during the day in severe weather.

Furnaces should be cleaned and put in order at the close of winter season.

DIRECTIONS FOR THE CARE AND USE OF THE "YORK" FURNACES

By Abendroth Brothers, 109 Beekman Street, New York

1240 *Kind of Fuel* : Our many years experience has taught us that for heating purposes, white-ash Lehigh coal, stove size or stove and egg size mixed, according to size of furnace, is best to use in all cases. We recommend for small furnaces, good white-ash stove coal; for medium-size furnaces, good white-ash stove coal and egg coal mixed; for large-size furnaces, good white-ash egg coal.

Evaporating Pan : Should be filled with clean water, kept full, and cleaned thoroughly once a week.

Cold-Air Box : Should be provided with a slide for

regulating the supply of cold air, and must never be obstructed or closed.

To Kindle Fire : Open damper and close draft regulator in smoke pipe; open slide in ash-pit door and put on a quantity of light dry kindling wood. Light fire on the top, when wood is well kindled, add, until a good fire is obtained. Put on coal in small quantities at first, and when well ignited and fire burning brightly, close the slide in ash-pit door as draft may require.

To Check Fire : Close the slide in ash-pit door, open the draft regulator in smoke pipe as much as the draft will admit.

To Remove Ashes and Clinkers : Close the draft regulator, open damper in smoke pipe, also dust damper, and remove clinkers by use of slicer or poker, after which shake the grate until a bright fire is obtained. *The dust damper must be closed at all other times.*

Ashes should be removed from ash-pit once every day, otherwise there will be imperfect circulation of air and grates will burn out.

Furnaces should have attention morning and evening; in severe weather at least once during the day.

At close of season, furnaces should be cleaned and put in good order.

1245 The Stove Manufacturers' Repair Association of 230 Water Street, New York, carry in stock fire-pots, water-backs and linings for the principal makes of ranges

and furnaces and will supply parts for ranges, stoves and furnaces made by the following manufacturers:

Abendroth Brothers	J. L. Mott Iron Works
Albany Foundry Company	Mount Penn Stove Works
Barstow Stove Company	Eugene Munsell & Company
Boynton Furnace Company	National Stove Works
Bramhall & Dean Company	New York Stove Works
Buckwalter Stove Company	Orr, Painter & Company
Carton Furnace Company	J. F. Pease Furnace Company
E. B. Colby & Company	Peekskill Stove Works
J. H. Cort & Son	Perry Stove Company
Abram Cox Stove Company	Phillipsburgh Stove Company
W. M. Crane Company	Rathbone Sard & Company
Danville Stove Manufacturing Company	Reading Stove Works
Ely & Ramsay Company	Richardson & Boynton Company
Excelsior Stove Works	Richmond Stove Company
Floyd, Wells & Company	Roberts, Winner & Company
Graff & Company	P. Rollhaus
Grander & Company	Rossmore Company
Hart & Crouse	Russell, Wheeler & Son
Harvey Furnace Company	Schuykill Valley Stove Company
International Heater Company	Scranton Stove Works
Janes & Kirtland	Isaac A. Sheppard & Company
Keely Stove Company	Southard, Robertson & Company
Kernan Furnace Company	Stamford Foundry Company
Leaf Stove Company	Syracuse Stove Works
James G. Lyon	Thatcher Furnace Company
Magee Furnace Company	Thomas, Roberts, Stevenson Company
March Brownback Stove Com- pany	Union Stove Works
	Yeager & Hunter Company

In ordering for ranges and stoves give the number, date, and the letter on your stove, range or furnace.

State whether grates are flat, duplex, triplex, etc.

State whether fire-box is on the right or left hand as you face the oven.

State whether water-back is on the side, the back or all around.

State whether it is cast iron or pipe.

In ordering for furnace, state whether it is brick-set or portable.

Make a rough sketch of any piece you cannot clearly describe.

PUMPS

1250 GENERAL INSTRUCTIONS FOR THEIR USE

Protect pumps from coal dust and dirt.

When not in use, oil them all over and then wrap them in cloth.

Keep them neatly painted.

DIRECTIONS FOR THE CARE OF STEAM PUMPS

By Henry R. Worthington, 114 Liberty Street, New York

See that the steam cylinders and working parts are well lubricated before turning on steam.

Allow steam to blow through drips a few minutes in order to warm up cylinders.

If your pump is provided with a pressure regulator, see that the valve on regulator pipe is open to the pressure on water end before starting.

If your pump is required to start against full load, it will be necessary to start pump with waste delivery open until the pump cylinders are filled and water is flowing through waste delivery; then this waste delivery may be closed; work pump up to the required pressure and speed slowly.

If your pump is provided with dash relief valves, adjust these valves so as to give pump full stroke.

On large pumping engines, where each high-pressure cylinder is supplied with a throttle valve, each side should be worked up and down several times in order to work water out of cylinders; this may be done by opening valve on one side and allowing piston to go to end of stroke, then close valve and open the other end and allow No. 2 to go to end of stroke and close valve. By just working one side and stopping, and then the other side, several times, until the water is all worked out of steam end, you can then close the main valve on pump and open up the two throttling valves wide and run your pump with main throttle valve on pump.

See that the packing in stuffing boxes is kept in good condition and packed free and evenly and kept clear of grit. A drop of oil on piston rods once in a while will help to reduce friction.

Keep stuffing-box glands screwed up against packing, not too tight, and at right angles to motion of rod; tightening on one side a little more than the other side will cause piston rods to rub on gland and score.

Keep stuffing boxes free from leaks, as stuffing boxes leaking will cause lots of annoyance at times when pump cannot be spared from service long enough to be packed.

Keep slide valves and cylinders well lubricated and all rubbing parts oiled and free from dust and dirt.

A steam pump is the easiest sort of engine to keep in proper working order. All that is needed is to give pump a little of the attention that is given to other pieces of

machinery in your plant. There is absolutely no reason for a steam pump working improperly any more than any other piece of machinery. The steam pump can be kept in good working order much easier than a steam engine can, and it is owing to this fact that engineers get careless and do not give the attention to steam pumps that is necessary to keep them in uniform working order.

See that the valves and plungers or pistons in water end are kept tight. A great deal of trouble from leaky valves is due to foreign matter getting into pump chamber with the water and lodging under the valves.

See that your suction line is perfectly tight, as the smallest leak will cause pump to work improperly. Remember there is always a cause for steam pumps not working properly, and that cause, nine times out of ten, will be found outside of the steam pump itself. Some of these causes will be pressure on the suction holding the valves off their seats until seated by the pressure on the plungers or pistons; pump cylinders getting filled with vapor in pumping hot water; failing to relieve pressure on top of discharge valves in starting; failing to keep water pistons and stuffing boxes properly packed; failing to keep working parts lubricated; failing to open discharge valve in starting; failure of water supply to pump; failure to open regulator valve in starting.

A pump, to do efficient and economical work, should be as carefully looked after as a steam engine. All working parts kept clean and, where necessary, well lubricated,

stuffing boxes carefully packed and the various valves periodically examined, cleaned and adjusted.

A first-class lubricant that will not develop fatty acids under the action of steam should be used for the steam cylinder, and the best quality procurable is in the end the cheapest. The low-grade inferior oils or tallow should not be used, as they soon gum up and often cause a great deal of trouble.

1255 DIRECTIONS FOR THE CARE AND OPERATION
OF THE
RIDER COMPRESSION HOT-AIR AND GAS PUMPING
ENGINES

*By the Rider Ericsson Engine Company, 31 Warren Street,
New York*

FIRING

A damper must be put on every stove-pipe.

If gas is used as fuel, do not apply the light until the gas has been turned on three seconds. The proper heat is obtained from blue flame, though sometimes it is necessary, where gas is deficient in heat, to have a little red in the flame. If engine runs too fast, shut off the gas until the proper speed is obtained.

If coal is used, the fire should be lighted one-half to three-quarters of an hour before it is required to start the engine. Use anthracite coal of chestnut size if it can be obtained. Other kinds of fuel will answer, but this is preferable.

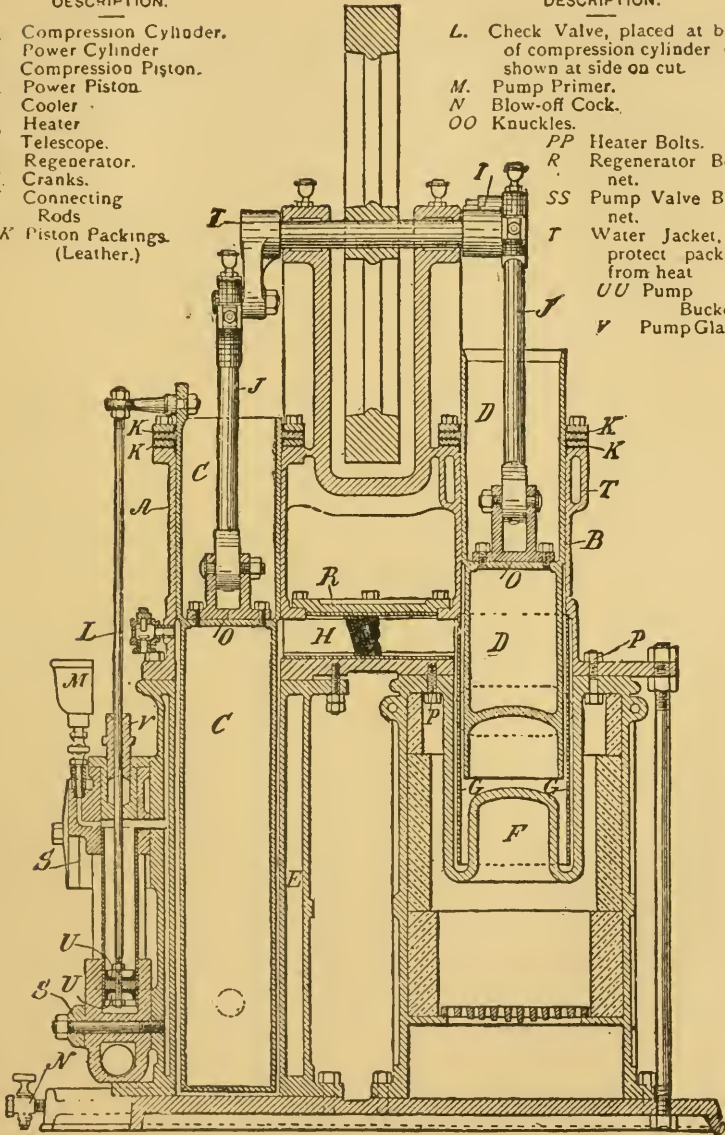
SECTIONAL VIEW RIDER COMPRESSION ENGINE

DESCRIPTION.

- A.* Compression Cylinder.
- B.* Power Cylinder
- C.* Compression Piston.
- D.* Power Piston.
- E.* Cooler
- F.* Heater
- G.* Telescope.
- H.* Regenerator.
- I.* Cranks.
- J.* Connecting Rods
- KK* Piston Packings (Leather.)

DESCRIPTION:

- L.* Check Valve, placed at back of compression cylinder but shown at side on cut
- M.* Pump Primer.
- N* Blow-off Cock.
- OO* Knuckles.
- PP* Heater Bolts.
- R.* Regenerator Bonnet.
- SS* Pump Valve Bonnet.
- T* Water Jacket, to protect packing from heat
- UU* Pump Buckets.
- V* Pump Gland



NOTE.—In ordering extra parts for engines please give shop number of engine, diameter of piston, and if the engine was bought through a third party, give name.

When the engine is hot enough to have its full powers, the heater casting hanging over the fire marked "F," in sectional cut, should be a dull cherry red. If this color cannot be obtained, the draft is defective or the fuel deficient in heat. To ascertain whether the heater is red, insert small fire shovel in fire chamber so as to prevent the reflection of the flame on the heater, and this will allow you to see whether the heater is red or not.

Keep a thin, bright fire when the engine is running. Keep the ash-pit clean. Do not allow your engine to stand still with a fire in it and the draft wide open. Close the lower and open the top door whenever your engine stops, even for five minutes; and when through pumping, open top door.

If the engine runs faster than desired, open the top door a little.

GAS PIPE AND OPERATION OF BURNER

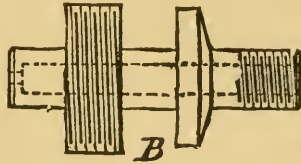
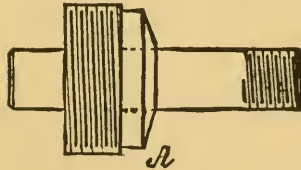
In setting up one of these engines with a gas furnace, it is advisable to have gas-pipe sufficiently large, in order to keep the pressure of gas up to its proper point when it is delivered to the burners, otherwise the burners will not work satisfactorily. The proper size is one-half inch for five-inch engine; one-half inch for six-inch engine; three-quarters inch for eight-inch engine; and three-quarters inch for ten-inch engine. These sizes will answer unless the pipes are long, when they should be increased.

GAS PIPE AND OPERATION OF BURNER

Connect gas-pipe to thread end of A. Put a cock in gas-pipe within one or two feet of engine, and regulate

*E*

GAS GLANDS

*B**A*

A—Position when lighting gas or turning off
 B—Position while gas is burning.

supply of gas by opening this cock until the proper flame is obtained. If the directions concerning the position A are not obeyed, there will be a report like a small pistol shot, but no damage will be done. If position B is not kept when gas has been lighted, not enough heat will be gotten from the gas. The right heat is obtained from a blue flame, and engine should start in from ten to thirty minutes after lighting gas. A little observation of the flame will teach the attendant how to start the engine in the shortest time.

OILING

Never use lard or any gummy oil. An excellent mixture is a compound of paraffin and sperm oils, in the proportion

of two parts of the former to one of the latter. We have for sale an excellent oil, known as "Rider Engine Oil, No. 20," which we have found, after twenty years' use, to be the best for the engines, as well as the cheapest in the end. We can furnish it in cans of any size or by the barrel. We strongly recommend the use of our oil as being the best for our engines.

Oil the engine every time it is used, but apply only just enough to the pistons to keep them always bright. Too much oil is injurious, as well as wasteful.

Do not allow oil to accumulate in the piston or cylinder.

Never allow the oil cups to get empty. Be sure that the end of the wick passes down the tube to the shaft or pin. A few drops of oil should be put into the oil hole at the lower end of the connecting rods.

CLEANING

The effect of neglect to keep the interior of the engine clean is to greatly increase the friction, whereby much of the power of the engine is lost, and consequent *overheating* must be resorted to to make the engine continue to work effectively. Continuance in this overheating will result in burning out the heater. This will *never* happen if the instructions in regard to cleaning are observed.

When the engine is in need of cleaning it requires a heavier fire and longer time to get the engine in operation. It also will be apparent by the difficulty experienced in starting, as the hot piston will show a tendency to stick in

the bottom of the cylinder. This may be seen when the engine is *cold* by noting whether the wheel can be turned freely with the air-cock *open*. If not, the engine should be cleaned.

To clean the inside of the engine, disconnect the connecting rods, remove the wheel and leather packings; the pistons may then be drawn out and scraped thoroughly. In scraping the inside of the hot cylinder, be very careful not to allow any of the dirt to get down into the narrow part of the heater. This can be prevented by stuffing waste or rags into the heater, and removing all scrapings with the rags after cleaning the cylinder. It is best to put in two or three layers of rags, making sure they touch the interior surface of the telescope, so that any dirt accidentally falling off in removing the first layer will be caught on the second, and so on.

In replacing the piston see that it is not turned around.

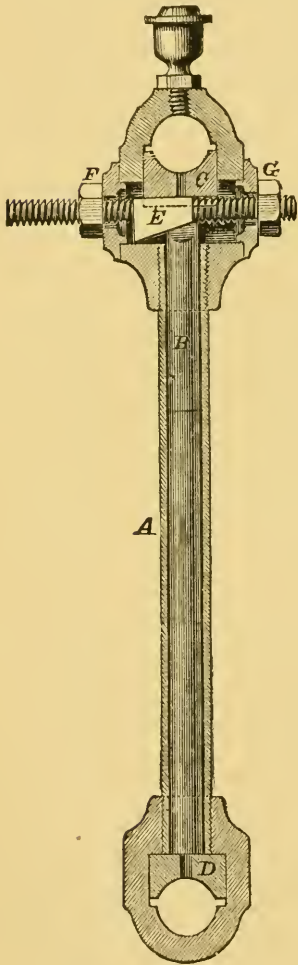
The regenerator plates, which must be thoroughly cleaned of all grease, are contained in the passage between the cylinders. The grease usually accumulates on the "cold" end.

The compression piston seldom requires cleaning.

As most of the noise about the engine is caused by neglect of them, we advise special attention to the *connecting rods*.

It would be well to take the key E out, so that its action and the construction of the connecting rod may be fully understood. It will be seen that it is wedge-shaped, one side acting on the upper brass C, the other on the lower

brass D, through the intervention of a rod B passing through the iron tube A, which connects the two brasses



or ends of connecting rod. Replace the key with the straight edge up and tap lightly till it bears up on both edges. Use no force in this operation. Next screw up the nut G on the small end of the key till it bears on the washer. This can probably be done with the fingers. Then screw up the nut F on the broad end with a wrench, which will slightly withdraw the key. Be particular to always adjust the keys in this manner, otherwise they will be too tight.

Should it become necessary to remove the connecting rods from the pistons (to adjust the brasses), it can be done by unscrewing the tap bolts which hold the knuckle to the piston. A long socket wrench is furnished with each engine for this purpose.

PUMP

There is a small air-cock in bottom of pump. If the air

barrel should fill with water, it may be recharged with air by opening this cock (with water shut off) for a few moments while engine is in motion. Should the pump leathers or "buckets" swell, it will make the engine labor and sometimes prevent its working. In this case, take out pump rod and trim down buckets with sharp knife until the rod will sink to bottom of pump-tube by its own weight.

It may be necessary to prime the pump for a few times at first until the valves get thoroughly seated and the leather soft (except when the water flows into the pump from main or other head). A priming cup is attached to top of pump for this purpose on engines pumping from wells or other places where water does not flow into the pump.

Before starting engine the first time, the valves of pump should always be taken out and scraped clean, as, after being tested at the Works, the valves sometimes "seat" too tight. If this is not done, it may be impossible to draw water. Should a "Deep Well" pump *ever* fail to deliver the water, unless buckets are worn out, it will be on account of this.

STARTING

Start the engine as soon as it is hot enough to run. Standing at the fire door, pull down on the flywheel till the hot piston is raised a few inches; then reverse the motion till the spring of the air offers resistance, when the forward

motion can be easily made. When the pistons balance at the upper part of their stroke, they will come down without help till the hot piston is nearly at the bottom. A *little* air being now let out by opening the cock at bottom of cold cylinder, the crank on the hot end will stand vertically downwards. Shut the cock and pull the wheel past this point of the greatest compression, and the engine will start off at once if sufficiently hot. This is not necessary in starting the small sizes.

STOPPING

To stop the engine open brass cock in end of bed plate under compression cylinder.

HEATER

If the heater should be burned (or cracked), it becomes apparent through the air blowing through down on the fire. The heater should be renewed at once, for, if over-firing is persisted in, the "telescope" will be warped.

To replace the heater, open the fire jacket and take off. Then remove heater, which is held in place by bolts (marked P on sectional cut), and make joint for new heater of asbestos and pasty red lead. Screw bolts up tight, and do not put fire into engine for five hours. The telescope is held in place by screws. In putting back these screws, be particular in observing that no air leaks through past them,

CHECK VALVE

The supply or "check" valve projects from the back of the "compression" cylinder, and must always be kept in a vertical position with opening at bottom. It must be kept tight and free, in order that the air may be taken in through it to supply any leakage. Should a hissing noise be heard about it, the air is escaping through it. Take apart and clean with clean rag.

WASTE PIPE ON HOT CYLINDER

The use of this small pipe is to keep the piston packings moderately cool. The water need only be allowed to drip out slowly, so that the packings never approach a boiling temperature, as the leather will not suffer injury below the boiling heat of water. The small cock on the front of the engine regulates this waste.

CAUTION

In cold weather always open the cocks in bottom of compression cylinder and in bottom of pump. If this is not done the frost may crack those parts. If a hissing noise can be heard about the engine, it indicates an escape of air. The leak should be found and stopped immediately, or a larger fire will be required, which will in time damage the heater. This is *vitaly important*.

Keep your engine wiped clean. Five minutes a day thus spent will not be wasted time. Avoid any "lost" motion in the connecting rod, as it is accompanied by

both noise and wear of the brasses. Do not think because the engine is harmless that it requires *no* attention. It needs a certain amount of good care and watchfulness. The fire must be attended to or your engine will stop. The engine must be oiled or the bearings will "cut" and be ruined. It must not be allowed to run too loosely or repairs will be required.

1260 DIRECTIONS FOR THE CARE AND USE OF
ERICSSON HOT-AIR AND GAS PUMP-
ING ENGINES

*By the Rider Ericsson Engine Company, 31 Warren Street,
New York*

FIRING

Coal : The fire should *be thin and bright* ; too much coal should not be put on at once, but rather a small quantity and oftener. This will keep the fire at a uniform heat and the engine at a uniform speed. Do not overheat the bottom of the engine. This may be determined by looking through the fire door and shading the light of the fire from the bottom of the engine by a fire shovel or something of that kind. This part of the engine should not be above a dull-red heat.

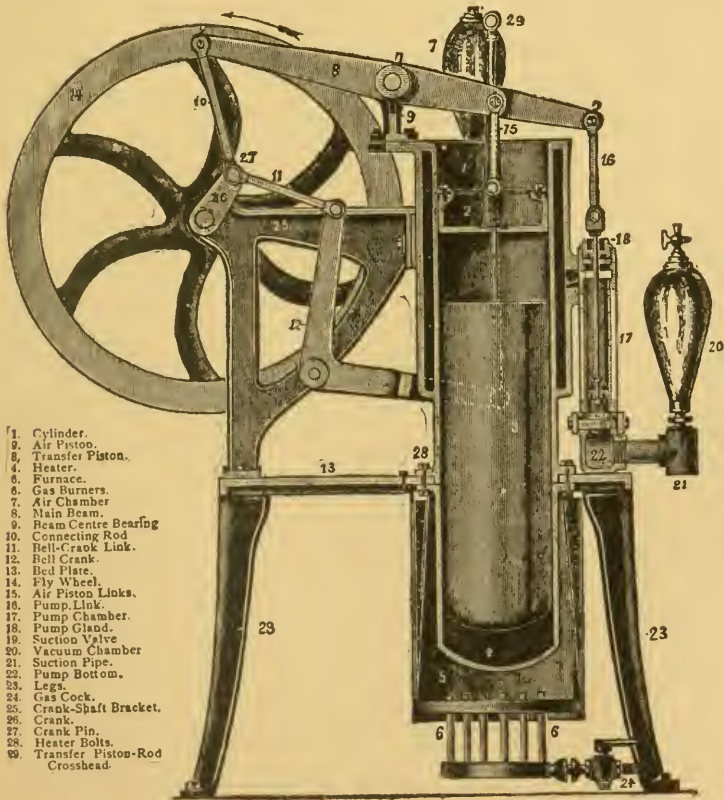
Wood : Hard wood is better fuel than soft wood, because it lasts longer. But any kind of wood answers the purpose well, and it is difficult to damage the machine by overheating with wood fuel.

SPEED

The best speed to run these at is 100 to 120 revolutions per minute for the five-inch and six-inch engines, and about 80 to 110 revolutions per minute for the eight-inch and ten-inch engines

OILING

All the working parts of these machines need a few drops of oil every time the engine is run. A little oil should be



- 1. Cylinder.
- 2. Air Piston.
- 8. Transfer Piston.
- 4. Heater.
- 6. Furnace.
- 6. Gas Burners.
- 7. Air Chamber
- 8. Main Beam.
- 9. Beam Centre Bearing
- 10. Connecting Rod
- 11. Bell-Crank Link.
- 12. Bell Crank.
- 13. Bed Plate.
- 14. Fly Wheel.
- 15. Air Piston Links.
- 16. Pump Link.
- 17. Pump Chamber.
- 18. Pump Gland.
- 19. Suction Valve
- 20. Vacuum Chamber
- 21. Suction Pipe.
- 22. Pump Bottom.
- 23. Legs.
- 24. Gas Cock.
- 25. Crank-Shaft Bracket.
- 26. Crank.
- 27. Crank Pin.
- 28. Heater Bolts.
- 29. Transfer Piston-Rod
Crosshead.

poured on the inside of the cylinder from the squirt can which is sent with the machine. Be careful not to use too much oil in this cylinder. If too much oil is used in the cylinder of these machines, or oil of an inferior quality, a thick, hard scale will be formed inside of the cylinder, which will stop the machine from working. This scale will have to be removed after it has once formed before the engine will work again. If proper oil is used, and not too much of it put into the cylinder, this operation will not have to be done for a very long time; but, on the contrary, if you are using a sperm or lard oil, this scale will form very quickly. A few drops of oil should also be put around the transfer piston rod where it works through the leather packing.

Oil: Special oil for use on these engines can be obtained from us and we would advise our customers to send here for the oil they use. If, however, it is too far to send to us for this oil, a mixture of one gallon of sperm oil with two gallons of good paraffin oil will answer, if used sparingly.

STARTING

Start the engine as soon as it is hot enough to run. Be particular about this, otherwise the engine will be unduly heated, and perhaps damage done. While the engine is running, the heat developed by the fire is being utilized to heat the air in the machine; but while the engine is standing this is not going on, and consequently the danger

of overheating is much greater than when the engine is running. To start the engine turn the wheel by hand in such a direction that the top of the wheel will turn from the top of the cylinder. If the engine is hot enough to run, it will only be necessary to turn it by hand about two revolutions, when it will go without any more assistance. *The blow-off cock should be left open while the engine is being heated up, and the engine turned one or two revolutions before closing this cock, in order to expel any moisture, etc., that may have collected inside of the cylinder while the engine has been standing idle.* Shut the cock when the main piston is at the top of its stroke.

STOPPING

To stop the engine, open the blow-off cock on the side of the cylinder, and unless the engine is very hot, it will stop after making three or four revolutions. This cock should be left open until it is desired to start the engine again. The engine should not be stopped for any length of time when the fire is burning brightly under it. If it becomes necessary to keep the engine standing, cover the fire with a little fresh coal and leave the fire door partly open, so as to protect the bottom of the engine from becoming unduly heated. The engine should be turned, after it has stopped, to such a position that the transfer piston will be at the top of its stroke, and left standing so until it is started again.

PACKING

The packings of these engines are all made of leather. The packings in the engine proper consist of one large packing in the main or air piston, and one small cup leather packing on the transfer piston rod. When a new air piston packing is to be put on, the operation is as follows: The packing should be first well soaked in oil, and then thoroughly worked in the hands until it becomes very soft and pliable. Remove the air piston from the engine; take off the old packing and replace it by the new one, and be careful to screw all the bolts down securely. Care should be taken that the proper side of the leather is up. This is the flesh side of the leather. Now place the air piston at the top of the cylinder, and carefully work the edge of the leather down into the cylinder, being careful to avoid any puckers or unevenness, which would allow the air to escape. If the packings have been well oiled and carefully worked by the hand, this operation is quite an easy one, and only requires a little care to do it successfully. The packing on the transfer piston rod is made in the shape of a cup. It is pressed in a mold of the proper shape. The above directions will apply to these packings also, in relation to oiling and softening. We keep these packings on hand, and can supply them at once.

CLEANING

When the engine shows signs of weakness it is usually the result of the interior of the cylinder being fouled by

too much oiling. Should the engine become gummed up by the use of too much oil, or oil of an inferior quality, the scale formed on the inside of the cylinder and on the transfer piston must be removed by scraping, as this scale becomes too hard to be removed in any other way. To do this both the air piston and transfer piston are first removed from the cylinder and the scale and gum scraped off, both from the inside of the cylinder and the outside of the transfer piston. Be careful to remove all this scale and to remove the dirt which falls into the bottom of the cylinder. Be careful, also, not to damage the cylinder or transfer piston by scraping into the iron. Care should be taken that the transfer piston is properly adjusted by the nuts at the top of the rod, so that it neither strikes the bottom of the cylinder when it is down, nor the air piston on its upward stroke. The adjustments are all made properly when it leaves our works, and if careful measurements are taken before removing these nuts, they may be put back in the same place without any difficulty. If these adjustments are not properly made and the rod is left too long, the transfer piston will strike the bottom of the cylinder; or, if this rod is too short, the two pistons will come together. In either case the engine is liable to be broken.

FREEZING

To prevent damage by freezing, all water should be drawn off in cold weather. Two cocks are provided for

this purpose—one on the pump and one on the water jacket—and these cocks should be kept free from sediment, and in condition to use at all times, by cleaning them occasionally with a wire. The engine should be turned over two or three times by hand, after the water ceases to run out, to insure getting all the water out of the upper part of the pump. The suction and discharge pipes should always be provided with drain-cocks, in order that they may be drained in exposed places.

LEAKS

These engines must be air-tight, or they will not develop the maximum power. They are frequently run, however, with a leak in the air piston packing, but it is a bad practice to run them so, and when a leak develops, a new packing should be put on at once. *The transfer piston should also be perfectly air-tight; that is, the piston itself.* If for any reason, such as overheating or damage from any cause, it leaks air, the engine will not run, and *a new one will have to be put in before the engine will develop its power.*

In conclusion, keep the engine clean; wipe it off every time it is used and before it cools.

1265 DIRECTIONS FOR THE CARE OF THE QUIMBY ELECTRIC PUMP

By William E. Quimby, Inc., 44 East 23rd Street, New York City

Keep the motor dry and the commutator clean.

Keep the oil cups on the motor full.

Put oil in the cups on the bearing and in the gear case and the stuffing boxes at least twice every week.

The pump must be run at least twice a week to keep it in good order.

If the stuffing boxes leak, oil them, and if this does not stop the leak, the glands should be forced in a little by screwing up the nuts on the bolts above and below, with the fingers. *Do not* use a wrench. *Great care* should be taken to screw these nuts up evenly and not to get the glands forced in too tight. Glands held unevenly or forced in too far bind on the shafts, and may *burn out* the motor.

The pump should always turn easily by hand, and if it does not do so or *if the motor sparks, open the switch and notify us at once.*

HOT-WATER SYSTEM HEATERS

1270 The construction of the heater is so simple that no especial directions for its care are necessary. The ash-pit should be kept clean to prevent burning out the grates.

If your hot water heater does not heat enough hot water, put a coil inside your boiler or furnace fire-box and connect your hot water tanks with it. This will probably give you all the hot water you need, if the work is properly done, and you may be able to get along without firing up the hot-water heater while you have steam heat on the house.

You must have circulation if you are to have hot water.

Hot-water tanks should be covered with asbestos. Covers will save enough fuel in a short time to make good the expense.

PLUMBING FIXTURES

1275

BASINS

If faucets are dripping, put in new washers at once.

To clean the marble, scour it with pumice stone.

To clean the nickel work, use solarine or a solution of one ounce of oxalic acid to one quart of water. Oxalic acid will burn your hands; use a brush and then wipe off with a cloth.

To clear stoppage, use a force cup or fill the bowl with a few inches of water and then use your hand as a force cup. If this does not clear the line, take off the trap screw and clean the trap with a wire.

BATH TUBS

1280 If faucets leak, put in new washers at once.

To clean porcelain tubs, scour them with fels naphtha washing soap, or porcela.

To clean metal tubs, scour with whiting powder. Paint will not hold on metal tubs. Use oil only on wood rims; varnish and shellac will discolor.

To clear stoppages, use a force cup.

TOILETS

1285 Stop waste of water at once. This is usually

caused by mud and sediment in the tank. Wash it out.

To clean the bowl, use pure muriatic acid. Muriatic acid burns the hands. Apply it with a swab made of soft cloth attached to a stick. When you get the stains off, clean the fixture with a damp scrub cloth. To clean the nickel work use solarine or vinegar and silicon or a solution of one ounce of muriatic acid to one quart of water.

To clear stoppage, use a force cup.

WASH TUBS

1290 Clean porcelain tubs with naphtha soap, washing soap, or porcela.

Clean soap-stone tubs with hot water and washing soda.

To clear pipes of grease, dissolve a can of potash in a tub of very hot water. Do not use the hand. Stir with a stick, then run it off when hot.

RANGES

REPAIR PARTS

1295 The Stove Manufacturers' Repair Association of 230 Water Street, New York, carry in stock fire-pots, water-backs and linings for the principal makes of ranges and furnaces, and will supply parts for ranges, stoves and furnaces made by the following manufacturers:

Abendroth Brothers	International Heater Company
Albany Foundry Company	Janes & Kirtland
Barstow Stove Company	James G. Lyon
Boynton Furnace Company	Keely Stove Company
Bramhall & Dean Company	Kernan Furnace Company
Buckwalter Stove Company	Leaf Stove Company
Carton Furnace Company	Magee Furnace Company
E. B. Colby & Company	March Brownback Stove Com- pany
J. H. Cort & Son	J. L. Mott Iron Works
Abram Cox Stove Company	Mount Pen Stove Works
W. M. Crane Company	Eugene Munsell & Company
Danville Stove Manufacturing Company	National Stove Works
Ely & Ramsay Company	New York Stove Works
Excelsior Stove Works	Orr, Painter & Company
Floyd, Wells & Company	J. F. Pease Furnace Company
Graff & Company	Peekskill Stove Works
Grander & Company	Perry Stove Company
Hart & Crouse	Phillipsburgh Stove Company
Harvey Furnace Company	Rathbone, Sard & Company

Reading Stove Works	Isaac A. Sheppard & Company
Richardson & Boynton Company	Southard, Robertson & Company
Richmond Stove Company	Stamford Foundry Company
Roberts, Winner & Company	Syracuse Stove Works
P. Rollhaus	Thatcher Furnace Company
Rossmore Company	Thomas, Roberts, Stevenson Company
Russell Wheeler & Son	Union Stove Works
Schuylkill Valley Stove Company	Yeager & Hunter Company
Scranton Stove Works	

In ordering for ranges and stoves, give the number, date and letter on your stove, range or furnace.

State whether grates are flat, duplex, triplex, etc.

State whether fire-box is on the right or left hand as you face the oven.

State whether water-back is on the side, the back or all-around.

State whether it is cast iron or pipe.

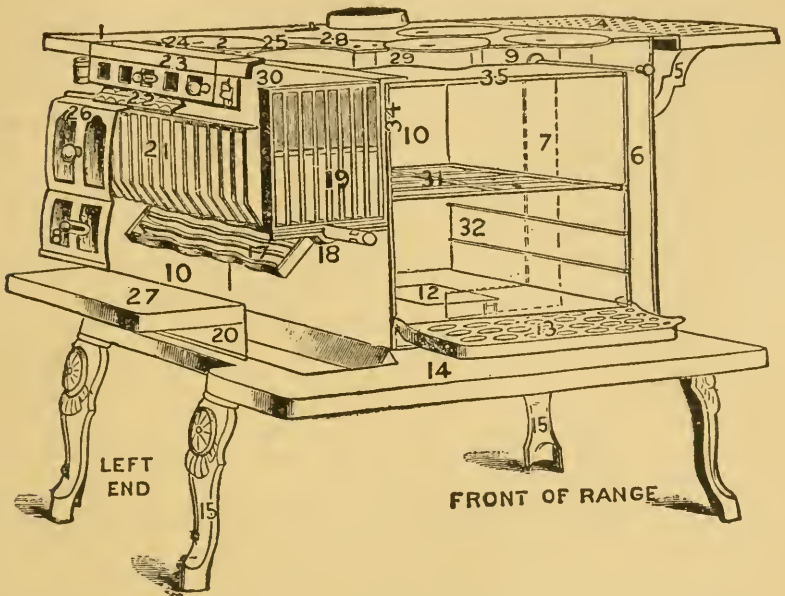
In ordering for furnace, state whether it is brick-set or portable.

Make a rough sketch of any size you cannot clearly describe.

EXPLANATION

Order by *name* of piece as given here, and *not by number*. If in doubt, give a general description or drawing:

1 Top of Range	6 Front of Range
2 Cover	7 End Flue Strip
3 Short Cross Piece	8 Bottom Flue Strip
4 Top End Shelf	9 Roll or Oven Damper
5 Bracket for Top End Shelf	10 Back of Range



OUTLINE OF A RANGE

- | | | | |
|----|--------------------------------|----|---|
| 12 | Flue Clean-out Plate | 25 | Dust Damper |
| 13 | Automatic Oven Shelf | 26 | End Fire Doors. Right or Left. Swing or Slide |
| 14 | Bottom of Range | 27 | End Hearth Plate |
| 15 | Leg | 28 | Middle, or T. Center |
| 17 | Bottom Grate | 29 | Top Flue Strip |
| 18 | Grate Rest | 30 | Fire Plate |
| 19 | Short Front Grate | 31 | Oven Slide |
| 20 | Left End | 32 | Right or End Oven Plate |
| 21 | Long Side Grate | 33 | Bottom Oven Plate |
| 22 | End Fire Doors Track | 34 | Left, or Fire Oven Plate |
| 23 | Broiler or Feeder Door | 35 | Top Oven Plate |
| 24 | Feeder Door Frame or Expansion | | |

STOVE REPAIRS—WHAT TO DO AND WHAT
NOT TO DO!

1300 *Do* give every number, *date* and *letter* in sight on all *stoves, ranges, and furnaces.*

Describe all grates, if flat, duplex, triplex, etc., and if fire-box is on right hand or left hand as you face the oven, and if *water-back* is on side, back, or all around, if it is cast iron or pipe, and if a furnace is brick-set or portable.

Make a rough sketch of any piece you cannot clearly describe.

IN WRITING RANGE-REPAIR ORDERS

1305 Paper is plentiful and cheap—use it.

Do not crowd items. Use separate lines for each article.

Do not crowd postal cards too much.

Do remember that there are *numerous* small pieces in all stoves that it is impossible for any foundry or repair dealer to keep in stock, and that some parts must be made to order.

We tag, mark and tie up each set or article separately, thus avoiding errors.

1310 GENERAL DIRECTIONS FOR THE CARE
AND OPERATION OF COAL
RANGES

To polish coal ranges, use enameline.

To clean, remove top covers and brush clean inside, then remove the plate in the oven and clean the bottom of the range. Clean all side flues; they are on the end farthest

from the fire-box. Clear smoke pipes of soot. To remove grease, scrape with a case knife.

Never allow the range to get red-hot on top.

Keep the brick clean of clinkers.

Do not allow the ash-pit to get full of ashes; it will burn out the grates.

1315 GENERAL DIRECTIONS FOR THE CARE AND OPERATION OF GAS RANGES

Gas ranges, if rented, are kept in repair by the gas company.

To polish, use enameline.

They are cleaned in the same way as coal ranges.

New parts are most readily obtained from the Stove Manufacturers' Repair Association of 230 Water Street, New York, or from the Estate of A. Frolich, 287 Pearl Street, City.

1320 DIRECTIONS FOR THE USE OF MOTT'S DEFIANCE RANGES

By J. L. Mott Iron Works, 84 Beekman Street, New York

To Kindle the Fire : Open the dampers in smoke pipes by turning the handles upright. See that the drum slide under warming shelf is closed. Draw out the damper handles over oven doors. Open the slide damper in draft door under fire-box. Make the fire in the usual way. After the coal is well ignited close the dampers over oven doors and regulate by pipe dampers and draft door slide.

To Keep a Good Fire : Never have the coal higher than

the brick lining of fire-box, and do not allow it to collect on top of the ovens. Keep the fire well cleared of ashes, especially from against the water-back or back brick. When shaking, raking or dumping the grate, pull out the dampers under the oven doors — all the dust will then pass off in the flues. At all other times these dampers must be kept closed.

TO BAKE OR ROAST

Close dampers over oven doors and drum slide, and regulate by pipe dampers and draft slide. Should one oven operate more freely than the other, turn slightly the pipe damper over the one that works the best. If it is desired to use one oven only, to get a stronger and quicker heat, turn off the pipe damper tight over the opposite oven.

TO BROIL

Close drum slide, open pipe dampers, and dampers over ovens. Keep the covers on; use the broiler through the broiler door above the fire or the draft door under the fire.

The tubes in bottom of oven should be taken out and cleaned at least every two months.

1325 DIRECTIONS FOR BAKING OR ROASTING BY GAS IN MOTT'S CLAIRMONT COMBINATION GAS AND COAL RANGE HAVING GAS BURNERS IN THE OVEN

By J. L. Mott Iron Works, 84 Beekman Street, New York

Close all dampers and slides in the range and pipe.

Remove the strip from the bottom of the oven which covers the burners,

Open the air mixer wheels at gas cocks so that the proper amount of air for combustion will be admitted to the burners.

In starting oven burners, light the rear one first.

In using the oven have the covers on top of the range in position, except when the upper gas burners are in use.

Be careful in lighting to have a blue flame; if flame is red, extinguish and relight it.

Close the oven doors slowly, so that the oven burners will not be extinguished.

In baking or roasting use pan somewhat smaller than oven, so that pan will not project over the flame of burners.

Allow the gas to burn in the oven for twenty minutes before putting bread or meat in.

When not using the gas oven attachment, replace the strip in the bottom of the oven, and close all air mixer wheels at the gas inlets.

1330 DIRECTIONS FOR THE CARE AND USE
OF THE BEEBE RANGES

Nos. 0—1—2—3—4

By Janes & Kirtland, 725 Sixth Avenue, New York

To Kindle the Fire : Close throat-valve in the chimney, open the dampers C, C, as marked on stove, by drawing out the handles, and open lower ash-pit door.

To Bake : Open valves B, B, and close the dampers C, C,

and the throat-valve in the chimney. Place the pans of bread, or whatever is to be baked, directly on the bottom of the ovens, and, should they be too hot, open the feed door, which will lessen the draft.

The throat-valve in the chimney may be opened, *except when baking and kindling the fire*, and will relieve the kitchen of the steam and the fumes of cooking, and, by checking the draft, will prevent a waste of fuel.

The fire-box two-thirds filled with coal, is sufficient for all ordinary cooking, and it should *never be more than even full*; if too much coal is put in, and allowed to lie on the iron plates, over the ovens, it stops the draft, and prevents the range working satisfactorily.

To Bake: There is a dust damper handle at left side of the grate, which, if drawn out while raking the fire, prevents the ashes flying about on the hearth. Also, while using the gridiron underneath, it will take the smoke up the chimney; *at all other times it must be kept closed.*

To dump the grate pull out the damper at the right side of the grate. After grate has dropped, push back damper and then push grate up into place where it will catch automatically.

To clean the flues, first unhang the oven doors, lift up and draw out the oven bottoms, and open the dust dampers under the grate, taking care to clean the flue which runs across the back of the range, connecting the two ovens in the rear. This should be done every week. In replacing the oven bottoms, be sure that the ends having the pieces

of sheet iron riveted on the under side are put in at the back of the oven.

With a proper gridiron, broiling can be conveniently done *under* the grate, while the range over the fire can be used, at the same time, for other purposes.

The fire bricks should be replaced before they are entirely burned out. By attending to this in time, and by sending directly to Janes & Kirtland, considerable saving can be made, both in expense of repairs and in the quantity of coal used.

NOS. 15 AND 16 BEEBE RANGES

1335 *To Kindle Fire* : Close the oven dampers and open the direct draft dampers, close the fire door with slide and open the lower ash-pit door.

To Bake : Close direct draft damper or dampers and open oven dampers and leave fire doors as above. If only one oven is to be used, open the damper of the one required and keep other damper closed.

Dust Damper : At lower right hand of grate will be found a dust damper, which opens by pulling out. When raking fire or dumping grate, open this damper and the dust will be carried into the flue, but at *all other times keep closed*.

Throat Valve : In all brick-set ranges there should be a sheet-iron throat piece to fill up chimney opening with a valve to carry away odors of cooking. When baking, this valve must be kept closed.

Direct Draft Dampers : In all No. 15 and 16 ranges

made previous to 1894, the direct draft dampers were on each side of range, and opened by pulling out or toward you. In 1894 the damper was made to open directly from fire-box at back into flue by turning the handle at right-hand of smoke pipe on top of range, which closes by pushing toward back of range, opens by turning forward.

Oven Dampers : In all ranges made previous to 1894, the oven dampers were placed at the back of range, one at each side of smoke pipe and lettered to show when open or shut. In 1894 the dampers were placed under the top at each side of range, and they open by pushing in the rod, and close by pulling out.

To Clean Range : Brush all dust and ashes from top of ovens into the fire-box. Clean out flues at each side of range under top. Take out oven bottoms and clean out all dust and dirt, being sure to clean out all dirt from under the flues which lead down from top of range. Ranges should be cleaned once a week.

Brick Linings : It is very important to replace the brick linings as soon as they burn out, or the main oven plates of range will be injured. Knock clinkers off only when bricks are hot.

Water-Back : To insure a good supply of hot water, clean all ashes from under water-back every night.

BEEBE NO. 19 FRENCH RANGE

1340 *To Kindle Fire :* Close the oven dampers, which are those with crooked handles at each side of range (turn

down to close), and open the two direct draft dampers by pulling out. Close the fire door with slide, and open wide the bottom ash-pit door.

To Bake : Close the two direct draft dampers by pushing in, and open the two oven dampers by turning the handles up, and leave the fire doors as above. If only one oven is to be used, open the damper of one required and keep other damper shut.

Dust Damper : At the lower right hand of grate will be found a dust damper which opens by pulling out. When dumping grate, or raking fire, open this damper and dust will be carried into flue, but at *all other times keep closed*.

Throat Valve : In all brick-set ranges there should be a sheet-iron throat piece to fill up chimney opening, with a valve to carry away odors of cooking. When baking, this valve must be kept closed.

To Clean Range : Brush all dust and ashes from top of ovens into the fire-box. Clean out flues at each side of range. Take out oven bottoms and clean out all dust and dirt, being sure to clean out all dirt from under the flues which lead down from top of range. The range should be cleaned once a week.

Brick Linings : It is very important to replace the brick linings as soon as they burn out, or the main oven plates of range will be injured. Knock clinkers off only when bricks are hot.

Water-Back : To insure a good supply of hot water, clean all ashes from under water-back every night.

REFRIGERATORS

1345 To clean, use washing soda and hot water.

To clear the drip pipe, use the ordinary cleaner sold at hardware stores; it is a rod to which is attached a bristle brush. Or empty the refrigerator and remove all loose fittings and pour into the ice compartment a solution of one pound of washing soda to every pail of water; have the water boiling hot. Scrape the waste pan under the refrigerator and remove the slime. To clear the main line remove the plug on the line near the basement sink. You will find most of the trouble at the bottom of the line.

When refrigerators are not in use leave the doors open.

GLASS, GLASSWARE AND GLOBES

1350 All light fixtures should be completely equipped with globes and glassware before a tenant moves in. The tenant is responsible for any breakage while in possession of the premises.

Broken glass in doors or windows and in mirrors should be replaced before a tenant moves in. The tenant is responsible for any breakage of mirrors or of inside glass after moving in. The house is always responsible for

breakage in outside windows or doors except when caused by the tenant.

Before putting in glass be sure to scrape off all old putty and to paint the frame around the glass; if you do not do so the putty will fall off.

ROOFS

1355 Sweep roofs every week. Refuse stays wet and rusts the tin.

Remove drying racks before you sweep.

Never remove snow or ice from the roof itself. Keep your gutters, leader heads and leaders open; let the sun do the rest.

To clear leader heads and leaders, sift salt into them freely and then use hot water. It is still better to make and use a strong brine of salt water and use while hot.

To clear gutters, remove loose snow and salt them heavily.

Paint roof drying racks, tanks and bulkheads every year in June.

Roof tin should be painted on both sides before being laid.

ROOF TANKS

1360 Cover all outside tank pipes carefully and heavily with hair felt, then wrap with burlap tied on with heavy

twine. Close in beneath the tanks with tongue and groove lumber, leaving a door of proper size. Make this boxing as nearly air-tight as possible.

Paint the outside of all tanks every year.

The roof beneath the tank should be made of the finest quality of tin and should be painted on both sides before being laid.

The tank should be equipped with an overflow and a clean-out valve with drains attached which reach the open roof, and with a telltale which runs to some point in the basement where it can be seen very frequently by the man in charge. The discharge line should run up into the tank at least six inches to prevent sediment going through the mains.

Clean your tank every month.

ROOF DRYING RACKS

1365 To properly protect the roof, the roof drying rack platforms should entirely cover that part of the roof used to approach the lines and to reach the dumbwaiter or elevator. Platforms should be made in sections to facilitate cleaning the roof beneath them. All bearings having contact with the roof should have rubber washers under them. No bearing should cover more than one square foot of the roof.

All iron should be painted in June of every year.

Platforms should be at least eight inches above the roof to provide for cleaning under them.

HARDWARE

1370. Keep hardware, locks, knobs, fastenings and fittings under lock and key and in a dry place in the house storeroom.

Nickeled fittings should be kept wrapped in tissue paper and in a very dry place.

Gas fixtures should be wrapped in cheese cloth and hung upon frames so as to swing clear of the floor.

Besides an assortment of nails, screws and tacks, it will save much time to keep in stock:

Iron. Hasps and staples, hooks and eyes, screw eyes, 100 feet of small wire and a package of both large and small picture wire; awning pins and nuts.

Brass. Screws, upholsterers' tacks and picture hooks. A spool of basin and bath chain. One dozen small door bolts. One dozen cupboard catches, one-half dozen washtub faucets.

Copper. One hundred feet of small wire.

Lead. Three or four square feet of sheet lead.

Fittings. Sash lifts and fasteners. Loose and fixed pin hinges. One-half dozen sash weight pulleys. One hank of best quality sash cord. One-half dozen door knobs of the kind in use. One dozen door stops. One

dozen toilet seat hinges. One dozen mortise lock key blanks. Two dozen Yale lock key blanks.

Plumbing Fittings. Two or three of each of the small sizes of valves in use. One-half dozen radiator valves. Plugs, caps, unions, elbows and tees of the size used on the house lines. Twenty feet of each size of pipe in use on the house gas, water or heating lines. One dozen washtub stoppers. One dozen hand basin stoppers. One dozen bathtub stoppers.

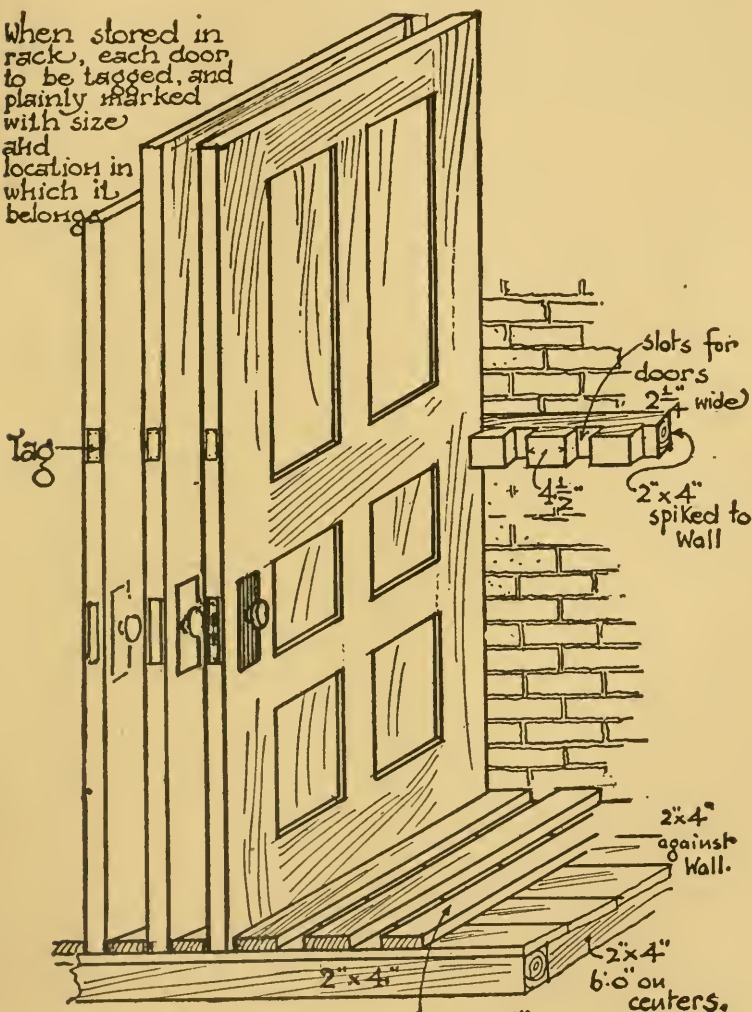
DOORS, TRIM AND MOLDINGS

1380 Keep all doors, mantels, molding and other trim locked up in your storeroom and off the floor to prevent moisture and warping. Never lay doors flat; stand them on end and straight, to prevent warping.

A door rack made of two strips of 2 x 4 lumber, notched and attached to the wall at heights of three and six feet, with a floor laid on 2 x 4 lumber, with one inch strips to form slides, will be found inexpensive and a time saver.

Mark the size of the door or location from which the door was taken, on the door before storing it.

When stored in rack, each door to be tagged, and plainly marked with size and location in which it belongs.



Rack for Doors not in use.

cleats $1\frac{1}{2}$ " high. $\times 4\frac{1}{2}$ " wide. $2\frac{1}{4}$ " apart spiked to flooring

slots for doors $2\frac{1}{2}$ " wide)

2×4 " spiked to wall

2×4 " against wall.

2×4 " 6'-0" on centers.

Tag

2×4 "

HARDWOOD FLOORS

1385 DIRECTIONS FOR THE CARE OF HARDWOOD FLOORS

*By the Buttle's Parquet Floor Company, 36 West 27th Street,
New York*

Dusting : To remove dust from floors use a wool duster. It is the best article for the purpose. A substitute may be had by taking six or eight yards of new cheese-cloth brought together in a fluffy bunch; this will absorb the dust as a sponge does water. Do not use a feather duster; never wash the cheese-cloth, simply shake it out and the dust is gone. When necessary to wash it use it for some other purpose and get a new piece for the floor. Do not dust furniture after dusting the floor. Always dust floor last and you will have it clean and bright.

Floor Enemies : *Water should never be used in cleaning hardwood floors ;* it will dull the most perfect finish, and in time will cause the colors to change. Imperfect castors on furniture that must be moved about is certainly an enemy to a well-kept floor. We have the "colonial castor cups"; they will protect the finish from injury.

Floor Refinishing : Your floors should be polished with

a finish that is made to walk on. Use for waxed floors, "Buttle's Colonial" make of liquid wax. Rub on with a dry cloth, then polish with a heavy brush. For hardwood floors use Buttle's floor tonic. Rub on with a cloth till it dries; it will polish of itself.

DIRECTIONS FOR REFINISHING HARDWOOD FLOORS

By Paul Thoms, 1238 Third Avenue, New York City

1390 To polish hardwood floors clean well with turpentine, using cheese-cloth in applying it. Sandpaper worn spots well. To wash or remove stains use oxalic acid (do not get the acid on your hands or clothes; it will burn them). Then finish with a mixture of one-third wood alcohol to two-thirds of orange shellac.

BRASSWORK

1395 Store all fenders, fixtures and fittings in your storeroom.

Iron fixtures should be covered with oil to prevent rust and should not be kept on the floor. Make a hanger of 2 x 4 lumber and hang your gas fixtures from the ceiling of your storeroom and clear of the floor.

AWNINGS AND SHADES

AWNINGS

1400 The house supplies awnings for the front windows only. Awnings should be taken down about October 15th and labeled and stored in a dry place and should be repaired in March and put up about April 1st, or as soon thereafter as requested by the tenants.

SHADES

1405 The house supplies tenants but one set of shades. These are always of uniform color and are for outside use. Inside or dark shades are not supplied by the house.

Shades in the main hall must always look fresh and must be replaced as soon as they are torn or show soil or wear.

Before tenants move in, all torn, faded or soiled shades should be replaced.

Equip every shade with a cord; never take hold of the shade itself; raise or lower it by its cord.

When storing them wrap unused shades in newspaper to keep out dust and to prevent them fading. Keep them off the floor and away from any moisture.

FURNISHINGS—WALL PAPER

1410 Do not allow the house furnishings to get shabby. In June (the dull month) of every year, have your main hall and house furniture done over or replaced and have your draperies, rugs and carpets cleaned.

Also do any necessary work on the walls and ceilings of the main halls and vestibules during this month.

In relaying stair carpets see that they are shifted to insure an even wear.

As often as necessary to keep them looking fresh, have your lace and window or door curtains cleaned.

Replace roller shades in your main hall if they become faded or torn, at once.

Keep your sky-light glass clean.

Keep the main hall lighting fixtures looking like new. If they need refinishing, do the work in June.

Use wire or rubber door mats. They are clean and durable.

Keep in the main hall an umbrella stand, a large umbrella and a mail box.

WALL PAPER

1415 Wrap up, label and store in your work room all left-over wall paper. You will need it for repairs.

Keep it dry and well covered to keep out dust.

METAL WORK

1420 The fire-escapes, fences, railings, outside lighting fixtures and all outside ironwork should be painted in June of every year.

Cornices and ornamental work should be painted as soon as it shows scale. It will rust rapidly if not protected by paint.

The ironwork of roof sky-lights should be painted in June of every year.

The first coat of paint on all metal work should be composed of red lead and linseed oil.

MASON WORK

1425 Keep stone, brick and terra cotta work well pointed up. It is not economy to neglect mason work. Do all necessary pointing in June of every year. One freeze in open joints will do damage you cannot repair.

LEADERS AND DRAINS

LEADERS

1430. Much damage is done by attempts to remove snow and ice from a roof.

Keep the leader heads and leaders open and allow the sun to clear the roof.

To clear frozen leader heads and leaders, sift salt into them freely and then use hot water.

Even better results will be obtained from the use of a strong brine of salt water if used while hot.

Wood alcohol will also be found to be very effective in clearing frozen leaders.

It is a great mistake to attempt to chop or break ice away from leaders or from roofs; when it cannot be thawed it is best to allow it to remain until the sun and moderate weather do the work. Chopping is very apt to occasion bad leaks and expensive repairs.

DRAINS

1435. Drains are trapped with an "S" trap in the same manner as is a hand basin.

Standing water in courts, areas and yards is an evidence of negligence.

Drain traps should be opened and cleaned every month. They should then be flushed thoroughly to carry all loose trash and sediment through to the street sewer.

RECIPES AND FORMULAE

WHITEWASH

1440 The following is an United States Government receipte for making whitewash. It does not rub or wash off:

“Take half a bushel of unslaked lime, slake it with boiling water, cover during process to keep in steam, strain the liquid through a fine sieve and add to it a peck of salt, previously dissolved in warm water, three pounds of ground rice boiled to a thin paste stirred in while hot, half a pound of Spanish whiting and one pound of clean glue dissolved. Add five gallons hot water to the mixture, stir well and let stand a few days covered from dust. It should be applied hot. The east end of the President’s house at Washington is done with this mixture. It is used on all government lighthouses.”

One pint of whitewash will cover one square yard and is almost as serviceable as paint and is much cheaper than the cheapest paint.

For cream, add yellow ochre.

For pearl or lead, add lamp- or ivory-black.

For fawn, add four pounds umber to one pound Indian red.

For stone color, add four pounds raw umber to two pounds lampblack.

ROOF PAINT

1445 A good roof paint is a compound of one-third part of raw linseed oil, two-thirds part of "Foots Oil." Color this mixture with dry metallic. "Foots Oil" is the settlings of linseed oil. It can be procured from the Dean Linseed Oil Company or through any of the large dealers. Before being painted, a roof should be scraped and thoroughly cleaned. If this is not done, the old paint will scale. (Roof Paint Formula supplied by Thomas O'Callaghan, 238 Columbus Avenue.)

1450 Pure red lead and good linseed oil is also a good roof or metal paint. It is claimed that this mixture is non-porous and elastic, and that, being non-porous, it will protect metals from rust, and being elastic, it will follow the contraction and expansion of metals without cracking, or leaving metal exposed to the influence of the atmosphere where the cracks occur. Exposure of tin to the atmosphere causes rust at once.

TO REMOVE STAINS FROM MARBLE.

(Taken from "Record and Guide"—March 31, 1905, Page 26.)

1455 To remove stains from marble mix quicklime with strong lye to the consistency of thick cream, and brush this on the marble. Leave for twelve hours and then wash off. If this is of no avail, mix four ounces of soft soap with four ounces of whiting, one ounce of soda (sodium hydrate),

and one-half ounce of sulphate copper in powder, and boil the whole together for fifteen minutes. Rub this mixture while still hot over the marble, using a bit of flannel on a stick for the purpose. Leave for twenty-four hours, then wash off and polish the marble. Oil stains may be removed by applying a paste of common clay and benzene. Iron rust and ink stains are treated with: Butter of antimony, one part; oxalic acid, two parts; soft water (rain water), 32 parts. Dissolve and add whiting or flour to the consistency of a thick paste. Apply evenly with a brush and leave for a few days. If the stains are still visible, repeat the operation. To restore the polish after any of these operations, use a bit of old felt hat wrapped around a bit of wood, and with it hot water and emery powder, rubbing the marble until an even surface is obtained. The emery powder should be in graded sizes, using the coarse first and finishing with the finest flower of emery, changing the felt with each change of powder. The flower will leave a comparatively fine gloss on the surface, which should be heightened with putty powder and fine, clean cotton rags, finishing with silk. No water should be used toward the last.

TO REMOVE GREASE SPOTS FROM MARBLE

1460 Apply a small quantity of whiting or fullers earth. Saturate with benzene; let it remain thirty-six hours. Or apply two parts of washing soda, one part of fine ground pumice stone and one part of chalk, all finely powdered and

made into a paste with water. Rub well over the marble and finally wash off with soap and water.

To take oil stains from marble, use soft soap, one and one-half parts; fullers earth, three parts; potash, one and one-half parts. Use boiling water to mix. Apply to the grease spots and let it remain three hours.

TO REMOVE STAINS FROM MARBLE

1465 Use turpentine, two and one-half tablespoonfuls; lye, one and one-half gills; oxgall, one and one-half ounces. Add sufficient pipe clay to make a paste. Apply the paste and let it remain several days, then wash off and dry.

TO REMOVE INK STAINS FROM MARBLE

1470 Dissolve one ounce of antimony trichloride and two ounces of oxalic acid in one quart of water. Add flour enough to make a paste; leave on the spot a few days until the spot is removed.

If this is of no avail, take two parts of common soda, one part of pumice stone, one part of finely powdered chalk; sift it through a fine sieve and mix with water, then rub it well over the marble and the stains will be removed. Then wash the marble with soap and water.

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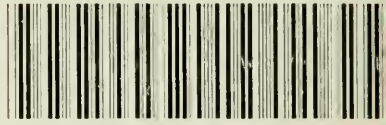
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