

Instruction Book for Ward's

Windsor Hydraulic Ram



Montgomery Ward Co.
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How to Figure the Capacity of a Ram

To find the number of gallons of water a ram will pump you must know: 1st, the number of gallons of water per minute that can be supplied to the ram from the spring, pond or stream; 2nd, the number of feet of fall from the water level to the ram (Drive Head in Feet); and, 3rd, the vertical height the water is to be forced from the ram to the storage tank (Delivery Head in Feet).

Locate in the first column your "Drive Head in Feet." Look opposite this figure in the table and find the figure that is directly under your "Delivery Head in Feet." Then multiply this figure by the number of gallons per minute that flow to your ram from the spring or pond. The result will be the number of gallons the ram will deliver to your storage tank in 24 hours. Example: Suppose your "Drive Head" is 6 feet, your

"Delivery Head" is 50 feet, and the flow of water to your ram through the drive pipe is 3 gallons per minute.

In the table opposite 6 feet Drive Head and under 50 feet Delivery Head you will find the figure 130. Multiply this by 3 (number of gallons per minute) and you have: $3 \times 130 = 390$, the number of gallons your ram will deliver to the storage tank in 24 hours.

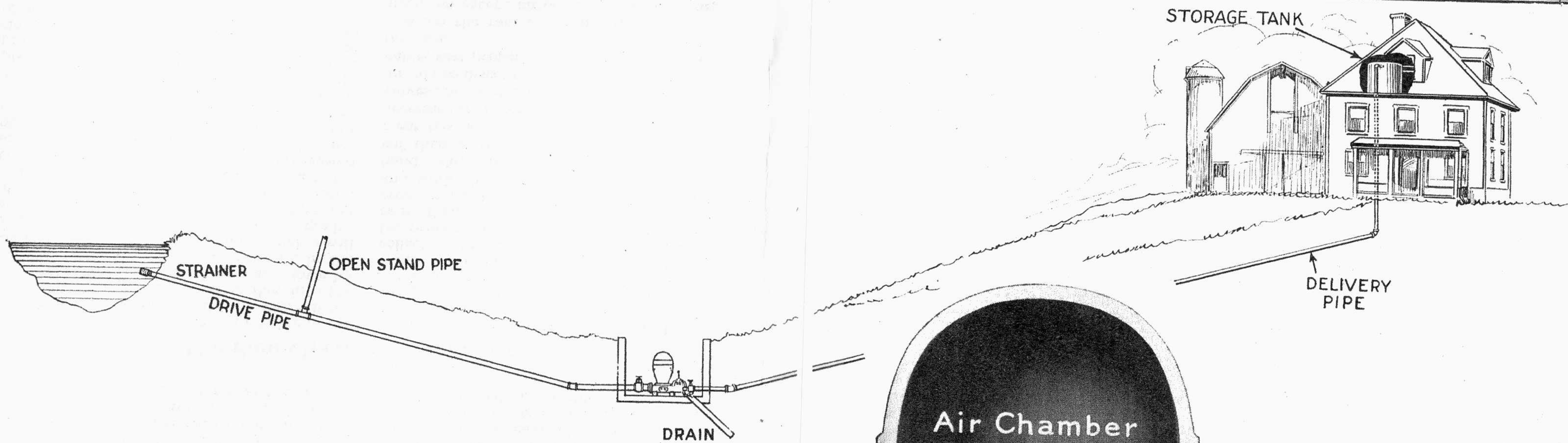
If a pneumatic tank is to be used, it must be remembered that each pound of pressure as registered on the pressure gauge of the tank corresponds to 2.31 feet of elevation. Therefore: If you intend to carry 20 pounds of pressure in the tank, the actual feet of elevation corresponding to this will be 20×2.31 or a delivery head of approximately 46 feet.

Tables of Capacities

Drive Head in Feet	Delivery Head in Feet															
	10	15	20	30	40	50	60	70	80	90	100	120	140	160	180	200
	Gallon Capacity in 24 Hours															
4	432	288	216	144	108	76	64	55	48	43	38	32
5	540	360	270	180	135	108	80	69	60	54	48	40	34
6	...	432	324	216	162	130	108	82	72	64	58	48	41	36	32	...
7	...	505	378	252	189	151	126	108	84	75	68	56	48	42	37	...
8	432	288	216	173	144	123	108	86	78	64	55	48	42	38
9	486	324	243	194	162	139	121	108	86	72	62	54	48	43
10	540	360	270	216	180	154	135	120	108	80	69	60	53	48
12	432	324	259	216	184	162	144	130	108	83	72	64	57
14	505	378	303	252	216	189	168	151	126	108	84	75	66
16	432	346	288	247	216	192	173	144	123	108	86	77
18	486	389	324	278	243	216	194	162	138	121	108	86
20	540	432	360	308	270	240	216	180	154	135	120	108
22	475	396	339	296	264	237	198	169	148	132	118
24	519	432	370	324	288	259	216	184	161	144	130
26	468	401	350	312	280	234	200	175	156	140
28	505	432	378	336	303	253	216	188	168	151
30	540	463	405	360	324	270	231	202	180	161

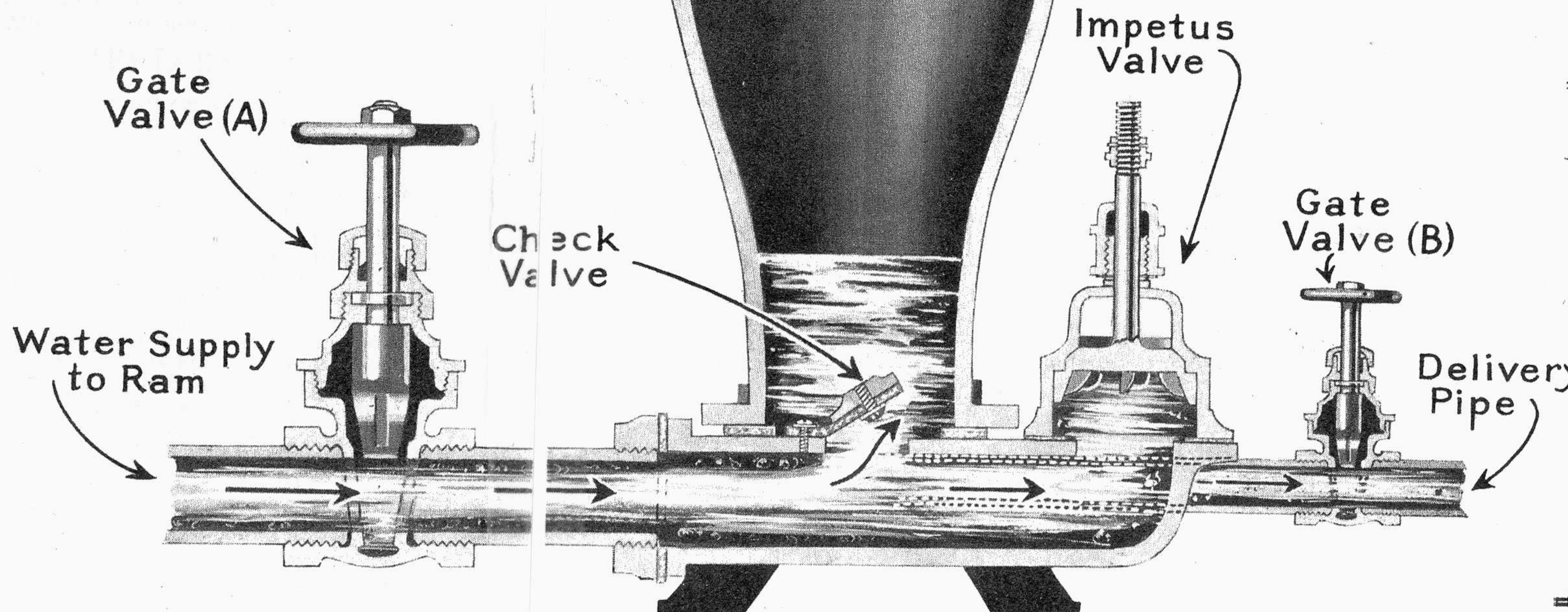
Table of Sizes and Weights

Size	Water Required to Operate Gals. per Min.	Length the Drive Pipe Should be	Size of Pipe		Shipping Weight Lbs.
			Drive	Discharge	
2	1/2 to 2	12 to 50 ft.	3/4 in.	3/8 in.	30
3	2 1/2 to 4	12 to 50 ft.	1 in.	1/2 in.	40
4	3 to 7	12 to 50 ft.	1 1/4 in.	1/2 in.	55
5	6 to 14	25 to 100 ft.	2 in.	3/4 in.	75



The upper picture gives a good idea of the way to install a ram arranged to pump into an attic storage tank. The lower picture is a cut-away view of the ram showing the valves and the path taken by the water. Notice the simple, rugged construction and the absence of complicated, delicate parts. Simplicity and reliability are the outstanding features of this ram. Once properly installed, it will operate without attention day after day. No valves or attachments to "fuss" with, no bearings to forget to oil. It makes it possible for you to have the comfort and convenience of running water in your home. You can also use it to pipe the water to your barn, for sprinkling the garden and lawn or for fire protection.

It is necessary to put an overflow pipe on a storage tank. The overflow water can be piped to the watering tank for stock.



It Is Easy to Install a Ram

When installing a ram, choose a location where the ram can be placed on a firm, level foundation of wood or concrete. The ram should be bolted securely on the foundation and provision must be made to carry away the waste water without undermining the foundation. It is imperative that the ram be level to operate satisfactorily and to permit the impetus valve to work without side friction. In cold climates where provision must be made against freezing, the ram should be installed in a covered pit and all pipes must be laid below the frost line.

The Drive Pipe

The drive pipe which supplies water to the ram, should be of the size given in the table on Page 6. For best results, it must extend on a straight incline, without bends, from the ram to the source of water supply. The best angle for the drive pipe is a fall of one foot for every five feet of pipe. This slope can be easily determined with a carpenter's level and a rule. If it is impossible to install a straight inclined drive pipe, it is preferable to make a bend in the pipe itself rather than use elbows or fittings. The upper end of the drive pipe should be fitted with a good strainer so leaves or weeds will not be drawn into the ram. It should be placed at least one foot below the lowest level of the water supply to prevent air being drawn into the drive pipe. Use red lead or white lead on the joints of the drive pipe to make it air tight and put in a gate valve near the ram to

shut off the water supply when necessary. This gate valve is shown in the illustration on the next page by the letter "A."

A gate valve should be used, because it permits a straight unobstructed passage for the water. When drive pipe is excessively long a tee with a plug in the side opening should be placed in the drive pipe about the same distance from the ram as the total height of the delivery head, so that an open stand pipe may be connected if it is necessary. This is also illustrated on the next page. The stand pipe should be at least one size larger than the drive pipe, and should extend several feet above the level of the water supply. The purpose of the open stand-pipe in a long drive pipe is to act as a cushion and prevent excessive strain on the pipe and fittings when the impetus valve of the ram closes.

The Delivery Pipe

The delivery or discharge pipe must never be smaller than the size given in the table on Page 6. Where the water is to be forced for a long distance, it is better to use a larger size pipe to decrease the friction. Make the delivery pipe as straight as possible and avoid all unnecessary bends or turns. The delivery pipe must be air tight and red lead or white lead should be used on the threads when screwing the joints together. A gate valve (see "B," Page 5) should be placed in the delivery pipe near the ram. It is a good plan to leave all connections exposed until after the ram is in operation and the pipes have been tested for possible leaks.

The Ram Operates Automatically

To start the ram close the gate valve in the delivery pipe and open wide the valve in the drive pipe to allow the water to flow into the ram. Work the impetus valve up and down by hand a few times, and as the pressure in the air chamber increases, the impetus valve will work automatically. When this occurs, gradually open the valve in the delivery pipe and allow the water to be forced to the storage tank.

The longer and slower the stroke of the valve the greater will be the amount of water wasted and pumped. If the ram is run fast, it does not pump as much water as when run slowly, but the high speed is more economical in the consumption of water. Therefore, if economy is desired, run the ram fast; but, if plenty of supply water is obtainable and it is desired to pump a large quantity of water, run the ram slowly. For sizes 2 to 5, inclusive, a good rate of speed is from 50 to 60 strokes per minute. The stroke of the ram is adjusted by raising or lowering the brass sleeve nut on the impetus valve and must be changed to suit the condi-

tions. Only by experiment can you determine which is the best stroke to suit your conditions and you will soon find the best length of stroke and speed for your ram after it is installed.

Scale or sediment should not be allowed to collect in the ram as this will interfere with the proper action of the valves and may even cause them to stick and stop the ram. If this occurs close the gate valve in the delivery pipe and work the impetus valve a few times by hand. This may free the valves and the ram will then operate automatically. If much sediment has accumulated in the ram it may be necessary to disconnect the pipes and clean the valves and air chamber. If it is ever necessary for you to disconnect the ram, be sure that the valves seat properly when you replace them in the ram.

When the ram is in operation it needs no attention except an occasional visit of inspection and it will pump night and day as long as conditions are favorable.

A Ram Requires No Motive Power

The hydraulic ram is a simple, automatic device for raising water from a stream or spring to a tank or reservoir at a higher level. It operates by water power and utilizes the principle commonly known as "water hammer." When properly installed, it is the simplest and least troublesome form of a self-contained pumping unit.

We have all heard the water "pound" in a pipe when a faucet is quickly closed when the water is running. This is the principle upon which the hydraulic ram operates. Inside the ram there are two valves which operate automatically after the ram has been started. The fall of a volume of water furnishes the power to raise part of the water to a higher level than the source of supply.

Advantages of the Hydraulic Ram

One of the chief advantages of the hydraulic ram is that it needs no other power than that furnished by the flowing water. It is of simple construction and very durable. It requires no attention or oiling and, in many cases, inspection is only necessary once or twice each year. It contains very few moving parts which are subject to wear and these parts are easily and cheaply renewed when necessary.

The isolated home, far from city water works,

Conditions Necessary to Use a Ram

When determining if your conditions are suitable for the installation of a ram, remember that there must be a flow of water available with a fall of at least four feet. A ram will operate with a smaller fall but is not efficient and is not so satisfactory. To determine the flow of water available, make a small, temporary dam with an open pipe laid near the top. Place a tub or several pails to catch the water and measure

You Can Use Pneumatic Tank With Ram

The ram can be used to pump into any style storage tank. In the pneumatic system the water is pumped into an air-tight steel tank, where it is stored under pressure. The pressure within the tank is regulated by an adjustable, automatic relief valve. The advantages in using the pneumatic tank system are many; the water is kept cool and clean; the tank is located out of sight; and water may be drawn at any point, as for filling water troughs, fire protection, etc. Under certain conditions this combination of the Hydraulic Ram with a pneumatic tank can-

Water flowing down the drive pipe (see Pages 4-5) flows against and out through the impetus valve until it attains velocity sufficient to close the valve. The momentum of the water, thus checked, forces some of the water through the valve at base of air chamber and up delivery pipe. This process is known as the water hammer. The greater pressure in the delivery pipe soon overcomes the upward movement of the water and causes a reaction or backward pulsation which closes the valve at the base of the air chamber. The decreased velocity of the water allows the impetus valve to open and the water flows out through the valve until it again has attained sufficient velocity to close it.

can often be easily and cheaply provided with a continuous supply of cold running water without further expense than the purchase and installation of a hydraulic ram. The constant pumping of the ram insures cold and fresh water.

A continuous supply of water under pressure in farm houses and country homes makes possible sanitary plumbing, watering stock without labor, sprinkling lawns, fire protection, facilities for vehicle washing, etc.

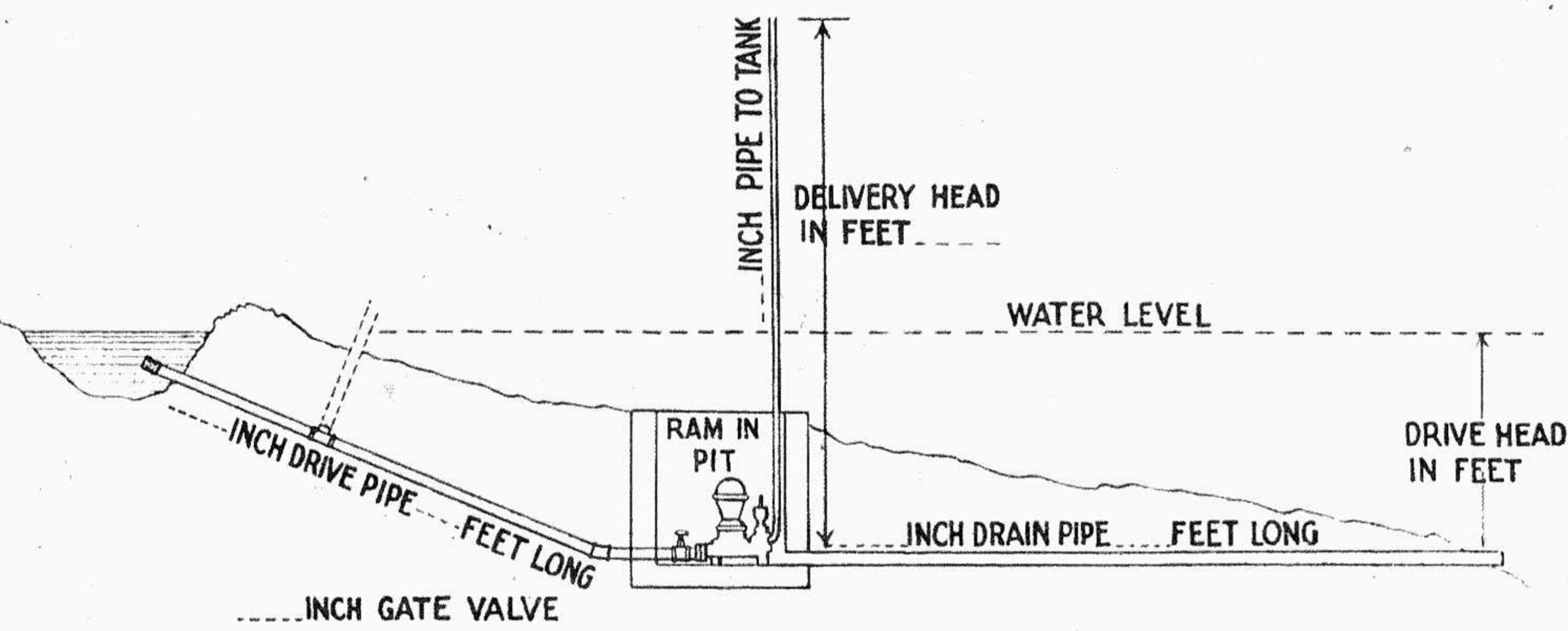
accurately the number of gallons of water that flow through the pipe in one minute, checking the time by the second hand of your watch.

If the ram is to be used in a cold climate it must be protected against freezing. The best plan of doing this is to place the ram in a covered pit equipped with a drain pipe to carry away the water and with all connecting pipe laid beneath the frost line.

not be excelled.

If you wish to use a pneumatic tank be sure to purchase a ram that is equipped with a small air valve near the point where the drive pipe connects to the ram. The purpose of this air valve is to supply a small quantity of air to the air chamber at each stroke of the ram. This prevents the air chamber from becoming water logged and insures the continuous operation of the ram. A small spray of water from the air valve at each stroke of the ram indicates that the air valve is operating properly.

Information Sheet for Ordering Hydraulic Ram



Read carefully the questions given on this page. Then fill out the exact answer to each question in the spaces shown by the dotted lines in the illustration above.

If you desire a quotation on a complete Hydraulic Ram pumping outfit, please answer the following questions. Our furnishing you with detailed data, with recommendations as to size of ram, size of pipe, etc., obligates you in no way whatever.

1. How many gallons per minute can be supplied to the ram from the spring, pond or stream?

.....
NOTE—Do not say supply fills a certain size pipe, but actually measure water by bucket and watch.

2. What is the vertical fall in feet from water supply to the point where the ram will be located?

.....

3. What is the distance between the point of supply and the place where the ram will be located?

.....

4. How many gallons per day will you need?.....

5. What is the vertical height, in feet, that the water must be lifted from the ram to the tank?

.....

6. What is the length of pipe necessary between the ram and the tank?.....

If the price on a storage tank is wanted, state whether an attic or pneumatic tank is to be used. If a pneumatic tank is wanted, under what pressure do you wish to store the water, or how high above the tank will the highest outlet be located?.....

Name.....

Street and No..... R. F. D..... Box.....

Postoffice..... State.....

Make Us a Rough Sketch of Your Installation

Make us a rough sketch on this sheet showing the location of the stream or pond, the place you would like to put the ram and the buildings where water is to be supplied. You can let the

distance between lines represent 10 feet, 50 feet, 100 feet or any figure that suits your conditions but be sure to tell us the distance each square represents.

