Amy Barkley.

THE

STEAM-ENGINE;

OR,

The Powers of Flame.

AN ORIGINAL POEM.

IN TEN CANTOS.

BY T. BAKER.

"Soon shall thine arm, UNCONQUER'D STEAM, afar,
Urge the slow barge, and drive the rapid car."
DR. DARWIN'S *Bot. Gard.* A.D. 1791.

"Steady and swift the SELF-MOVED CHARIOT went,
The way was through the adamantine rock.
. . . . . on either side
Its massive walls arose, and over head
Arch'd the long passage."
SOUTHEY.

LONDON:
J. S. HODSON, 22, PORTUGAL STREET,
LINCOLN'S INN.
1857.

London:
Printed by J. S. Hodson, 22, Portugal Street,
Lincoln's Inn.

PREFACE.

THE unparalleled greatness and grandeur of the Powers, collectively termed the Steam-Engine, the great revolutions and ameliorations which they have gradually produced in the state of Society, during the last half-century, and the consequent vast progression of the human race to a higher position in intelligence and power throughout the civilized world, have concurrently raised them so high in public estimation that, I trust, a recital of their rise and progress, in the present form, will excite no surprise.

It will be evident from a perusal of the Poem, even to one who has never previously turned much of his attention to the development of the Steam-Powers, that they have deeply impressed themselves upon the inventive intellect of a very high order of men,—from commoners to peers, for a long series of centuries; until they have at length amazed and gratified the world by their achievements; the mere notion of which, not many years since, would have been regarded as an attempt to surpass Eastern romance, and which have even more than realized the sublime, which gives magnificence to poetical ideas.

It will be further found that the Poem not only refers to the great achievements of the Flame-Powers, but also to the almost divine aspirations of their Fostersires; who, in a truly Christian spirit, sought to aggran-

dize and elevate the human race; and, though their first partially successful attempts met with little encouragement, but were abundantly assailed with ridicule, which is the common fate of inventors, yet, in most cases, they lived to witness the pre-eminent success which was worthy of their noble aims.

I deem it unnecessary here to detail the plan of the Poem, which will be sufficiently evident from the Arguments to the several Cantos; and which is acknowledged to be decidedly original by several gentlemen of high and well-known literary reputation, who have examined either the whole or portions of the work; and who, with several other highly intelligent gentlemen, have done me the favour of giving me their names as subscribers for the Work.

T. Baker.

April 25, 1857.

THE

STEAM ENGINE;

OR, THE

POWERS OF FLAME.

A POEM.

IN TEN CANTOS.

CANTO I.

ARGUMENT TO CANTO I.

I. Introductory Address to the Hero, the Great Power of Flame or Steam-power, in the collective and most extensive acceptation of the term.—II. Plan of Poem.—III. Proposed correction of vulgar error concerning the Foster-Sires of the Powers of Flame.—IV. The mental conceptions of great inventions often originate from the most trivial things: instances given in the discoveries of the laws of gravitation, electricity, optics, &c.: their progress to perfection slow.—V. Similar origin and slow progress of the Power of Flame: the Steam-Boy of Heron, the Egyptian Mathematician: Æolipile and Jack of Hylton: the antics of the latter in Hylton Hall, Staffordshire: Song, Jack of Hylton.—VI. The opinion of the ancient Philosophers concerning Steam: the thunder of the Pagan God, Busterich, produced by Steam: Rivault's Steam-Bomb.—VII. Early attempts to bring forth Powers of Flame by De Garey, Branca, and De Caus.—VIII. Tubal Cain's claim to the origin of Flame-Power doubtful: Vulcan's claim fully established, he having existed before the creation of the world, and having forged the CRATER, one of the Southern Constellations near the Zodiac, which is also called the Cup, Cauldron, or BOILER, the primordial part of our Hero's frame: thus establishing his CELESTIAL ORIGIN.—IX. Hence the propriety of applying the names of the Gods to the Marine and Locomotive Flame-Powers.—X. Resumption of our Hero's Progress.—XI. Important mission to the Marquis of Worcester concerning the production of an efficient Flame-Power, during his Imprisonment in the Tower of London, in the time of the Commonwealth: his experiments, &c.—XII. The Marquis' Vision of splendid Machinery, exhibiting a Panorama of "The Century of Inventions," including Flame-Power: The Hymn of Steam: The Genius of Aerial Flame addresses the Marquis in his Vision, predicting the future glories of the Power of Flame, with the ultimate deliverance of man from toil and care: The destruction of Vice and reign of Virtue.

THE

STEAM ENGINE;

OR, THE

POWERS OF FLAME.

CANTO I.

I. Hail mighty chief of adamantine frame!
Born of fierce fire, thy breath the scorching flame;
Boundless thy power and terrible thine ire;
Vast prodigy! who bidst the world admire,
And, wondering, view in matchless flight afar,
The lengthen'd train of thy triumphal car!
As if impell'd by magic art to bound
Thro' rifted rocks, o'er open plain and mound,
A glorious feat supremely in advance
Of Wonder's dream or Araby's romance!
Or, if on rolling ocean be thy way,
It is not thine for favouring breeze to stay;
But, e'en against the furious tempest's force,
Sublimely daring, thou pursu'st thy course!
Such thine achievements which the world amaze,
For such are most exposed to public gaze!

But in the darksome depths of Cornish(1) mine,
Where massive rocks forbid the sun to shine,
Thy potent arm began its active play,
And heaved the swamping flood* to face of day;
Secured the precious ore deep in the vein,
Which long the miner had despair'd to gain.
But now, so god-like grown, thy powers prevail,
Where else the noblest art of man would fail!
Such are thy deeds, beyond what Fame of old
For future praise on Glory's list enroll'd!

II. Our Hero, own'd almost divinely great,
Thus introduced, our Muse shall first relate,
In due accordance with his fame and worth,
His deeds on ancient record from his birth;
His early frolies† on the banks of Nile;
His progress westward to this favour'd Isle;
Where his young antics‡ made a fresh display,
And gratified alike both grave and gay;
Where learned men began to mark, elate,
His active powers, while yet in embryo state;
Where full development of all his might
Was first achieved and witness'd with delight!
What nature, accident, and art supplied
To raise him thus supreme in vigour's pride!
His sons, the SAILOR§ and the CHARIOTEER‖,
Of wide-spread modern fame, shall next appear;

* This was the first use to which this splendid power was applied, A.D. 1689.
† See note, p. 6, and Additional Notes, No. 2.
‡ See Additional Note, No. 7.
§ The Marine Steam-Power.
‖ The Locomotive.

What pleasure, pain, what ridicule and praise
Their deeds excited in their early days;
Their countless triumphs both by "flood and field;"
And what the grand result to man must yield!
Their foster-sires besides, as we proceed,
Shall each of praise receive his rightful meed;
Whose mental throes and patient care brought forth
This VAPOROUS RACE of matchless power and worth!

III. In error's mazes some so far have gone
As to ascribe to famous Watt alone,
(Whose honour in this cause has weighty claim)
The sole production(²) of the POWERS OF FLAME,
Excluding blindly from high honour's place
The prior claims of the illustrious race
Of wise and learn'd, of commoners and peers,
Their foster-sires in long-fled infant years;
Hence to the reader, who the truth would know,
Our verse shall now their rise and progress show.

IV. Most works of man, admired as truly great,
By slow degrees attain their perfect state;
And take their rise from the most trivial things;
As from a seed the stately cedar springs;
But ages must elapse ere comes its time
To cleave the skies all glorious in its prime.
An apple falling from its parent tree,
Led Newton to unfold the mystery
Of that all-powerful gravitating force
Which gives the planets their unerring course.
Such the result from a mere casual glance;
The magnet's power was thus observed by chance.

Gases, the optic lens, electric might,
Amazing all, thus all were brought to light;
But time was needed, toil, and efforts slow,
T' extend their use, and all their powers to show.

V. Thus in a cauldron on a glowing fire,
Th' imprison'd VAPOUR, with rebellious ire,
Spurning the cover which its force confined,
Produced at once in famous Heron's mind
The grand conception, whence the SPIRIT came,
That moved the WHIRLING SPRITE(3) which bears his name.
Such was the birth, in Egypt's palmy days,
Of our young STEAM-BOY*, and his first displays
Of active force were merely to impart
A lively zest, and show new powers of art!
No doubt the old Egyptian sages smiled
At the first antics of this marv'llous child;
But soon dismiss'd, as a mere empty boast,
The curious toy, all vanity and cost;
Nor thought, nor dream'd, that he in future time
Would grow in strength, in a far distant clime,
Till he *en masse* could lift and proudly bear
Their largest pyramid aloft in air,
And thus, in full reality of deed,
Their famous Magi's fabled feats exceed!
Æolipile(4) and Jack of Hylton(5) too
Their moving spirits from HOT VAPOUR drew;

* This is the first recorded Steam-Power, the production of the famous Mathematician Heron, or Hero, in the reign of Ptolemy Philadelphus, 120 years B.C.—See Additional Notes, No. 3.

By both its active force is clearly shown;
Their foster-sires and dates remain unknown.
All these at most were ANTIC-BOYS confess'd,
On whom young Genius had his stamp impress'd;
They drew the curious in "the good old days,"
Had all their share of ridicule and praise,
And gave the thinking mind a transient gleam
How vast the strength of the GREAT SPIRIT, STEAM!
Of those whose powers made infantile displays,
YOUNG JACK OF HYLTON* claims especial praise;
A younger brother was this youth of fire
To him who had great Heron for his sire;
But JACK, a more amusing, merry boy,
First in the ranks of revelry and joy,
Was prompt to show his antics at the call
Of Hylton's Lord in old baronial hall:
Our Muse delights his glories to prolong
In numbers gay, with livelier tones of song.

* In the sixteenth century, a little instrument was invented, being another application of the power of steam for the purpose of turning a wheel, by means of a current of vapour issuing from a tube fixed in a hollow ball, partly filled with water and placed over a fire. An instrument or toy of this kind is mentioned in Plot's "Staffordshire." He says, "JACK OF HILTON is a little hollow image of brass, about twelve inches high, leaning upon his left knee and holding his right hand upon his head . . . having a little hole in the place of the mouth about the bigness of a great pin's head, and another in the back about two-thirds of an inch diameter, at which hole it is filled with water, and holds about four pints and a quarter. This, when set to a strong fire, evaporates after the same manner as an æolipile, and vents itself at the smaller hole at the mouth in a constant blast, driving very forcibly round the wheel, to the fans of which it is directed; the wheel being placed or mounted in an oblique position with respect to the horizon, and carrying near its rim two images on opposite sides of the centre, which, in consequence of the rotation produced by the blast of steam, appeared to caper and dance."

Song.

JACK OF HYLTON.

Fair England gave young JACK his birth;
Each merry Christmas ball,
He gave high tone to sprightly mirth,
In Hylton's lordly hall.

Lord Hylton then with banquet rare,
The hallow'd evening crown'd,
For baron, knight, and lady fair,
All Staffordshire around.

Then music, dancing, wine, and song,
Enliven'd every soul;
And Hylton's Lord, a warrior strong,
Push'd round the wassail-bowl.

But what made this the blithest feast
In pleasure's rapturous round,
Young JACK OF HYLTON gave a zest
Not elsewhere to be found.

For while the wassail-bowl and mirth
Right merrily round were pass'd,
JACK from his mouth sent vapouring forth
A hot and furious blast;

Which struck the fans of well-poised wheel,
That bore two younkers tall,
And made them caper, dance, and reel
To the delight of all.

Jack's heart well primed with active fire,
He strong and stronger blew;
Quick whirl'd his wheel, loud rang the lyre,
And quick the dancers flew!

Ah! little thought the joyful throng,
On that gay festive night,
That Jack, who blew with breath so strong,
Display'd the infant-might

Of IRON GIANTS, then unknown,
With more than Titan powers;
Whose feats by land and sea are shown
In this bright age of ours.

Youth's frolics, practised in a harmless way,
Meet kind indulgence both from grave and gay;
They show young spirits to be duly rife
With active vigour for the toils of life.
And we've just seen that the young CHIEF OF STEAM
Disported gaily through youth's airy dream:
His lively vigour, which was thus reveal'd,
Had else been ever from the world conceal'd.
Though, thus reveal'd, his growth indeed was slow,
And long forbid advancing strength to show;

Yet still the vigour of his SPIRIT, STEAM,
Gave to philosophers a fruitful theme
Of grave debate, to priests a brand of fear
To awe dull devotees, as we shall hear.

VI. To STEAM destructive powers(6) immensely great
Were first imputed at an early date:
The earthquake's shock, the dread volcano's rage
Were thought t' arise, by Greek and Roman sage,
From casual floods, which might beneath acquire
A sudden change to STEAM by latent fire.
This theory still, at least in part, exists
With casuists keen, and sage geologists.*

Tuetonic Superstition, artful dame,
On Weser's bank did much to raise her fame,
By what the ignorant would doubtless deem
Dread miracles, through agency of STEAM.
For when great Busterich(7), their guardian-god,
Was moved by wrath to use the chastening rod,
A boiling cauldron, in his frame conceal'd,
Forced up its clamps, when mimic thunder peal'd;
While steam in stifling clouds began to spread,
Which struck his worshipers with trembling dread;
And hence his priests at once secured a load
Of else reluctant gifts to soothe their god.

But maugre what philosophers surmised,
Or Pagan priests for lucre's sake devised,
Man by experiment had not yet found
This SPIRIT'S STRENGTH defied all earthly bound;

* See Book IV. p. 96, of the Rev. J. S. Watson's Poem entitled *Geology*.—See also Dr. Buckland's works on the same subject.

Till Rivault's bomb(8) of iron strong and tough,
With water charged, with plug made leakage proof,
And bound besides with heavy brazen tire,
Was duly placed upon a glowing fire;
When soon the active flame on airy wing
Bid the great SPIRIT with such vigour spring,
That he, impatient of confinement there,
Upheaved the bomb in shivers through the air.

VII. Thus did our sires this active POWER employ
As something marv'llous, or an antic-boy,
Exciting ardent Genius to bring forth
Those grand productions of more real worth.
Hence Garey(9), Branca(10), and De Caus(11) became
The foster-sires to these young sons of flame:
All these to active powers made some advance,
By turns in Spain, in Italy, and France;
The first was destined some renown to gain,
By moving loaded vessels on the main;
The second only rivall'd Heron's* scheme;
The third display'd the expansive power of steam.

All these, although for matchless action meant,
Fell clearly short of the desired intent,
From some important member wanting there,
Or inefficiency of fostering care,
From lack of funds or public patronage,
Or from fell Envy's more destructive rage.
From stolid gazers ridicule they drew,
With some cool praise from the enlighten'd few.

* See Additional Notes, No. 3.

Thus doubtless many more were thrown aside,
Of which no record has a trace supplied;
Which Genius from his young resources drew,
When men, less polish'd, felt their wants but few.
These, though abortions mimicking the might
Of those grand births hereafter brought to light,
Encouraged hope in this most glorious cause,
And claim a record and mankind's applause.
These were precursors of our HERO's prime,
The beacons of his fame in future time,
Which, thro' the deepening gloom of ages gone,
With feeble light to modern days have shone.

VIII. Thus far we've traced our VAPOROUS CHIEFTAIN'S course,
From infantine attempts at playful force;
Which, dating from sage Heron's time, appears
T' include a lapse of near two thousand years.
But savans deep, and casuists, gravely state
That his YOUNG SPIRIT had its primal date
In ages far remote, when art was young,
Long ere the STEAM-BOY* to existence sprung:
That those pugnacious agents, flood and flame,
The great and primal movers of his frame,
Could not themselves sustain continuous life,
Without a CAULDRON to compose their strife,
The adamantine cradle, where at first,
Innocuous flame his YOUTHFUL SPIRIT nursed;
Where he was wont to play for many an age,
Till duly noticed by th' Egyptian sage.

* The Egyptian production already noticed.

Hence they, with much apparent truth, maintain
His origin is due to Tubal Cain ;(12)
Who, as in Scripture's sacred page 'tis said,
Before the flood began the founder's trade,
Whose huge sledge-hammer, slung with new-born skill,
Made brass and iron pliant to his will ;
Supplied new implements the arts to aid ;
Whence they assume he the FIRST CAULDRON made.
While some at this, as vague deduction, sneer,
And not at all historically clear ;
So they, advancing prior claims, aver
His rise is due to famous Mulciber*;
Who, as by ancient classic authors said,
Existed long before this world was made,
Who form'd Apollo's and Aurora's car ;
Equipp'd stern Mars in panoply of war,
And forged th' effulgent golden CRATER, near
Fierce Leo's foot in the celestial sphere,
By sage star-gazers nightly seen to shine
With radiant glow, when summer days decline ;
Its brilliant carving makes a grand display,
Most glorious work, not destined to decay,
But through all time in realms above to stand,
And show the splendid work of Vulcan's hand ;
Which in the modern cup or cauldron's place,
Is clearly the most ancient of its race,
And hence, as clearly the primordial sign,
Or REAL FOUNT, of all our Hero's line :

* One of the names of Vulcan.

We, therefore, can produce a pedigree
Of peerless splendour and antiquity!

IX. Success thus crowns our bold attempt to trace
Our Hero to his high celestial race,—
A race his superhuman deeds may claim,
And fully authorized by classic fame.
Thus all great bards of old heroic verse,
When they their chieftains' god-like deeds rehearse,
Prolong their lineage to their sires above,
Not e'en excepting the great thunderer Jove;
So we, discovering just and lineal claims,
Without presumption may apply the names
Of these same gods to our great HERO'S RACE,
Thus putting honour in its proper place!
Each modern LOCOMOTIVE, therefore, bears
The name of Mercury, Pluto, Vulcan, Mars,
Or some great hero's name of mortal birth,
Whose brilliant honours prove his god-like worth.

X. We now shall look two centuries back through time.
Ere yet our HERO'S powers attain their prime;
That we may trace him in his first degree
Of adaptation to utility.
Whence "the long glories" of the sons of flame,
Their great achievements and exalted fame,
We shall with care record, ere we proceed;
What Heaven on this important point decreed,
Without whose aid nought great beneath the sun
Can be successfully by mortals done!

XI. In embryo then his future power reposed.
Save what the sages named before disclosed,

In distant climes, and ages long since gone,
Their immature productions scarcely known,
Save what perchance might meet the curious eye,
That scann'd the records of antiquity.
None "gave the midwife-word to call him forth,"
To show his might, his long neglected worth.
Young Jack of Hylton solely kept the stage,
The boy of rare delight in that dull age,
Confined, however, to the narrow sphere
Of knight and lady's gaze in Staffordshire:
Thus was the youth of future greatness spent,
As antic-boy, for centuries in restraint.
Great Shakspeare, speaking of precocious youth,
Says "naughty weeds are always quick in growth;"
While Virgil, in majestic Roman lays,
Through Dryden's like majestic English, says,
"The mighty oak, the monarch of the trees,
Reaches maturity by slow degrees."
Such was the youth of the first CHIEF OF FLAME,
A sure prognostic of his future fame!
But Heaven resolved to end his youth at length,
And show him forth in pride of growth and strength.
The weighty scheme to aggrandise mankind
Was straight reveal'd to noble Worcester's[14] mind;
Who, then imprison'd for imputed crime
Against the State, in dreaded Cromwell's time,
Sat lone and thoughtful in the gloomy Tower;
His mind intent, at that auspicious hour,
On the vast force with which the vapour toil'd
T' escape the vessel, while his meat was boil'd.

With 'kerchief next the lid he padded round,
Which to its place seem'd now securely bound;
But soon the SPIRIT so much strength reveal'd
As made his bonds, like a mere cobweb, yield!*
Straight Worcester saw, (as we've already told
That Garey, Caus, and Branca, did of old,)
From thence vast power might be deduced by art,
Which would to man essential good impart.
All prior powers by these old sages shown
In distant nations, were to him unknown,—
But he had read of Heron's WHIRLING SPRITE,
A soul of whim with strength by far too slight;
And he had once beheld with ecstacy,
YOUNG JACK OF HYLTON'S antic-revelry;
Whose boyish spirit seemed t' evaporate
Too quick by far to give his strength full weight.
But now he deem'd the mighty POWERS OF FLAME
Should animate a more recondite frame;
Yet by what means to bring his scheme to bear,
Perplex'd his mind with anxious thought and care:
Since dire restraint and watchful spies prevent
All hopes t' achieve the great experiment
Which he conceived, though vaguely, in his mind
To prove this MATCHLESS POWER to all mankind;
While he, devout, implored the powers divine
To aid, propitious, this august design.(15)

* The Marquis of Worcester allayed the tediousness of his imprisonment in the Tower of London, by daily making experiments such as are here described, for which he was considered to be insane.

THE VISION OF THE MARQUIS OF WORCESTER.

XII. With hopes now high, now with despair oppress'd,
As Phœbus sunk, he also sunk to rest;
When lo! uprose before his mental view
A HUNDRED ENGINES (16) of devices new!
In slow procession he their forms survey'd;
In each recondite fabric were display'd
Rare works of art, and such as far surpass
Ought erst beheld in iron, steel, or brass;
While gems with gold and silver's polish'd sheen
Blended their hues in this artistic scene:
Thus clearly was the glorious art foreshown,
That graced the Crystal Dome of Fifty-one.*

Resplendent seals were there in groups arranged,
Which by a touch their rare devices changed,
And secrets in all languages convey'd
From man to man, nor once their trust betray'd.
Such were the seals to Eastern Magi known,
By which of old their wond'rous feats were shown.

Nine engines next in slow succession came,
Explosive from the slightest touch of flame,
Replete with missiles, used in various ways;
Such engines were unknown in former days,

* The Crystal Palace in Hyde Park in 1851.

The dread devices of our modern Mars,
Since known so fatal in Crimean wars;
Rockets and bombs, with fire-works made to please,
Have all derived their origin from these!

A floating garden, gay with verdant bowers,
And redolent with blooming trees and flowers,
Drew its own moisture, moved its pleasing form,
Spontaneous met the sun, and shunn'd the storm;
Such scenes of fair delight are wont to smile
From age to age in Hainan's palmy Isle!

Nine splendid founts their varied forms display'd,
Whence cooling streams, abstrusely winding, stray'd;
In one, tall jets bright Iris' colours show'd;
In one, the waters ever ebb'd and flow'd;
Not founts so rare are known in Ispahan,
Nor in the harems of proud Ottoman;
The grand competing jets of Fifty-one,
In all their crystal sheen, were here foreshown!

Next there came forth a vast abstruse machine,
Where motions of ten thousand worlds were seen:
Th' æthereal vault around was wide display'd,
As by bright Phœbus from his car survey'd;
Here scenic splendour and rich art outshone
All Orreries to modern science known!

A new variety, in number vast,
Of ever-changing forms before him pass'd:
Not Proteus' self could with their antics cope,
Nor modern scenes of gay Kaleidoscope:
Their graceful symmetry and rainbow-hues
A rapt'rous wonder o'er his mind diffuse!

To vary these abstruse artistic scenes,
There pass'd along a group of fresh machines;
Many there were that in these days impart
Essential aid to various schemes of art:
One was a globe buoy'd by a crystal well,
Which night or day the passing hour could tell,
With the elapsing minutes, seconds too;
And, like the dial, to the heavens true;
The famed Clepsydra, in its artifice,
Was but a bauble when compared with this!
Martial designs came next, in size immense,
Adapted for attack, and for defence:
Such are the bulwarks frowning o'er the Rhine!
Such those of Spain that floated on the brine!
To crown these shows of wonder and delight,
A BEING rose of superhuman might:
With pond'rous rod he brought the foaming waves,
As if by magic, from earth's deepest caves;
Varied his task his wond'rous powers to prove;
Swift o'er the plain he bid the chariot move;
Now by his touch made the huge millstone reel;
Now moved 'gainst wind or tide the loaded keel.
In all the strength of iron was his frame;
And though from Heaven he seem'd his birth to claim,
The vast recondite powers of human art,
Abstrusely grand, shone forth in every part!
At every motion from his nostrils came
A mounting vap'rous breath like subtle flame!
At once it beam'd on Worcester's mental eye
That STEAM alone might this great power supply:

And, lo! as 'twere this thought to realize,
He saw it, fuming, from vast cauldron rise;
From whence this PRODIGY his SPIRIT drew,
Achieving thus what met the wondering view!
But as he scann'd the various springs of might,
A cloud of vapour hid HIM from his sight.
While still before him Art's fresh glories shone,
A Hymn was chanted with seraphic tone:—

HYMN OF THE GREAT SPIRIT, STEAM.

All hail! all hail! by Heaven's command
The mandate 's duly seal'd;
Th' auspicious hour is just at hand
My powers shall be reveal'd!
Make strong, make strong my iron-frame,
Ye powers of Art below!
And let my arm full freedom claim,
My god-like strength to show!

Long, long, I've had oblivious sleep,
From Nature's dawning hour,
Embosom'd in the waters deep;
But now I'll rush to power,
To stand supreme in glorious light,
To shine in iron-mail,
And shame the pride of human might,
So puny, vain, and frail.

Deep in the dark unfathom'd mine
My potent arm shall play;
Earth's hidden ores that peerless shine,
I'll bring to glorious day;
From floods I shall the miner save,
That swamp the depths below,
And make "the dark reluctant wave"
Its granite cup o'erflow.

Such deeds shall form the first display
Of my all boundless power;
But what shall men wild-wondering say,
When I at distant hour,
In league with Commerce and proud Mars,
Shall drive in pageant pride
My fiery steeds in flying cars,
O'er seas and empires wide?

Entranced with rapture still great Worcester lay,
While the Hymn's music gently died away.
Still came vast groups of grand machinery,
Some were for pleasure, some utility;
In modern art some hold a glorious place,
And shone in Fifty-one with matchless grace;
While some, 'twould seem, were destined to engage
The great mechanics of a future age!
Keys next appear'd, rose-shap'd, three-corner'd, square,
Their various locks of mechanism rare;
Their complicated and artistic wards
Scorn'd cunning thieves, and need of watchful guards;

From them the sons of Muleiber deduce
Their famous patent locks in modern use:
The locks abstruse of Transatlantic art,
Were clearly here foreshown in ev'ry part!

These pass'd away, when lo! appear'd a chair,
Which clasp'd resistless those once seated there:
A like device was used in days of old
By wily monks to tame the rash and bold.

Now soaring in the air a youth was seen,
Buoy'd by the action of a vast machine;
Its power derived from complicated springs,
Which, like the eagle, moved expanded wings.
When thus to soar, say, shall mankind profess?
Since all attempts are yet without success;
Though Darwin prophesied that this grand scheme
Shall reach perfection by the aid of STEAM.

Lastly, to close this bright artistic train,
The BEING(17) HALF-DIVINE came forth again,
To show the energy of STEAM once more;
Firm on a rock he stood by ocean's shore.
Though in essentials he appear'd the same,
More large and intricate his wond'rous frame:
Which soon was destined to divide in three;
ONE PART* skimm'd quickly o'er the rolling sea;
ONE† o'er the land, swift darting from the coast,
In pageant car was soon in distance lost;
While on the PART‡ which still retain'd its place,
Appear'd a FORM of super-human grace;

* The Marine-power. † The Locomotive-power.
‡ The Stationary-power.

Enrobed he seem'd in bright ætherial vest,
And thus the wondering Marquis straight address'd :

" I am the Genius of aërial flame,
" By Heaven's command, omnipotence I claim !
" Can shake the mass of this vast mundane sphere,
" And strike all lands with trembling awe and fear ;
" From the deep bosom of volcanic caves
" I heave black fumes and lava's burning waves ;
" My voice in thunder echoes through the air ;
" My livid arm seen in the lightning's glare ;
" Unseen I rend, by the dread earthquake's shock,
" The lofty mountain and the granite rock !
" Now mark my words, nor view my form with fear,
" Peace is my misssion, I'm innocuous here !
" By high command of dread creative Power
" I have appear'd at this auspicious hour,
" Thus to foreshadow to thy searching mind
" This PRODIGY of strength for man design'd,
" Much to alleviate his toil on earth,
" And give to art a new and glorious birth !
" Besides this POWER, I've shown thee ninety-nine ;
" But THIS in strength is destined to outshine,
" To form, direct, and animate the rest,
" With many more which time shall hence suggest ;
" As by Divine command the glorious sun
" Bids vigour through a boundless system run.
" The crystal waves by fierce embrace of fire
" With giant-strength will actively aspire,

" And dissipate their powers in empty air:
" 'Tis, therefore, thine with high artistic care,
" Their strength in frame of iron to invest,
" When their vast energy will be confess'd!
" The SPIRITS, thus upraised from crystal flood,
" Shall form the FUTURE GIANT'S LIVING BLOOD,
" Wield his huge limbs, the task required fulfil;
" Like thine own arm, subservient to thy will.
" I've shown thee much at this eventful hour,
" Which appertains to this RESISTLESS POWER,
" Much shall be left to thy conceptive brain,
" And much to those that follow in thy train!
" For, be it known, 'tis by high Heaven design'd
" That neither single hand, nor single mind,
" Nor single age, is destined to mature
" The various functions of this god-like power,
" Who hence shall take, a thing not dream'd of now,
" The weighty duties of the loom and plough:
" While virtue's growth, and pleasures more refined,
" With this VAST POWER allied, shall bless mankind!
" But long before they duly consummate
" The full enjoyment of this blissful state,
" Perverse delays and interruptions rude
" Will on his march to future strength obtrude:
" For bigots, demagogues, and all their train
" Of wild delusionists their arts will strain,
" To lead frail man t'adopt their wily schemes;
" Which, (though as baseless as mere madmen's dreams,)
" Will urge him forth to grasp with loud acclaim
" Deceitful hopes, and spurn the POWER OF FLAME,

" Will kindle endless jars and mad debate,
" Long desolating wars, and ruthless hate.
" All these must happen ere vain man can know
" His real friend from his decided foe.
" And though our great divines, philanthropists,
" Lawgivers, sages, and economists,
" With much success, have their grave plans design'd
" To conquer vice, and elevate mankind :
" Yet vainly look we for th' auspicious hour,
" When these designs, with full efficient power,
" Shall all be brought harmoniously to bear
" Against the tyranny of toil and care,
" 'Gainst crime of every shape in word or deed,
" And evil thought, of other crimes the seed,
" Till this VAST POWER come into active play ;
" And then shall dawn true freedom's glorious day ;
" When man, to slavish toil no more confin'd,
" Shall, pleasing task, alone exert his mind !
" His frame be brac'd with healthful exercise ;
" Pure joys his heart, gay scenes delight his eyes,
" Like future Sydenham's, all green and new,
" Expanded and expanding to the view ;
" Great mental powers, acknowledged such, shall then
" Direct with ease the vast concerns of men ;
" A full QUIETUS thus shall be attain'd
" For human ills, and ' Paradise regain'd !'
" 'Tis thine this MIGHTY POWER t' initiate,
" And show to men his all-important weight :
" Though they at novelty are wont to sneer,
" In this, thy grand attempt, still persevere,

" And treat their levity with disregard,
" For deathless fame shall be thy great reward!"
This said, the Genius rose in clouds of STEAM,
While Worcester woke from his enchanting dream.
The hundred engines,—their devices new,
Impress'd on memory's scroll, he kept in view;
Described them briefly, gave to each a name,
And hence the " Century of Inventions " came!
While soon arrived great Cromwell's mortal hour,
Which freed the Marquis from th' immuring Tower,
And straight began his toils and mental throes,
From which the GOD-LIKE POWERS OF FLAME arose!

END OF CANTO I.

THE

STEAM ENGINE;

OR, THE

POWERS OF FLAME.

CANTO II.

STATIONARY POWER.

ARGUMENT TO CANTO II.

I. The magnificent pre-eminence of the Hero's Stationary Power, both in strength and skill: Examples given: His vast productive powers in alliance with Commerce, extend the social intercourse and civilization of mankind: The Muse undertakes to disclose the anxious cares and mental labours of his successive foster-sires, for a long series of ages, in bringing him forth, and raising him to his present proud position.—II. The Marquis of Worcester produces the first Stationary Power: His vast strength proved to the great discomfiture of those who ridiculed the project.—III. The Marquis' "Century of Inventions," including his Steam-Power, coolly received by mankind; partly on account of the languid state of commerce in his age, and partly on account of their novelty.—IV. Professor Papin's Steam-power: he first introduces the Cylinder and Piston: his persecution by bigots, his exile, and his project condemned.—V. The drainage of the Cornish mines found impracticable by ordinary means: The efficiency of Captain Savery's Steam-power for this purpose, same as that of the Marquis of Worcester: Superstitious notions of the ignorant concerning this power.—VI. Newcomen's splendid reproduction of Steam-power: Its greatly increased strength; Condensation by jets accidentally discovered, and resulting improvement in its strength: Bacchanalian revels in honour of the event: Song of the Cornish bard in praise of this gigantic power.—VII. Professor Papin's second Steam-power: he first introduces the Safety Valve, &c., &c.—VIII. The Contest between England and France for priority in the production of this remarkable Power.—IX. Potter's improvement, by which our Hero becomes for the first time an Automaton with greatly increased energies.

THE

STEAM ENGINE;

OR, THE

POWERS OF FLAME.

CANTO II.

STATIONARY POWER.

I. THIS MIGHTY CHIEFTAIN, both in age and fame
The sire supreme of all the POWERS OF FLAME,
Unlike his sons, the Locomotive race,
Displays his strength in one selected place,
With skill so varied, as to fix at call,
On any task, however great or small!
The elephant, by vast corporeal might,
Can bear a bulwark dreadly arm'd in fight;
Or with his trunk can rend huge oaken trees,
Or lift minutest gems with equal ease!
These, though an ample range of varied powers,
Are quite eclipsed by this GREAT CHIEF OF OURS!
Who hurls huge rocks of granite from their base,
Or forms the texture of the finest lace;
Can lift the largest ship aloft in air,
Or spin a thread as slender as a hair;

Or, should his wrath prevail with fiery breath,
Can spread around him havoc, wounds, and death!
Such varied feats of strength, of skill and rage,
Were ne'er recorded on poetic page;
Feats which invest our CHIEFTAIN with a charm
Of awful grandeur both for good and harm!
But since he rarely is with anger fired,
His useful deeds are still the more admired!

He, thus endow'd with superhuman power,
Soon onward sped the bright auspicious hour,
Which gave new arts of peace their glorious birth;
Spread the mild reign of Commerce round the earth;
And pass'd the barriers, which, since time began,
Forbade the social intercourse of man.

Our Muse's task is henceforth to declare
The anxious hopes, the toil, and mental care
Of peers, professors, sages, artizans,
To rear our HERO on their favourite plans;
To trace from age to age the toils he bore,
In draining mines, in dragging coals and ore,
With every step by which he proudly rose,
And whence he thus such god-like vigour shows!

II. When Second Charles began his regal sway,
Our CHIEFTAIN first to Britian found his way;
Where, as already said, from embryo state
His powers were destined to become so great,
In due accordance with high Heaven's command,
By aid of noble Worcester's skilful hand:
Whose meritoriously ennobled name
Has thence acquired a higher rank in fame.

His glorious " Century of Inventions " shows
A rare conception, whence so proudly rose
Our youthful CHIEFTAIN's vigour to show forth
Impulsive action of acknowledged worth!

The new-born strength of his vast iron-frame
Rose from expansion by the glowing flame,
Then condensation of his vap'rous blood,
By sudden contact with the cooling flood.(1)
Thus Worcester placed in our YOUNG HERO's hand,
An active power, by which he could command
A foaming stream with its reluctant weight,
To rise direct full five score feet in height;
To the chagrin, discomfiture, and shame
Of all who ridiculed the POWERS OF FLAME!

III. Of all his hundred projects this alone,
In vig'rous action, to the world was shown;
And much he wish'd to aggrandize mankind
By this VAST POWER, with all the rest combined.
His ardent, active, philanthropic thought
New projects ev'ry day to ripeness brought,
To counteract the troubles, toil, and care,
To which frail man, through Eden's loss, is heir;
Ills which he hoped entirely to remove,
To add new pleasures, and the old improve,
Such as by Heaven's behest were erst foreshown,
In vision's hallow'd light, to him alone.
But his, alas! was not th' aspiring age
To give such vast designs due patronage;
For commerce then was languid in the land,
And no gigantic projects yet had plann'd,

Nor had the Cornish and Northumbrian mines
Prolong'd so deep their excavating lines,
As to require the potent arm of STEAM
To carry out e'en one vast drainage-scheme:
Th' apparent wildness, too, of Worcester's views,
On many a subject, made the world refuse
To sanction those great projects he design'd,
As the light whims of an erratic mind.
Of his own age a century in advance,
He still was thought the creature of romance,
Till worn with care and poignant grief of mind,
At the neglect he suffer'd from mankind,
He died, yet young, and left the powers of flame
To give renown to many a future name:
He now had forged, 't was his appointed part,
THE FIRST GRAND LINK in the great chain of art;
And thus to Genius pointed out the way,
To his great triumphs in Victoria's day.

IV. The POWERS OF FLAME, apparently dissolved,
Were duly still in some strong minds revolved;
For the great boon, by hallow'd mandate seal'd,
And henceforth to the world to be reveal'd,
Through the conception of great Worcester's mind,
Was in due time ordain'd to bless mankind;
But many years their tedious course had run,
Ere in the cause grand efforts were begun.
Among the sons of progress, then so few,
Great Papin (2) kept these SPLENDID POWERS in view;
Deep his research in all the varied store
Of Æsculapius' and Mathesis' lore;

Whence he explored great nature's latent springs,
Of active motion in material things.
His skill in art, long spread by Fame's report,
Induced the royal lord of Gallia's court
To place him o'er the engineering train,
In charge to raise the crystal flood from Seine,
The vast Parisian reservoir to fill,
When this NEW POWER began t' engage his skill.

From his new foster-sire our CHIEFTAIN came
In high artistic energy of frame.
The CYLINDER and PISTON* here we find,
For the first time, among his parts combined;
Own'd as improvements on the NOVEL POWER,
Produced by Worcester many a year before.
The pliant parts our HERO thus obtain'd,
Appear'd, at once, a mighty object gain'd,
Since straight essential members they became,
For all th' arrangements of his modern frame,
His central parts of action, breast and heart,
Where his hot SPIRITS their quick strength impart.
Tho' these important points were clearly gain'd,
To add new pliant members still remain'd,
Ere he to prosperous action could be brought,
"So vast is art, so narrow human thought."

When Papin's SCHEME, for wat'ring Paris meant,
Fell greatly short of its desired intent,

* The Cylinder and Piston were previously invented and introduced in the Air-Pump by Otto Guertricke. But this was their first introduction as parts of Steam-power.

The parts required, he with such skill design'd,
As proved a fertile, energetic mind;
That well could bring so great a GIANT forth,
And e'en forsee his future strength and worth!
As by his lucid tracts is well made known,
Still in fair Gallia's annals proudly shown.
But, lo! this great conception of his brain
Was doom'd for years in embryo to remain!
'Tis said neglect, and long arrears of pay,
Had much effect in causing this delay;
For costly pageants, wars, and state affairs,
Engross'd King Louis', and his courtiers' cares,
And left no means to rear the iron-frame
Of Papin's hopeful SON, the CHIEF OF FLAME.
Meanwhile the court, by Papal councils sway'd,
Did Henry's boon*, unfetter'd thought, invade;
Hence, reckless Bigotry with fury rose,
And dealt fell vengeance on her Luth'ran foes;
The wise, the good, the sober, and the sage,
Were all the objects of her boundless rage.
Papin, well known to spurn the ancient creed,
Was straightway mark'd among the rest to bleed,
While he, t' escape fell Persecution's hand,
Sought an asylum in a stranger's land.†
His grand design, thus rudely check'd, 'twould seem,
Was long neglected as a hopeless scheme,

* The revocation of the edict of Nantes, by which toleration to Protestants was granted by Henry IV. of France.

† See Additional Notes to Canto II. No. 2.

And by his foes assail'd with ridicule:
While he was mock'd as heretic and fool.
Thus suffer'd Genius, and our HERO's cause
From Popish bigots, and their cruel laws;
But one of many 'mong the flagrant crimes,
Which mark'd with terror those priest-ruling times:
Though then had dawn'd the true and glorious light,
Destined to chase dire Ignorance's night.

V. At length the miner, who his wealth attains
From Cornwall's vast, unfathomable veins,
His excavations had so deep pursued,
That drainage now with serious care was view'd;
While all th' existing powers at art's command,
Proved quite unequal to the task in hand,
Or else attended with so great a cost,
That all his gains, alas, must now be lost!
But soon the Mother of Inventions new,
Necessity, the world's attention drew
To this emergency, (a pressing strait,)
When Savery(3), son of Mars, stood forth elate,
Eager t' achieve his mighty drainage sheeme
Through our great HERO's arm impell'd by STEAM!

Worcester's grand FLAME-POWER, we hereafter find,
Employ'd anew bold Savery's fertile mind;
Who, with some few improvements of his own,
Born of deep thought, or by experience shown,
Did to our HERO's fabric now impart
A fresh construction with consummate art;
And used his strength, with great success, to drain
The Cornish mines in Orange William's reign.

Our HERO grew from that eventful hour
An active agent of acknowledged power;
And, destined in Herculean toil t' engage,
Became the boast and wonder of the age;
His lightest efforts were full threefold more
Than other powers, at utmost stretch before;
And this, accomplish'd at such trifling cost,
Was all-important and admired the most.
Thus was our HERO's early force display'd,
Like convict, slavish drudge, or washing maid,
At pump to make the crystal flood ascend,
Nor yet seem'd destined for a nobler end.

His novel form, endow'd with powers so rare,
Made, with amaze, the simple miners stare:
Some, quite o'erawed by superstitious fear,
Stood far aloof, not daring to come near;
While some their courage cautiously display'd,
And near the MONSTER slow approaches made;
Said one, while he with spell-bound wonder gazed,
" The dreaded imps of Hell are surely raised,
" Who thus with fire and fume effects impart
" Beyond the reach of our forefathers' art:
" Sure, sure, all this will have some fatal end;
" May Heaven our lives from such vile fiends defend!"
With hideous forms of giants in his head,
Another thus his awe-struck thoughts betray'd,
" Tho' by famed Jack* were all our giant's slain,
" This sure is one return'd to life again,

* Jack the Giant-Killer, well known as a Cornish hero.

" Condemn'd to toil and expiate his crime,
" Of countless murders, in King Arthur's time!
" Alone within the mine I'd not remain
" For all the wealth its utmost depths contain!"
For such was Superstition's gloomy day,
When wonders held their undiminish'd sway,
When pixies, faries, fiends, an awful host,
Haunted these mines and flitted round the coast!

Rock after rock with patient toil gone through,
The excavations deep and deeper grew;
While fountains, daily pierced, deep in the vein,
Pour'd on the miner all their floods amain,
So that to drain the depths became, at length,
A work too great for our young HERO's strength.
Who next shall aid his growth, whose skilful art
Shall to his frame new energy impart?
Who his new foster-sires? and from what source
Shall vigour spring to speed his glorious course?

VI. The noble, learn'd, and men of martial fame,
Thus far have honour'd the YOUNG CHIEF OF FLAME;
He next descends to the plebeian hand,
To rise and shed new glories o'er the land.
A novel form behold him now attain
From famous Newcomen(4), in Anna's reign!
Of Devon, he, in Vulcan's studio train'd,
With high success his patron's fame sustain'd,
And had, besides, a rare conceptive mind:
With Cawley's* aid he those huge limbs combined,

* Newcomen's co-engineer.

Produced by Worcester, Papin, Savery's skill,
Prepared this weighty purpose to fulfil;
Then bid him grasp in his Herculean hands
The massive lever* his vast strength commands,
And toiling heaves, from earth's deep mineral caves,
With ceaseless force "the dark reluctant waves!"

Our YOUTHFUL CHIEF, though in his frame we find
The nice conceptions of full many a mind,
And though so much by all his friends admired
For strength and action, thus at length acquired,
In these essentials soon gain'd great advance,
A rare production of the merest chance!
Since the strong heavings† in his spacious chest
Rose from cold-bathing‡ its strong iron-vest,
In which it proved there was a casual wound,
Through which cold dews an inward entrance found,
And powerful motion all at once renew'd,
Which Newcomen with gazing wonder view'd!
And sought the latent cause, whence could proceed
Such vig'rous strokes with such unwonted speed;
When from the vent the life-blood's outward flow,
Gave him the cause with rapt'rous joy to know;
And straight he form'd the needful parts to do,
What lucky chance presented to his view;
And bade the vapour thence collapse§ and rise,
With speed that struck the world with fresh surprise!

* The great beam of the Steam Engine first introduced by Newcomen.
† The re-action caused by the condensation of the Steam.
‡ The old process of condensation. A defect or casual vent in the cylinder.
§ Condensation by jet.

And thus was gain'd a power full three-fold more
Than was possess'd, for want of speed, before;
Two pages* now did all he could require,
Observed his pulse, and gave his heart due fire.

Such powers, beyond all expectation great,
With cost, besides, at still diminish'd rate,
Made all the tin-lords'† hearts o'erflow with joy,
That they forthwith to all in their employ
Proclaim'd a holiday from morn to night(5),
"To drink good luck" to the YOUNG CHIEFTAIN'S MIGHT!
When, by the custom of old gala-days,
In Bacchanalian routs and wild displays,
Masters and workmen hasten to an inn,
With all concern'd in the great works of tin;
Bold Newcomens, then chief of Vulcan's peers,
With Savery, Cawley, his co-engineers,
And all the smiths who forged our HERO'S mail,
Convened exultingly his feats to hail!
And last, not least, in this wild, jovial scene,
Was Cornwall's bard, with wreath of holly green,
The last was he, of all his race, who bore
Those once-loud harps, renown'd on Cambria's shore,
At fetes like this he aye right welcome sung,
While to his voice his harp responsive rung.

No care had Boniface about his score,
Strong ale was brought in barrels to the door:

* Only two boys were now required to attend the valve (pulse) and fire of the improved Steam-power.

† The owners and lessees of the tin-mines.

All join'd promiscuously in loud acclaim,
With copious draughts to hail the CHIEF OF FLAME,
Who gave their efforts greater scope t' explore
The vein's vast depths where lay the richest ore!
And next the tin-lords and the engineers
Were pledged by turn with long vociferous cheers;
These were repeated twenty times at least,
While still their mirth, and still their thirst increased.
At length unanimous they call'd the bard,
Who rose with ecstacy, right well prepared
With song and music loudly to proclaim
The glorious feats of the YOUNG CHIEF OF FLAME!

SONG OF THE CORNISH BARD.

What future boon shall Cornwall bless?
The land of wond'rous deed;
Where giants ruled, but they are dead;
And who shall next succeed?

A greater GIANT far than they,
But not for us to dread,
In this our happy land is born,
And he reigns in their stead!

Hail, mighty CHIEFTAIN, son of flame;
Hail, CORNWALL'S PRINCE again!
Thy potent arm can foil the might
Of full ten hundred men*;

* This was at that time considered a most marvellous power.

No more the floods shall swamp the mines,
While Heav'n prolongs thy reign:
For should the sea come rushing in,
Thou 'dst drive it back amain!

Fill high your cups with mighty ale,
And pledge the POWER once more;
Who featly aids us to obtain
The vein's most precious ore!

Fill, fill again, and hail the CHIEF,
Who rules the floods below,
With masters, men, and engineers,
Who make the work to go!

This song, with many a wild exciting roar,
Awoke the echoes with profuse encore!
Thus Bacchus triumph'd.—The uproarious feast
Was day by day prolong'd a week at least:
While still the brewer came with loaded dray,
And care was bullied from the scene away.
Our CHIEF, attended by inebriate page,
Long threaten'd much to split himself with rage,
But steady Cawley dreading something dire,
Quick hasten'd forth to moderate his ire;
Hence in their mirth they'd no mishap to rue,
Till Bacchus, weary, from the scene withdrew.
Such was th' excess of almost savage mirth,
That hail'd our HERO, when he first came forth
With all his chief essentials, much the same
As we now witness in his modern frame,

On Cornish wilds, and far from civic view,
His welcome still was heartfelt, warm, and true!
Nor was his fame confined to Cornish mine,
But quickly travell'd to the banks of Tyne;
Where then the "viewers*" sought his aid e'en more
Than did the tin-lords for like cause before.
There soon he let the wond'ring colliers see
His active arm's resistless potency
To heave the flood in ever-foaming waves,
And bring "black diamonds†" from their gloomy caves.
There too, when first his powers made vast display,
Wild horror spread among the weak dismay;
But this soon vanish'd, and succeeding mirth
To Bacchanalian revelry gave birth,
And all the routs again were acted o'er,
Which Cornwall witness'd not so long before.

VII. At this eventful time again we find,
New schemes engross inventive Papin's mind;
For now what Gaul's voluptuous court denied,
Was to his hand by Hesse's prince supplied;
With which he rear'd a second POWER OF FLAME(4),
(From Newcomen we lately had the same)
With strength and action both surpassing far,
That which had previously engross'd his care.
Among th' improvement to his genius due
In this design, two more are wholly new,
And each of these his apt invention spoke,
The famous "safety valve" and "four-way-cock,"

* The managers of the coal mines.
† A name given to coals.

This forms our HERO's pulse in modern days,
That, too well known to call for further praise,
And as essential to his glorious plan,
As sight or hearing to the race of man.

VIII. The step, just made so boldly in advance,
Placed glorious laurels in the crest of France;
To which, as Papin's due, she makes her claim
In the bright annals of the CHIEFS OF FLAME:
And hence a strife of furious words arose,
'Twixt Gauls and Britons, long inveterate foes;
Each, in their old conceits, so wont to deem
Themselves in arts, as well as arms, supreme.
On lighter grounds they've often drawn their swords;
This proved, however, a mere war of words,
For ages yet prolong'd with furious tilt;
And, if no blood, much ink, was vainly spilt;
Each pressing endlessly their favourite plea
Of Papin's—Newcomen's—priority(7),
While borrow'd parts, which either side might claim,
Were seen confess'dly in each splendid frame.

The "good old times," we hope, are ever fled,
When men so vainly, vain contention spread;
While generous feeling has its place supplied;
And men shall wonder, what could men divide;
Since Heaven gives genius with impartial hand,
Alike to every class in every land;
Sheds, like th' auspicious sun, a genial blaze,
And mental light to all the earth displays.

IX. With all the strength our HERO could command,
Though hail'd as sovereign through the Cornish land,

And, by the Tyne, with loud exulting joy,
He still lack'd help, like a huge looby boy,
Lack'd still the leading strings of tender age;
Nor could he breathe without a trusty page*,
His giant-efforts sluggishly display'd,
Were but th' effect of constant care and aid.
But lo! another accidental shift
Gave all his powers a fundamental lift!
One of his pages, a wild youth, they say,
Who watch'd his beating pulse†, was bent on play,—
" Plague on this pulse," cried he, " this bar to bliss,
" Himself, with all his strength, might manage this:
" Self leading strings I shall at once supply,
" Leave him to work himself, at least to try."
Straight he essay'd the moving parts to bring
Into harmonious play by hempen string‡:
This rare design, almost as quick as thought,
By luck or skill to full success was brought;
And did the work in such a matchless way,
That he henceforth, without neglect could play;
And thus besides secure a lasting name§,
Though a mere frolic, in Steam-Engine fame.

Beighton's improvement(s) on this happy scheme,
To aid the action of the CHIEF OF STEAM,
Redoubled all his moving speed once more,
Check'd and irregular, through neglect before;

* One of the boys who moved the throttle-valve.

† A valve.

‡ This string was used to connect the great beam and the lever of the throttle-valve, which was thus opened or shut, as required, with great regularity.

§ Humphrey Potter was the boy's name.

With equal pace of course advanced his strength,
While spread his fame thro' Europe's breadth and length;
A PRODIGY admired by every one,
Now for the first time an Automaton;
Destined from man no trouble to require,
Save now and then to prime his heart of fire;
While this achievement of the ingenious boy,
Was hail'd with scenes of Bacchanalian joy,
Not less than those in mirth and revels gay
That mark'd the triumph of a former day.

Our CHIEF, as yet a youth of tender age,
And just released from leading strings and page,
We'll leave awhile.—His future foster-sire
Shall give his frame its final strength and fire,
And Heav'n and Art speed on th' auspicious time,
That shows him forth in all the strength of prime.

END OF CANTO II.

THE

STEAM ENGINE;

OR, THE

POWERS OF FLAME

CANTO III.

STATIONARY POWER.

(PERFECTED BY WATT.)

ARGUMENT TO CANTO III.

I. The prophecy of the Genius of Albion.—II. FLAME-POWER long thought to have attained perfection: His defects discovered by Watt, who thenceforth becomes his foster-sire.—III. Watt's able reproduction of "single stroke" STEAM-POWER, by the addition of the New Condenser, the Air Pump, the Governor, and other appendages.—IV. The action of our Hero's parts similar to those of a living being: His astonishing increase of strength.—V. The effect of this gigantic Power, when in operation, on the mind: Great results produced.—VI. Watt's splendid production of "double stroke" STEAM-POWER.—VII. The magnificent result as a moving power for revolving machinery.—VIII. Other Inventions immediately connected with Steam-power are produced: Resulting changes in the Social System.—IX. Watts' character.—X. The rising glories of Steam-power: The consequent magnificent advances of Commerce and Civilization: These advances only the precursors of still more important ones in connection with Marine and Locomotive Steam-powers.

THE

STEAM ENGINE;

OR, THE

POWERS OF FLAME.

CANTO III.

STATIONARY POWER.

THE PROPHECY OF THE GENIUS OF ALBION.

Hail happy regions of the West,
Wash'd by the vast Atlantic main,
The hallow'd Islands of the blest,
The future Ocean-Queen's domain!
Where all the Virtues, own'd divine,
In law and polity shall shine.

There brighter still shall glow the fire,
That warms the hearts of free and brave;
To noble heights shall still aspire,
Whatever Art and Science gave,
In ages past, to Greece and Rome,
In this, their chosen future home.

There shall be hail'd th' auspicious hour,
When FLAME-POWER shall exalt his worth,
His youth now past, his frame mature,
The greatest PRODIGY on earth,
With more than strength by Titans shown,
To be employ'd for GOOD alone.

There shall his MAIL-CLAD SONS arise,
And traverse, in their pageant pride,
To greet mankind's admiring eyes,
O'er rolling seas, and empires wide,
Shall be the despot's dread in fight,
For honour, freedom, fame, and right.

And they shall bear each hallow'd name,
Borne by Troy's conqueror's of yore;
Who shall acquire a nobler fame,
Removed to Britian's happier shore!
For the great chiefs, by Homer sung,
Shall ever live, be ever young!

But not, as erst, in war alone,
Shall they their willing aid impart,
For their vast prowess shall be shown
In Commerce and in peaceful Art;
Till they extend their Empire's bound,
To compass all the earth around!

In novel forms of might and worth
Engage the eye on land and deep:
Their death, a prelude to new birth,
Or rise from transitory sleep;

Like fabled Phœnix realized,
In each new form more highly prized!

II. Our CHIEF, 'twas thought, his climax had attain'd;
Since fifty years unchanged, his powers remain'd,
Which gave him in the mines supreme command;
Till famous Watt supplied a fost'ring hand;
Who, in his iron-frame, could soon detect
A long unseen—yet an immense defect:
He saw that in his lungs the cooling flood,
By frequent contact with his vap'rous blood,
Although from thence his much-prized action came,
Diffused a deadly chillness through his frame,
That check'd the vigour of his living flame;
And while these elements were thus at strife,
He ne'er display'd continuous, active life;
Like shipwreck'd sailor, forced cold brine to drain
Till nearly dead, to be restored again.
But now was come the fulness of the time,
When he was destined to attain his prime,
When all his parts with living vigour rife
Would be endow'd with almost god-like life!
His foster-sire's designs (1) we shall disclose,
From whence our CHIEF in power supreme arose.

III. His iron-frame, long deem'd so ably plann'd,
Received at first, from Watt's ingenious hand,
A sep'rate cell*, in which the cooling flood
Produced collapses in his vap'rous blood.

* Watt's new condenser.

Watt, thus apart, secured the end desired,
When heat's full active force was not required;
That in his spacious chest he might insure
A constant, high, and vig'rous temp'rature*;
He well foresaw our CHIEF would thus acquire
A vast dilation of his native fire;
Still further this important plan to prove,
His chest, with pond'rous iron-disc above,
Was firmly closed†; where erst the cooling damp
Had free access his energy to cramp.
In this great system, with recondite art,
New veinous ducts‡ perform'd their needful part,
And made his blood more freely circulate,
Which moved his limbs at an unwonted rate;
And made at once his new-born vigour gain
As great a force§ as iron could sustain.
Nor did he show till that auspicious hour,
Such matchless efforts of continuous power!

That this prime action, thus so ably gain'd,
Might with full energy be still maintain'd,
The source of all his powers and heart of fire
Self-acting parts(2) for management acquire,
That no excessive, no defective change
Of air‖ or liquids¶ might his frame derange,

* A boiling water heat, not previously kept up continuously in the cylinder (chest), on account of the condensing process being performed therein.

† In Newcomen's old engines the cylinder was open above, which was necessary to admit the free pressure of the atmosphere on the piston, but which at the same time allowed the heat to escape.

‡ Pipes and valves.

§ The high pressure principle.

‖ The self-acting damper.

¶ The boiler-feeder.

While heaving pulse*, to act in concert made,
To this new process duly gives its aid,
Which from the cooling cell extracts the air,
And tepid water, generated there,
His power, thus acting 'gainst a perfect void,
Is with full energy at once employ'd.
Meanwhile the liquid, still in tepid state,
Through the whole system made to circulate,
Back to his heart of fire soon finds its way,
Again in vapour's active form to play,
And in his chest its former task repeat,
From thence returning to the source of heat.
As to man's heart the cooling blood returns,
Where life's ethereal flame with vigour burns;
Such is the GREAT CREATOR's glorious plan
Of veinous action in the frame of man!

To regulate and properly direct
Our HERO's energy with full effect,
The GOVERNOR†, which may be call'd his brain,
Is introduced to urge or to restrain,
By radiating action of its spheres(3),
His moving speed; and duly interferes,
As if possess'd of a directing sense,
To check at once attempts at violence,
By pliant tendons of ingenious tact,
Which quickly makes his throttle-vein‡ contract;

* The pump that draws the tepid water and air from the condenser (Watt's new cell)

† This elegant piece of mechanism acts as effectually for our Hero, as the brain does for man.

‡ The throttle-valve which regulates the supply of steam to the cylinder.

Or open wider to excite the flow
Of powerful vapour should his speed be slow.

IV. These great additions, as had been surmised,
His vap'rous action so economized
As now to give a power full three-fold more
Than by like means he e'er produced before!
And by "high pressure," with no dang'rous strain,
This then-vast power was tripled once again,
While all his countless parts of apt device,
Moved with such ease, in action so precise,
That each, spontaneous, did the task assign'd,
As if directed by a cautious mind:
Such the harmonious concert of his parts;
Such the grand triumph of transcendant arts!

He thus became, from that eventful hour,
A VAST AUTOMATON of boundless power;
And, like a giant from his fetters broke,
Could with his arm of potent "single stroke"
Out-match ten thousand men's united force,
A power mechanics call "two thousand horse."

V. This GIANT POWER(4), as if the sight was new,
Deep imaged in my mind I still can view;
Displaying the omnipotence of STEAM,
By vast impulsion on the massive beam,
To which his arm of godlike vigour clung;
(A sight that moved my wond'ring mind when young,)
His still repeated energetic stroke
His firm foundation on the granite shook;
While pond'rous spears, in the deep tubes immersed,
Brought, like a cataract with its steam reversed,

The gather'd flood from the deep gulf below,
Wave after wave with ever foaming flow!
Nor were his powers confined to mineral veins,
To heave the floods that swamp'd the miners' gains;
His were Herculean tasks[5] of toil beside,
Where other powers in vain had long been tried.
The crowded cities own'd him as their friend,
For whom he bid the crystal flood ascend;
Which from their tubes and cooling fountains play,
Dispensing health and comfort in their way.
The once-vast marshes, too, at his command,
Gave to the plough their doubly-fertile land;
Augmenting thus the husbandman's domain,
Where feed his flocks, and wave his golden grain.

VI. But Watt's ingenious mind could still impart
A "double stroke"* of his transcendant art,
To make our HERO's growing vigour shine
Beyond the gloomy cavern of a mine,
And show his power could serve some nobler end
Than merely make the crystal flood ascend.
His arm's vast power was not yet pliant found
To twirl with smoothness the huge axle round:
He here display'd much more of strength than skill—
Training for this, Watt found was wanted still;
And various modes this object to attain,
Were duly tried and found completely vain.
At length his genius on his object fell,
His grand device the "MOTION PARALLEL"[6],

* The double stroke engine, for the purpose of propelling machinery, has the steam admitted both above and below the piston.

To make his vig'rous arm impel the beam:
What now remain'd was but the lathe-man's scheme
To make this action to the crank apply,
Which gave rotation to the pond'rous fly*;
Hence came that steady energetic power,
Which acts unrivall'd to the present hour!

VII. Thus to new life, with god-like strength awoke,
See now our HERO's arm of "double stroke,"
By huge impulses on the well-poised wheel,
Make the vast system on its axis reel!
Whence the machine(7) attach'd with all its parts,
Its thousand wheels, to vig'rous motion starts!
Where once the wind-mill, once the weary horse,
Produced weak efforts with unsteady force!
See now a steady power, which knows no bound,
With vast propulsion urge the wheels around!

VIII. And next, to second the GREAT POWER of STEAM,
An intricate and vast artistic scheme(8),
Matured by Arkwright's skill and patronage,
Another wonder of this fruitful age,
To form the pliant thread, to motion starts:
While, in the weaver's, forgeman's, sawyer's arts,
Machines, design'd to take their several parts,
In quick succession to perfection rise;
While artizans look on with wond'ring eyes,
To see their toil, as if by magic charm,
Usurp'd by art and STEAM's all powerful arm!

* The fly-wheel which imparts steady and continuous motion to revolving machinery.

But though this great and all-important change
The social system might awhile derange,
The skilful hand could soon new labours find,
Of more congenial and less arduous kind.
Now busy mills began apace to rise;
And towns to grow to an unwonted size :
While round the coast the once neglected port
Became of Commerce the renown'd resort.
A change so vast, and in so short a time,
Unwitness'd erst in any age or clime,
To STEAM's triumphant power was due alone;
While every art with added lustre shone;
And Britain's wealth in more abundance grew,
Than if she'd held the mines of rich Peru.
Such the rewards which powerful art bestows,
Diffusing blessings as its vigour grows !

IX. In this great cause the lapse of time must show,
How great the debt to famous Watt we owe;
His was the vast, the encyclopædic mind(9),
To no one science, no one art, confined:
The mighty deeds of Greece and Rome of yore,
'Twas his to know through their own classic lore;
While both the sophist's and the poet's page,
His thoughts alike were destined to engage;
The moderns' lore in their own tongues he read,
As if alone he'd been a linguist bred.
Mathesis' page, in all its strength of truth,
Engaged his mind, by choice, from early youth;
E'en Chemic science, at its dawning hour,
Owed its first impulse to his mental power;

The elemental parts([10]) he first defined,
That form the crystal waters, when combined;
In this essential point he went before
The late great founders of our Chemic lore;
E'en Priestly, Black, and their great peer* in Gaul,
Confess'd that famous Watt outshone them all.
'Twas his, besides, the first to calculate,
In water, when sublimed to gaseous state,
The thermometric heat that needs must pass
To latent state([11]) in the expanded mass;
And hence it was his heaven-directed mind,
With more than mortal energy design'd,
Framed and matured the splendour of his scheme,
That shines conspicuous in the POWER OF STEAM.

In art and science, Watt, not great alone,
Pre-eminent in social virtues shone;
His candour, truth, his manner mild and free,
His constant kindness and vivacity,
With that divine simplicity of heart,
That marks the man devoid of grov'ling art,
Added their charms to give his converse zest,
His chosen friends with one consent confess'd:
While in the son's, the father's, husband's place,
He gave domestic bliss unwonted grace:
Not over studious, nor too much retired,
He little concourse with the world desired,
But rather from the public gaze withdrew,
And hence was known but to a social few:

* Lavoisier.

Not so the honours of his deathless name,
Identified with our great HERO's fame,
The god-like offspring of his mighty mind,
Great benefactor of all human kind,
Progressively to bless in every clime,
And grow in glory with the growth of time!

X. Thus rose our MIGHTY CHIEF from stage to stage,
Too great an effort for one single age,
The rare conception of full many a mind,
With art and science skilfully combined,
Till centuries of mental toil at length
Matured his frame in all its modern strength!
Hence Britain's real glories date their birth,
The first t' appreciate his rising worth,
And to neglect the pomp and vain parade
Of those who make destructive war their trade;
And mark, as heroes, the ensanguined clan,
With rare exceptions, a disgrace to man.
While Art and Commerce, joining hand in hand,
Their projects of unrivall'd splendour plann'd;
Thus with IMMENSE PRODUCTIVE POWER allied,
They spread their glorious empire far and wide!
A social revolution hence began,
Which changed the habits, and the views of man;
While knowledge brighter scenes began t' unfold,
And dissipate the ignorance of old;
Bid novel maxims ev'ry land pervade;
While those of "good old times" began to fade.
The village housewife now began to feel
Her toil quite needless at the spinning-wheel;

Which Eve's fair daughters long were doom'd to prove,
Through forfeiture of Eden's blissful grove:
While in the loom the shuttle's noisy play,
Less frequent heard, at length quite died away:
For STEAM in Britain now perform'd alone
The work ten million men could not have done!

This change from gloom to day-light thus begun,
Was but the rising of our HERO's sun,
To radiate with all the added grace
Of his BRIGHT SONS, THE LOCOMOTIVE RACE;
Henceforth a glorious future to unfold,
To make new knowledge far outshine the old,
And prove Utopia is not all a dream,
Such the vast conquests of the POWER OF STEAM,
The world's CHIEF PRODIGY since time began,
The NOBLEST BOON by Heaven conferr'd on man!

END OF CANTO III.

THE

STEAM ENGINE;

OR, THE

POWERS OF FLAME.

CANTO IV.

MARINE LOCOMOTIVE POWER.

ARGUMENT TO CANTO IV.

I. The Great War-Steamer, Wellington: His supremacy on the ocean: The characters of his crew.—II. The Muse undertakes to trace the several steps by which he attained his present pre-eminence.—III. Wild hopes of ardent minds respecting Steam-power being superseded by some other power.—IV.—Ericsson's proposed change of heated air for steam: this change cannot increase the power of our Hero, which is already boundless.—V. The economy of Steam-power may perhaps be superseded by Ericsson's principle, especially in Marine-power.—VI. New principles of power, perpetual motion, &c.: The folly of those who still persist in searching after such chimæras: The limits of the power of Genius already on the verge of attainment in Steam-power: Such limits were attained long ago in Sculpture, Painting, and Poetry: These arts, being imitative, more easily attain perfection than the results of Mechanism, Chemistry, and Mathematics: These results the highest of which human powers are capable.—VII. De Garey's early production of Marine-power: Its probable defects and failure.—VIII. Hall's early Marine-power: Its failure.—IX. The Marquis de Jouffray's splendid Marine-power: The Goddess of Liberty denounces the project: She promises to do more for mankind than Steam or any other power on earth: The French Revolution, and exile of the Marquis: His project fails in consequence: The Goddess of Liberty also fails to fulfil her promise: The Marquis' project usurped in a clumsy manner by Des Blanes: Its ultimate failure.—X. Ramsey and Fitch's Marine-power: Its failure: Fitch prophesies its ultimate success, but sinks through the pressure of misfortune.—XI. Serratti's Marine power: Blessed by the Pope: Its failure: Miller's Canal-Steam-power successful: Reason why laid aside.—XII. Lord Stanhope's duck-Steamer unsuccessful.—XIII. De Blanch and Symington's Steam-power: Their slight success.—XIV. The projectors of Marine-power too precipitate: Their attempts made without experiment or calculation, hence their failure: Great expense of these productions, involving their projectors, in many cases, in ruin and distress of mind: their project assailed with ridicule: These abortions suffice as experiments for succeeding projectors, whose success now becomes obvious.—XV. The Scorner's Fate.

THE

STEAM ENGINE;

OR, THE

POWERS OF FLAME.

CANTO IV.

MARINE LOCOMOTIVE POWER.

I. The chief of all our Hero's first-born race
Came forth with god-like energy and grace,
Great Wellington(1), who, on his ocean-car,
Bears Britain's thunder, and her pomp of war;
Prompt to chastise her stern insulting foes,
And proud her Cross of well-won glory shows!
High mounts his courage from his heart of fire,
Which he inherits from his mighty sire.
All perils of the sea he scorns and braves,
Like proud Leviathan he cleaves the waves!
Such is the vigour of his life-blood, steam,
Upon the ocean gloriously supreme!
The pride of Neptune, and of frowning Mars,
And of their sons, the brave and jovial tars,

Who in his car triumphal hold their court,
And there parade in high heroic port!
Here stands the youth that sighs to emulate
Blake, Nelson, Jarvis, and the naval great:
Who with disdain regards ignoble ease,
And courts the perils of the angry seas;
Seeks every chance to meet a daring foe,
Mix in the fight, and war-like prowess show.
Next see the youth devoid of martial fire,
The younger offspring of patrician sire,
With no estate to shield his pedigree
From dread attacks of hated poverty,
And hence he strives 'gainst cowardice, and braves
The fatal perils of the wars and waves.
Here in his wrath the slighted lover speeds,
Forgets his flame, and sighs for warlike deeds:
And he, untrue to early plighted love,
Long falsely breathed in some sequester'd grove,
Who leaves his faithful fair to sigh and mourn
For her betroth'd, who never shall return.
Such form "the staff," descendants of the great;
Next come the "hardy tars" of low estate.
The youth of blighted hopes here wends his way;
And he that spurns his father's tyrant sway,
Leaving his fond mamma in tears and woe,
All tender ties thus sever'd at a blow.
While some t' avoid the gallows, jail, or dun,
Here choose their course, and thus dame Justice shun:
While some grow weary of the plough or spade,
Some spurn the anvil, some the dens of trade,

Make truce with care, and hither joyful come;
In our great HERO's car they find a home.
Thus led by choice, impell'd by urgent force,
Or love of change, or sunk to last resource,
They of their fortunes strive to make the best,
And deem themselves, if dreams but flatter, blest;
While, as an antidote for Fortune's frown,
They look with ardour to marine renown;
Join in the revels of the hardy crew,
Brave fellows, hearty, all well-met and true;
Forget their loves, ignoble toil and care;
For livelier pastimes, and new scenes prepare;
Learn to talk big of thunder, flames and wars;
And crown the bowl to Britain's Queen and Mars;
While dreaded WELLINGTON o'errides the waves,
And fear-struck Russians in their stronghold braves!
Such are the men with adverse fate to cope,
To fight and conquer is their only hope!
Such are the men at every point prepared
The hallow'd land of Liberty to guard,
The fear despising hearts of steel and fire,
Whom dangers gladden, and whom toils inspire,
The Wellingtonian crew in martial glee,
To spurn the foe upon the rolling sea!

II. Our Muse's next grand task is to record
By whom our brave young HERO, ocean's lord,
Was first brought forth, and by what steps he rose
To reach the powers he now so proudly shows,
To triumph thus on the triumphant seas,
And more than brave the battle and the breeze!

III. There are who, in these wonder-working days,
Their eager hopes so prominently raise,
As to expect Invention's game shall spring,
In future time, on more than eagle's wing!
Who only eye her present dizzy flight,
As but the tithe of her intended height;
Who deem some artist's Heaven-directed mind,
By splendid efforts, yet to be defined,
Of igneous, airy, or electric art,
Or all combined, shall to the world impart
Some mighty engine(²) at no distant hour,
Surpassing all that Fancy dreams, in power!
That hence our HERO, the great Chief of Steam,
No longer known for energy supreme,
Shall vanish from the world and be no more,
Save in the records of the deeds of yore!
While curious eyes perchance his frame may see,
Stow'd with the relics of antiquity,
Then shall this tale, or some such like, be told:—
" This is the GIANT of the days of old;
" The HERO once renown'd for peerless power,
" That moved large ships some twenty miles an hour,
" And trains of civic length in barbarous state,
" Then view'd as magic, at full thrice that rate;
" And thus outstripp'd the eagle in its flight:
" This cumb'rous thing from STEAM derived its might;
" Perform'd, it seems, what men had then to do,
" When they were savage and their wants were few:
" But lo, he vanish'd like a falling star,
" Soon as they launch'd the light aërial car!"

Such the prediction of our STEAM-CHIEF'S doom,
And such the epitaph upon his tomb!

IV. Thus Ericsson's deep scientific mind
Would range art's dreamy regions unconfined,
Who has essay'd to change our HERO'S blood,
From that by fire wing'd from the crystal flood,
And to infuse into his alter'd frame
Th' invigorating air-begotten flame*;
And what his high aspiring views surmised
Will soon, says Hope, be amply realized.
No bound has his gigantic airy scheme;
Nor is there bound to the vast POWER OF STEAM;
Nor shall device of this new art exceed
The fiery LOCOMOTIVE'S strength and speed:
Which speed, but doubled, would indeed go far,
By rapid action on the ambient air,
To emulate the Indian hurricane,
Which strews with wreck the ocean and the plain.

V. Our HERO'S matchless energy, beside,
With due economy(3) must be allied;
Whate'er his feats, his cost must not outrun
The value of the work his strength has done.
Look thro' the Cambrian and Northumbrian lands,
You 'll learn at once how this great question stands:
His forage†, deem'd some thousand years to last,
In vast profusion there is left to waste;

* The proposed change of steam for heated air, which will in all probability economise the power of the engine, but cannot increase its strength.

† Coals (our Hero's forage) are so abundant in the districts referred to, that such of them as are more than sufficient for the steam-engine, are left to waste.

And hence his mighty power, the miner's boast,
"A thousand horse," is there devoid of cost!
What power shall e'er be found beneath the sun
By which such marv'llous feats shall be outdone?
Still this, a local accident, must yield
To general principle "by flood and field."
If, therefore, some expansive mind can bring
Sufficient force to some new motive-spring*,
To supersede the fuel's pond'rous load,
Which in the wave-borne chariot must be stow'd,
For lengthen'd voyage on the rolling sea,
We 'll hail the scheme with rapt'rous ecstacy!

VI. 'T is on this point that future Genius may
His active mind with much success display;
But all new principles† of power, it seems,
As yet conceived, appear like madmen's dreams.
Yet some, misled by their malignant star,
From Reason's light are doom'd to wander far:
While still th' illusion haunts the busy brain,
That art perpetual motion can attain;
Which Nature's law, Mathesis well can show,
Has rigidly forbid to man below!
Yet still the phantom‡ is pursued; how strange!
How high shall Folly on her pinion range?
Such is the wish of human kind to rise,
To scale the height, where hangs fair Glory's prize,

* The pyro-aërial principle, see a previous note.

† The pyro-aërial principle is not here referred to, which is the same as that of steam.

‡ The mania for "perpetual motion."

And bear it thence, with plaudits long and loud
From an admiring and delighted crowd!
But most, ere they the envied height attain,
Fainting and sunk, come floundering back again;
And, for their toil of mind and body, find
The gaping ridicule* of all mankind!
Nor aught, alas! awaits such luckless men,
But to repeat their follies o'er again!

But there's a bound, as has been said before,
O'er which e'en Genius vainly strives to soar;
That bound, so long an object to be gain'd,
By STEAM's all-conquering power is now attain'd;
That bound, was reach'd too by the lib'ral arts,
Long centuries past, in all their noblest parts!
The life-like forms, so beauteously pourtray'd,
By sculptor's curve, by painter's light and shade,
Which to the eye at once their truth attest,
Were by the ancients with like truth express'd.
But imitations of external parts
Are much the easiest conquests of the arts;
And hence their all-engaging graces sprung
To full perfection's height, when time was young.
The various moving passions of the mind,
Though felt by all, are with less ease defined:
Those secret springs, which move the human will,
Require a Shakespeare's or a Dante's skill
To bring their latent powers to mental view,
That man shall own the image to be true,

* This is commonly incurred by unsuccessful inventors.

Shall own the mind almost divinely great,
Which thus so perfectly can imitate!
But great philosophers of Bacon's grade
See Nature's works, effect and cause, display'd,
Guided by Heaven to view the secret springs
That move and animate material things;
And hence its own divine omnipotence
Becomes quite evident to mortal sense.
And as all lands adore with one accord
The great JEHOVAH, vast Creation's Lord;
So is their admiration duly given
To these, th' especial fav'rites of Heaven;
Who, as it were, by a mere casual glance,
To the arcana of all power advance:
Hence are deduced those arts of god-like grace,
Which now exalt so high the human race!

VII. 'T was thus to Garey(t), as already said,
Imprison'd STEAM his latent powers display'd:
He heard at once the embryo SPIRIT's voice*,
In new-born strength, exultingly rejoice:
A voice, so often heard, so often near,
But not regarded by the vulgar ear.
We travel now into the Spanish clime,
And backwards full three centuries in time,
When skilful Garey, at that early hour,
Boldly adopted STEAM's then latent power
To move, by new marine machinery,
A heavy-loaded vessel on the sea.

* The hissing of steam in a closed boiling vessel.

We 've no account of this adventurous scheme,
Save that its arm of power was moved by STEAM;
And that its action on the rolling main
Did all the gazers' loud applause obtain;
And that Don Charles the Fifth, august and brave,
A splendid lift to Garey's fortune gave.
But, when, alas! th' experiment was made,
Spite of applause, much dread was still betray'd;
For so much vapour, fire, and smoke appear'd
That e'en the stoutest-hearted Spaniard fear'd
That Garey, by device of wicked spell,
Had thus engaged the agency of Hell!
" What else but some infernal power," said they,
" Could move the ship in such a novel way;
" Strange! that we see nor sail, nor rope, nor oar,
" Used for this purpose thro' all times of yore."
Hence Bigotry and Envy both stepp'd in,
And both denounced his STEAM-POWER as a sin:
Meanwhile to combat their destructive rage
Commerce could then no powerful hand engage.
Thus was the promised splendid work undone
Of Barcelona's most illustrious son;
Nor deign'd he its description to record,
Save vaguely what the feats perform'd afford.

VIII. Thus slept the embryo Leviathan,
In visions vague of sage and artisan;
Till, early in our Second George's reign,
Hall(s) strove to realise this POWER again.
In his new fabric all those parts we find,
Which were by Newcomen so well design'd:

The steerage-tackle all confess'dly new
(Such as we moderns use) to Hall was due:
Much genius through the whole design prevail'd;
But this, as Garey's, for like reasons, fail'd.

IX. The Marquis Jouffray(6), of expansive mind,
Meant to regenerate and raise mankind,
By means artistic; and his leading scheme,
Or primal lever, was the POWER OF STEAM,
To do all work without man's care and pain,
On road, on river, and the rolling main;
As his precursor, famous Worcester, fired
By strong philanthropy, had once aspired.
Much zeal the Marquis show'd in this great cause,
And much he merited the world's applause.
His ocean-car was fifty yards in length,
Yet found his STEAM-POWER of deficient strength;
But while he strove this want to overcome,
By placing power superior in its room;
Behold, there rose, by adverse Fate's decree,
A fascinating Dame, call'd Liberty!
To this fair title though she made her claim,
Her deeds soon proved she but usurp'd the name!
She promised to do all, and ten times more,
Than STEAM or any power on earth before;
Declared she'd spurn with stern unflinching hand,
Injustice and oppression from the land;
Give every blessing in abundance birth,
And make Elysium itself on earth!
The Gauls admired her, call'd her good and great,
And placed her high in splendid car of state;

Then hail'd her Queen with shouts of loud applause,
And swore devoutly to uphold her cause:
While some, regardless of her frown or smile,
Reproach'd her, mock'd her, call'd her base and vile,
Not thinking Fate at that eventful hour
Had arm'd her hands with might and ruling power!
Now shouts with murmurs, praise with slander blend;
'Twas doubtful still where all this strife would end;
The Queen most blandly on her fav'rites smiled;
But then, provoked to hear her name reviled,
She on her slanderers with stern aspect frown'd,
Then swore revenge and bid her trumpets sound!
Dire Discord heard, and with a dismal roar,
Broke out of Hell, besmear'd with filth and gore,
Provoked a tumult, moved with mad career;
Rage storm'd in front, Rebellion in her rear;
Madness and Fury rush'd amid the crowd,
This wildly foam'd, that raised her voice aloud,
While Discontent, upheld by stout Tom Paine
Huzza'd the Queen, and join'd her brutal train;
Pale Death morose and stern, stalk'd at her side,
And shook the Guillotine with barb'rous pride;
For Death had now met with such large demands,
As claim'd new modes of slaughter at his hands;
Hence he through need invented this machine,
To crush the foes of Gaul's then-ruling Queen;
While round him fiends in awful triumph bore
His victims' heads, exuding streams of gore.
Thus moved the rout, big with destructive fate,
And massacred where Fancy bade them hate;

And now a king, a sage, a noble bleeds,
While Gauls with shouts extoll'd her brutal deeds;
But famous Jouffray, with some thousands more,
Straight fled for safety to a foreign shore:
Hence his grand prospects of the POWER OF STEAM
Soon vanish'd like an unsubstantial dream.
While many an ardent mind in every land
Deem'd man's regeneration just at hand;
And hail'd with shouts of loud exulting glee,
The awful havoc of Dame Liberty,
To rid the world of all such baneful things,
As taxes, tithes, and haughty priests, and kings;
Nor dreaded that a still more haughty race,
To mar the boasted scheme, would take their place.
For rulers and the ruled, since time began,
Have ever acted on the self-same plan;
And rulers, though almost divinely just,
Are by the ruled regarded with mistrust;
Which demagogues enflame to open hate,
And needless changes thus precipitate:
Hence when we change a dynasty or creed,
Small is the chance that better will succeed!
Though such like changes of exalted fame
Have bless'd mankind, and such our Muse could name;
But these, indeed, but rarely intervene,
"Like angels' visits, few and far between!"
The Queen* look'd proudly from her chariot round
To see where merit might the most abound:

* The Goddess of Liberty.

Pleased with the feats of savage Robespierre,
She call'd him forth to be her charioteer.
He seized the reins, with madness in his head,
And drove with fury, bidding havoc spread;
While loud and louder rang the din of war:
At length the driver quite upset her car;
And with the Queen fell down in front of Death,
Who grasp'd him with his rack and stopp'd his breath!
And now th' ensanguined tumult still'd, the Queen
Shrunk back, disgusted at the murd'rous scene,
And, when remounted, much less fierce appear'd;
Now this, then that, her lofty chariot steer'd:
Till, after many a triumph proudly won,
She gave the reins to young Napoleon:
This new-made steersman, with ambition fired,
Usurping, to his mistress' seat aspired,
And threw her headlong from her car of state,
(Such was the now-reversed decree of Fate)
And straight assumed the functions of command,
Which he thus wrested from her dreaded hand.
His future actions, good or bad or great,
Shall form no part of this our plan to state;
Suffice to say, in his eventful reign
The POWERS OF FLAME resumed their course again;
Which man for years had suffer'd to stand still,
In hope the Queen her promise would fulfil:
But now, the vast inflated bubble burst,
They all unanimous their folly cursed!
Yet, during famous Jouffray's lengthen'd flight,
Des Blanes(*) of Trevoux, scorning what was right,

Usurp'd his scheme;—his whims and vain conceit,
Howe'er conspired his project to defeat;
While the sole triumphs that his fraud could boast
Were cash consumed and reputation lost.

X. Ramsay and Fitch[10] in the United States,
Far from these scenes of blood and mad debates,
With soaring hope brought forth their POWER OF STEAM,
Intent to navigate the inland stream:
Though slight success was gain'd, Fitch, ne'ertheless,
Quite confident of ultimate success,
Predicted that this vap'rous POWER would sweep,
At no far distant day, th' Atlantic deep:
And meant what he predicted to fulfil,
Had not misfortune come his hopes to chill;
And hence cold penury was his reward,
Though well he merited the world's regard!

XI. Serratti[11] too, at this eventful time,
Made like attempts in the Italian clime:
This scheme, though bless'd and aided by the Pope,
Fell clearly short of the projector's hope.
But Miller's FLAME-POWER[12] fortune's favours shared;
His rare success commanded high regard,
The pride of Scotia's sons, much praised by all;
He skimm'd the waters of the Clyde-canal,
But he plough'd down its banks* with vap'ring pride;
Hence Miller's project soon was thrown aside;
While all his fortune spent, and spent in vain,
Bade him not try the enterprise again.

* The paddle-wheels, projecting from the sides of the vessel, had this effect.

XII. Lord Stanhope(13) hit upon a novel plan
Of bringing forth this vast LEVIATHAN;
(This notion first Genovois' genius struck)
His frame was made to emulate the duck;
Webb'd feet had he in ocean's brine to play;
With whale-like might he whirl'd aloft the spray;
But made with all this splash but little speed;
Alas! the duck was doom'd not to succeed!
A duck disporting on the crystal flood
Suggested this, a plan that promised good,
And not unworthy noble Stanhope's mind,
By learning's flame and virtue's warmth refined.
De Blanch(14), too, added to the list one more,
With slight success, upon the Gallic shore;
While Symington(15), at Paris and New York,
Made double efforts in the glorious work.
Ambassador was he to Gallia's court,
To which indeed he made his visits short;
For't was his daily care and nightly dream
To give perfection to his darling scheme.
This keen projector some success acquired,
But fell far short of what his hopes desired;
For his and all the rest were thrown aside,
Unfit to brave the ocean's foamy tide;
Besides their FLAME-POWERS, one and all, indeed,
Were far too weak to give essential speed.

XIV. Such were the schemes, with few exceptions, all,
In form and functions much like that of Hall*;

* See Additional Notes to Canto IV., No. 5

They push'd them forward at a headlong rate;
Nor was Mathesis call'd to calculate;
Nor were experiments e'er tried to gain
The due relation speed and power maintain;
For when our sages now these two compare,
They find the former as the latter's square*:
Hence giving twice the power could never lead,
As then 't was thought, to getting twice the speed:
And thus, on false assumption, sad to tell!
The grand designs of these projectors fell.

Each, in his turn, was urged by hope t' aspire,
To be the great STEAM-SAILOR's foster-sire.
Their ample fortunes some entirely spent,
Such was the cost of the experiment!
Such was the fate attendant on defeat,
Which left no means their projects to repeat;
While grinning Ridicule would seldom fail,
With bitter scorn, their efforts to assail!
And sage predictions of the would-be seers
Were ever rung, unwelcome, in their ears!
"Of what we told," said they, "you took no heed;
"We knew such vap'ring schemes would ne'er succeed!"
Long sleepless nights were spent, besides their gold;
Heart-aches were many; hearts, that now are cold,—
Yet noble hearts were theirs:—want of success
Gave others fame, whose skill perhaps was less:
Since from the slight advance which thus was gain'd,
Th' experimental knowledge, now obtain'd,

* By this proportion a double speed will require four times the power, a triple speed nine times the power, and so on.

Gave the acute at once to understand
That the important hour was just at hand,
(Though these had proved abortions every one)
To bring to light our HERO'S ELDEST SON.
By whom, light as a feather, shall be borne
Th' ill-boding prophets' obloquy and scorn;
To such our Muse, for all their rancour vile,
Shall change her tone with a contemptuous smile!

THE SCORNER'S FATE.

XV. Of Hate and Envy he was born,
Whose paltry ridicule and scorn,
With all the bile of venom'd tongue,
Is with vindictive rancour flung
At those, who with capacious mind,
Attempt to aggrandise mankind,
By rare inventions of their own,
To all the world before unknown;
To give fresh scope to useful art,
Exalt the mind, improve the heart.
Full many a one, in this great cause,
Has nobly won the world's applause,
Gain'd with much toil a lasting name,
For weary is the way to fame:
But if in this attempt they fail,
For mortal men are truly frail,
The wretch of Pandemonian breed,
Who hastes to ridicule their deed,

Although he feel himself elate,
Through rank conferr'd by vast estate,
Yet, as of narrow selfish mind,
No benefactor to mankind,
Shall pass unnoticed all his days,
Shall forfeit honour, fame, and praise!
In death, although his dust be laid
Beneath proud monumental shade,
His name and memory from mankind
Shall, as in life, no honour find;
Not e'en respected by his heirs,
Who but rejoice his wealth is theirs;
While all alike with scorn shall turn
From the vain sculpture on his urn!

END OF CANTO IV.

THE

STEAM ENGINE;

OR, THE

POWERS OF FLAME.

CANTO V.

MARINE LOCOMOTIVE POWER.

ARGUMENT TO CANTO V.

I. Nature's throes and other portents, which precede the births of her great and wondrous offspring: These are real, and not merely feigned by poets.— II. The preceding evinced in the bringing forth of the first efficient Marine Power, Fulton's Steamer: Tremors of the earth, thought to be the shock of an earthquake, and consequent terror of the people: The people still further terrified on seeing the smoke and fire flying from the Steamer, and his great speed against both wind and tide, while making his first voyage up the Hudson river from New York to Albany.—III. His return from Albany to New York: Rejoicing at the latter place: Fulton, his foster-sire, weeps for joy.—IV. Stevens's Marine Power first navigates the Atlantic, a few days afterwards: His great speed: Terror of the crews of merchant vessels at the unusual sight: He sails up the river Delaware to Philadelphia: The Captain of a slave-ship, supposing him to be a demon about to devour him for his wicked practices, runs his ship on shore and liberates his slaves, &c.—V. Description of these Marine Powers.—VI. Many Marine Powers are brought forth about this time: The great Comet of 1811 appears, evidently portending the future supremacy of Steam-Power on the ocean: Bell and Dawson's Marine Powers, each called Comet, in honour of the Divine Symbol of that name.—VII. Steamers become general on the coasts of Europe and America: Their names significant of their Divine origin: Many other Marine Powers also called Comet.—VIII. Dodd's Marine Powers: His Commerce and Majestic: Their greatly improved speed.—IX. Napier's Marine Powers: Their cars first pointed at stem and stern, hence their still further improved speed: Great vigour of the Rob Roy Steamer: His numerous conflicts with the Atlantic tempests: Napier's other Marine Powers first brought the British mails from Ireland and the Continent: Their splendid saloons and convenience for passengers, &c.: One of Napier's Marine Powers first crosses the Atlantic.—X. Song, The Ocean-Steamer.

THE

STEAM ENGINE;

OR, THE

POWERS OF FLAME.

CANTO V.

MARINE POWER.

I. Portentous aspect teeming Nature shows,
Anguish she feels, and heaves with awful throes,
That shake the starry dome, and solid earth,
When she to mighty prodigies gives birth!
While, when at eve, the dusky shadows fall,
And gloomy night spreads wide her sable pall,
Meteors are seen,—strange echoes strike the ear,
That fill the mortal mind with awe and fear,
Proclaiming that the midwife's task is done,
A full delivery! A GLORIOUS SON!

They err, who say that these are phantoms vain,
The wild creation of the poet's brain;
That while he dreams, his feign'd or fabled Muse
Does in his brain these airy whims infuse!
They err indeed,—romancers they at best,
For living witness can these facts attest;

As we at once shall undertake to show,
That e'en th' incred'lous these grave truths may know!

II. Bright shone the sun on that eventful morn,
That usher'd forth our HERO'S ELDEST BORN,
A morn still honour'd in th' United States,
And chronicled among important dates.
The nineteenth century seven years had run,
And the Republic's date was thirty-one;
Early that morn, (they still with rapture tell,
What at New York and Albany befel,)
Deep tremors* of the earth their slumbers broke,
'Twas thought by all to be an earthquake's shock!
They rose and ran, not knowing why or where,
When lo! a fresh event engross'd their care;
For the STEAM-SAILOR(1), in his vap'ring pride,
Was launch'd just then in Hudson's swelling tide;
His lofty form and his paternal fire,
Drew every eye, and bid the throng admire;
His novel ocean-car with splendour glow'd,
His steerage tackle still more novel show'd;
The quick collecting crowd all eager gazed;
The would-be-wise their own discretion praised,
To put no faith in STEAM, thus fuming wild,
Nor aid in bringing forth so strange a child!
And straight exultingly they pass'd the joke,
"This scheme will end, as it began, in smoke!"

* This was said to be attended by the falling of a very large and lofty pile of timber; and some think that the falling of the timber was accidental, thus causing the shock.

And prophesied, ere the declining sun,
A fresh abortion,—Fulton* too undone!
Some joint, as yet not pliant, caused delay,
In his first effort to get under way;
This slight mishap at once drew from the crowd
A burst of ridicule and laughter loud,
Enough to chill the foster-father's† heart,
And sink the honour of the midwife's art;
Our Hero's new-born son(2), at that dread hour,
Was arm'd on board with energetic power:
Hot glow'd his heart which wing'd the crystal flood
In vapour strong to form his living blood;
And every time he heaved his pulse of fire,
A galaxy of flame‡ was seen t'aspire!
At length his limbs got into active play,
And up to Albany he blazed away.
'Twas distant fifty leagues, his infant power,
'Gainst wind and tide, made full five miles an hour§:
Thus bidding all at once the little wise,
With ill-conceal'd chagrin, avert their eyes!

* Fulton, the projector of the first efficient Marine-power. See Additional Notes to this Canto, No. 2.

† Fulton was the most successful of the projectors of Marine-power. Warned by the failure of his partner (for he stood in that relation to Mr. Symington,) he employed a much more powerful engine. This, in 1807, was put on board a boat built for the purpose of running between New York and Albany, a distance of one hundred and forty miles. After a failure at first starting, which exposed the anxious inventor to the ridicule of the spectators, he got his boat fairly under way, and accomplished the distance in from thirty to two-and-thirty hours.

‡ Dry pine is still used by some of the American steamers, which in burning emits such a profusion of sparks as to terrify those who are not accustomed to the sight.

§ Five miles or knots an hour, was at that time thought to be a surprisingly great speed against wind and tide.

While from the careless vacant-staring crowd
Huzzas of gladness issued long and loud!
And soon he left the congregated host,
In anxious gazing, till in distance lost.
Thus up the stream, in demon-like array,
And on the shore, he scatter'd wild dismay;
For few on Hudson's stream, and none on shore,
Had seen our HERO or his SON before!

Ere yet the arduous voyage was half done
The current strengthen'd, and down went the sun:
Yet still he cleaved the waves and steer'd away,
His train of flame diffusing partial day;
That even now, when night o'erhung the scene,
Great Hudson's banks display'd their living green:
While the reflection from the stream below
Gave double radiance to the fiery glow;
A most alarming and terrific sight*,
Now magnified by the deep gloom of night.
These flashing meteors, rapidly renew'd,
Excited wonder, when at distance view'd;

* The astonishment and terror of the good people of Albany, when they saw the moving mass approach, was extreme, and is thus described by an American Journalist:—

"She had the most terrific appearance from other vessels that were navigating the river. The first steamers, as many in America yet do, used dry pine wood for fuel which sent forth a column of ignited vapour many feet above the flue, and whenever the fire was stirred, a galaxy of sparks flew off, and in the night had a very beautiful appearance. Notwithstanding the wind and tide were adverse to its approach, they saw with astonishment that it was rapidly coming towards them; and when it came so near that the noise of the machinery and paddles were heard, the crews, in some instances, shrunk beneath their decks from the terrific sight, and left their vessels to go ashore, while others prostrated themselves and besought Providence to protect them from the approach of the horrible monster, which was marching on the tide, and lighting its path by the fire which it vomited."

But horror struck each boat's returning crew,
As nearer this suspected monster drew:
Their horror still increased, when they descried
That he approach'd against both wind and tide!
The noise* he made redoubled still their fear,
More audible as his grim bulk drew near;
Some crouch'd beneath their decks; some, frighten'd more,
Leaving their boats, made good their flight on shore!
E'en those on shore, in village, cot and farm,
Were struck alike with trembling and alarm!
While still he blazed, and still increased the din,
Some pray'd, confessing their most secret sin,
And, penitent, besought high Heaven to thwart
The threaten'd vengeance of infernal art!
To such a climax rose fell horror's power,
That many pray'd, who pray'd not till that hour!
Who, wicked mortals, thought their final doom,
Through Heaven's avenging anger, now had come!
Some started from their sleep in wild affright,
To share the horrors of that dreadful night!
But happiest they, who, sunk in slumbers deep,
And free from sin, prolong'd their balmy sleep;
For only they who, conscious of their crimes,
Are doom'd to suffer at such awful times!

Thus up the stream he made his dread display;
Still dire alarm pursued him on his way;
E'en when the gloomy shades of night withdrew,
And dawning day gave forth his form to view,

* The noise made by the paddle-wheels and engine.

The country-folks, still eying him with dread,
With cautious haste from the dire monster fled!
But hope at length somewhat relieved their fear;
Since up the stream he moved in full career
To Albany, where hosts of sinners dwelt,
'Twas there they deem'd his fury would be dealt.
And wood-built Albany, with terror soon
Saw our young HERO's dread approach at noon;
His moving mass 'gainst wind and current came;
"A Demon this," cried they, "all wrath and flame!
O mercy, Lord! avert our city's doom,
Forbid the monster near our shore to come!"
Thus in their turn their terror was extreme;
For then, e'en there, the mighty POWER OF STEAM
Was quite unknown, save to the enlighten'd few:
From street to street the awful tidings flew!
Their wooden houses and commercial wares
Were equal objects of their fears and cares;
For man, poor sinful man, regards his pelf,
When danger frowns, e'en more than life itself!
Our HERO's heart of fire, which now had long
With vapouring energy and pulses strong,
Perform'd its task, reposed from active play;
While by degrees fell terror died away.
The cause is learn'd; the lately awe-struck crowd
Hail him in turn with plaudits long and loud.
III. Next day at dawn our SAILOR, now supplied
With all the aid of current, wind, and tide,
Tripled his speed, with swelling pride moved on,
And reach'd New York before the day was done:

Again he meets the gather'd crowd's applause,
Express'd of course with thundering loud huzzas;
To Fulton, this was now a glorious night;
Whose friends embraced him with profuse delight!
Such is the warmth with which mankind caress
The genius that achieves unhoped success;
The banquet was prepared, the generous wine
Was pledged to Fulton's health with nine times nine:
Who, foster-father to our SAILOR BOY,
O'erpower'd with swelling rapture, wept for joy!
As did the sire of the illustrious son(3),
When he the laurel crown at Elis won.

IV. Again at York, in that eventful year,
When Fulton's CHIEF commenced his grand career*,
His BROTHER (4) on the rolling waves was seen,
Stronger his frame, and more august his mien;
His car was splendid, lofty, wide, and long,
His heart of fire beat high with pulses strong.
As foster-father Stevens had the claim;
Our brave young HERO therefore bore his name;
Not only brave, but bravest of the brave,
Undauntedly he skimm'd the ocean's wave.
'Twas he that first this daring task began
To show the energy divine of man!
And soon away from sight of land he stood,
Majestic on Atlantic's deepest flood;
Spread wide his canvass to the wanton breeze,
And cut the mountain-waves with whale-like ease;

* Stevens's steamer was launched only three days after Fulton's, and immediately put to sea. See Additional Notes to this Canto, No. 4.

His speed, now aided by both wind and tide,
All previous parallel at once defied!
While merchant-vessels, eyeing him from far,
With fire and vapour flying from his car*,
At first imagined 'twas a ship on fire,
Then some infernal monster still more dire!
And therefore stood upon another tack,
Prepared, had winds allow'd, to sheer aback;
While ever and anon as he drew near,
With all their tact, they from his "gangway" steer,
Dreading no doubt, both from his noise and speed,
Their fate, ah, lack a-day! was now decreed;
But, since he pass'd, they deem'd 'twas wond'rous well,
Thus to escape this dread device of Hell!

Another class of craft had next to view
Our DEMON-SHIP and grim infernal crew,
Thus running so terrific a career!
Since now 'twas meet that he his course should steer
Against the wind the Delaware to gain;
Still more confirm'd was terror's awful reign;
A monster now, beyond all doubt, was he,
So dread a form ne'er witness'd on the sea!
His sailing 'gainst the wind was quite enough,
To give their worst suspicions ample proof,
Without the aid of vapour, flame and smoke,
Which first of all their wild alarm awoke;
The sailing craft, as erst, with cautious heed,
Steer'd from the DEMON at their utmost speed!

* See Additional Notes to this Canto, No. 4.

'Mong these a reckless Slaver(5) miss'd her way,
Which straight for Chesapeake's safe harbour lay,
But her wild drunken captain bore her far,
On a mistaken tack, to Bombay Bar;
Doubling a headland, he with awe and grief
Encounter'd suddenly our DEMON CHIEF!
This late-mad tyrant, struck with conscious dread
Of vengeance for the wicked life he led,
Unchain'd his slaves, betook himself to pray,
And ran his ship into the nearest bay,
Let all his slaves escape to freedom's shore,
And, penitent, resolved to sin no more!
Our CHIEF, unconscious he'd set hundreds free,
One from his sins, the rest from slavery,
Now straight up Delaware in full career
Swift skimm'd the flood; not only struck with fear
Were sailing crews, but those, as erst, on land*,
Who could a view of his dread form command!
While every wood-built house in Delaware
In turn entreated Heaven with humble prayer,
To shield both them and theirs from fatal scathe,
Now threaten'd by the monster's burning wrath!
Till the famed city† of immortal Penn,
(Alas the world produces few such men!)
Beheld him in his demon-like array.
His voyage done, suffice it now to say,

* As this took place only three days after Fulton's steamer produced so much terror on Hudson's river, and as postal communication was then less frequent than at present, the appearance of this steamer was quite new, and therefore equally an object of terror.

† Philadelphia, the capital of Pennsylvania.

That vent'rous STEVENS, in his new-born pride,
Spread a like terror on the ocean wide,
And up the Delaware, as was before
Spread by his BROTHER on the Hudson's shore!
But, when men found their fears devoid of cause,
They hail'd him, too, with thunders of applause!
Such were the painful throes and heights of mirth,
That mark'd our brave young HEROES at their birth!

V. Our STEAMER's form need scarcely be defined,
So much like that by famous Watt design'd.
His powerful arm was seen on deck to move;
By "double stroke" successfully he strove
To make the well-poised pond'rous axle reel,
And grasp the wave with quick revolving wheel.
Could Worcester's life have been prolong'd till then,
And Gallic Papin's, these illustrious men
Had said, "the offspring of our powerful arts,
"With slight additions to their wond'rous parts,
"Have now successfully began to brave
"The dreaded perils of the ocean's wave;
"The glorious future of the POWER OF STEAM,
"Which we foresaw in many a happy dream!"

VI. At this important time we fix the date
When ocean flame-power rose from embryo state;
Each month that pass'd, now duly gave to earth
One more, and still one more important birth!
All SAILORS still, still an improving breed;
Still in the flood they plunged to show their speed:
While Scotian[6] Bell, and Dawson[7], Erin's son,
To launch their steamer's scarcely had begun,

When lo! by Heaven's decree, in radiance clear,
The wond'rous COMET* of the northern sphere,
Display'd to man its lengthen'd train of light:
By most regarded as a fearful sight!
Nightly it blazed, and waved its fiery tail,
And made the dreaded Ursa Major quail;
Destined but once before her fear to prove,
When Phaëton the Solar car misdrove.
But Bell and Dawson hail'd this glorious sight,
And sagely view'd it as prophetic light;
At once they deem'd its bright resplendent gleam
Was the precursor of the REIGN OF STEAM,
A shred from out the PALL OF GLORY riven,
The grand symbolic messenger of Heaven,
The radiant light divine to northern climes,
To be recorded through all future times,
That augur'd plain the splendid march of mind,
And intellectual greatness of mankind,
To spread their light in foreign realms afar,
By means of STEAM'S triumphal ocean-car;
Give heathen lands the GOSPEL'S saving grace,
Where dark idolatry alone had place;
Diffuse FAITH, HOPE and CHARITY, to bind
In social union all the human kind,
With all the Christian virtues in their train,
Thus to confirm the GREAT JEHOVAH'S reign!
All these bright views, e'en then, were wont to rise
Effulgently in these projectors' eyes;

* The great Comet of 1811.

Their STEAMERS launch'd, this grand symbolic Flame,
' Yclept the COMET, was each SAILOR's name!
Bell's splendid COMET skimm'd along the Clyde;
And forced its way, defying wind and tide.
He made at once the sons of Glasgow stare,
And sunk full low the Greenock stages' fare;
Then first our vap'rous CHIEFS began t'encroach
Upon the province of the steed-drawn coach.
Dawson's grand COMET urged superior claims;
He cross'd the rolling main and reach'd the Thames;
He was the first that show'd on Thames, 'twould seem,
With full success the energy of STEAM.
Eight miles an hour 'gainst wind and tide he made,
And full sixteen when both supplied their aid.
He put the wherry-boys all in a rage;
In courts of law long warfare* did they wage;
Till Dawson's splendid car, and others too,
To more propitious stations all withdrew;
There still to ply, till these dull folks should choose
To change their darkness for enlighten'd views.

VII. This glorious work, thus gloriously begun,
A still improving course had now to run!
The foster-fathers†, and first pioneers,
In teeming births pursued their grand careers;
Till Mississippi, Hudson, Delaware
And all West Indian Isles, both near and far,
Canadian Lakes and Lawrence' flood could boast
STEAM-SAILORS numberless, a vent'rous host:

* See Additional Notes, No. 6. † Fulton and Stevens.

While Russia, Holland, Italy, and France,
In these same glorious births still made advance.
Fulton and Stevens, many others too,
Took of the COMET an enlighten'd view,
Precisely that of their co-artist Bell,
Not as a type of the dread wrath of Hell;
Which in its train would plague and famine bear;
They left these fancies to the bigot's care:
Hence every land could many COMETS boast
That skimm'd along their streams, and round their coast;
Some bore great Neptune's, some their owner's name,
Some those of famous cities whence they came;
With names of Trojan and of Greek renown,
In Homer's deathless Epics handed down.
Like Fulton's Steamer in his first career,
Among the simple folks they scatter'd fear,
And scenes were acted now, which told before
With dire effect, upon the Hudson's shore:
For in those days, how strange to tell! unknown
Was STEAM's vast power almost to every one;
Their novel forms with their paternal fire,
Stamp'd them as demons of Tartarean ire;
But e'en the simplest soon began to know
A friendly power in the suspected foe.

VIII. As foster-father to our HERO'S RACE,
Dodd(8) takes an early stand in honour's place;
Both on the Thames, and on the rolling sea,
Much he advanced their tact and energy.

His Commerce was of Thames the boast and pride;
From famed Augusta* he to Margate plied;
Unwonted speed and vigour he display'd,
And daily visits to the ocean paid:
By turns he scorn'd and courted tide and wind,
And left his brothers hopelessly behind.

But Dodd's MAJESTIC, deem'd almost divine!
Paid visits to the Seine, the Elbe, the Rhine:
And, lastly, to the Tagus borne away,
Defied the raging storms in Biscay's bay.
While to the world triumphant proof he gave
Of conquest o'er the perils of the wave.

IX. Napier(°) came next; men had from him to learn
The aptest structure of the stem and stern,
By which our SAILORS' spacious ocean-car
Could best confront the tempest's furious war.
Both ends he taper'd, pointed like the sword;
Thus arm'd ROB ROY henceforth was ocean's lord;
Defiant war at once he dared to wage
Against th' Atlantic tempest's furious rage,
And split its dreaded mountain-waves in twain;
Supreme was he upon the rolling main,
As was the dauntless chief whose name he bore,
In Highland feud and deadly broils of yore!
Belfast and Glasgow were his ports of trade,
To each twice weekly he his visits paid.
'Twixt Giant's Causeway and huge Ailsa's Craig,
'Twas his triumphantly to bounce and brag;

* London.

And, resolute his voyage to perform,
Innumerous times he foil'd the raging storm!
His kith and kin, for there were many more,
First bore the mails* to Britain's sea-girt shore.
Large space had they to stow the merchant's ware;
Saloons with decorations rich and rare;
With steerage-cabins for the sons of toil,
Whose unwash'd hands the gay saloons would soil.
From shore to shore they drove a wond'rous trade,
And gave a ready and essential aid
To restless souls, who ne'er could stay at home,
But round the world, they cared not where, would roam
To see, be seen, to plan, devise, and scheme,
Like those who rear'd the wond'rous POWER OF STEAM.
Such were their feats! our Muse can boldly say,
Their powers remain unrivall'd to this day!
And one of these was 'mong the first to brave
With STEAM'S YOUNG POWER th' Atlantic's dreaded wave;
And Britain's CROSS in noble triumph bore,
Despite the storms, to far Columbia's shore.
His watery march, majestic, bold, and long,
Our Muse shall give, in Jack's blithe style of song.

THE OCEAN STEAMER.

X. Huzza! huzza! all are on board;
The STEAM roars out amain;
The captain gives the welcome word,
"Let go the mooring chain!"

* The mails were first brought from the continent and Ireland by Napier's Steamers, instead of the common sailing vessels, previously used for that purpose.

And let the OCEAN-STEAMER dash
The broad Atlantic o'er,
To where the restless billows wash
America's free shore.

Away he skims 'gainst wind and tide,
While by his crew, with glee,
From cabin, deck, and poop is eyed
The now-subjected sea!

How he triumphantly careers
O'er the vast liquid space,
The glory of Creation's peers,
The Anglo-Saxon race!

His vap'ry train far, far away,
Still from the cliffs we see;
And still he skims and heaves the spray
With ceaseless energy!

The ocean pales to see him sweep,
And in his strength rejoice;
The scaly monsters of the deep
Shrink, trembling at his voice.

Mechanic skill can now disclose
What Science first design'd:
And lo, the OCEAN-STEAMER shows
The modern march of mind!

The restless wilderness, the main,
Has thus been nobly made
The world's secure commercial plain,
The grand highway of trade.

Away! away! he speeds afar,
A thousand miles from land;
And soon beholds his floating car
On ocean's broadest strand.

He bears Britannia's merchandise,
Fair India's spicy store,
And works of art, of princely price,
To far Columbia's shore.

Away! away! careering fast
With or against the breeze,
Through storm and calm on the wide waste
Of the triumphant seas.

All hail! all hail! the land is near
Of free Columbia's shore;
He saw Hibernia's tall Cape Clear,
But nine short days before!

Anon the distant port is won,
His pulse's active play
Now sinks to rest, its labours done,
In Boston's crystal bay!

END OF CANTO V.

THE

STEAM ENGINE;

OR, THE

POWERS OF FLAME.

CANTO VI.

MARINE LOCOMOTIVE POWERS.

ARGUMENT TO CANTO VI.

I. The Lady-Flame-Powers: Coequal to their brothers in the dominion of the ocean, in aiding commerce and in naval wars.—II. The Elizabeth, one of the early flame-powers: She outstrips the Comet in speed: Her saloons first decorated.—III. The Vixen: Her great prowess: Was the first Flame-power that visited the West Indies, under the direction of Sir J. Woodford: Her unusual appearance and her sailing against the wind and the great currents, called the Bocas, frightened the crew of one of the pirate-vessels, which then infested the coast of Columbia: The pirates dreading the Vixen, as a sea-demon, run their ship ashore and escape to land: One of the pirates, through a broken limb, compelled to remain in the vessel: His narrative.—IV. Great advance of Marine-power: The Victory, a fine packet between Bristol and Cork.—V. (The Tempest.) Commencement of the voyage in the Victory from Bristol to Cork: Brief description of the scenery by the River Avon, including Clifton and the adjacent parts: Views on the coast of Wales, Somerset, and Devon: Great speed of the Victory; she rapidly passes the swiftest sailing ships: Description and conduct of the passengers, Captain, &c.: The wind changes and becomes squally: Fears of some of the passengers.—VI. The Tempest begins to the great terror of most of the passengers: Their conduct during the Tempest.—VII. The sky-light of the grand saloon accidentally broken; the water rushes in furiously: The passengers, of whom the author is one, now become certain of immediate shipwreck; their ejaculations: Heroism of one of the passengers: This dilemma got over, to the great joy of all.—VIII. The Tempest ultimately ceases, and the Victory reaches her destination, the port of Cork, in safety.

Note.—Some of the Marine Powers in the following Canto were produced previous to some of those mentioned in the latter part of Canto V. This arrangement was thus made agreeable to the note on the opposite page.

THE

STEAM ENGINE;

OR, THE

POWERS OF FLAME.

CANTO VI.

MARINE LOCOMOTIVE POWERS.

I. To full perfection with their BROTHERS, grew
A peerless race of OCEAN-SISTERS* true;
Viragoes they, with all their FATHER'S flame,
His god-like energy and iron-frame;
And, with their BROTHERS, destined to obtain
The joint dominion of the rolling main;
By Venus bless'd, the sea-born goddess fair,
As heroines placed in her peculiar care.
Many bright daughters of this ocean race
Will in our verse demand their proper place;
With swan-like majesty shall skim the seas,
Spurn the wild billows with luxurious ease,

* It would be improper to refer to those steamers, as masculine, the names of which, according to classical authority, are considered feminine; we shall, thereupon, now depart from the rule adopted in the preceding Cantos with respect to the pronouns, as the case may require, in this and the following Cantos.

Give northern climes the produce of the sun,
And make wide regions, erst unsocial, one;
Shall join their BROTHERS in the ranks of Mars,
The dreaded AMAZONS of naval wars,
First, in the cause of glorious Liberty,
To spurn the tyrant, and to guard the free!

II. The ELIZABETH(1) was famed for early strength,
Her ear unmatch'd in splendour, height, and length:
Her peerless speed was Scotia's boast and pride,
Outstripping far her brother* on the Clyde.
First, her saloons, with decorations rare,
Allured the gay, the wealthy, and the fair.
At Glasgow city, still remember'd well,
Her early triumphs they exulting tell;
When down to Helensburgh†, devoid of care,
She bore them forth to breathe its purer air,
And view the fields, all gay in summer's pride,
The modern Eden, on the banks of Clyde.

III. The Vixen(2) was with spirits high prepared,
And reckless courage, as her name declared.
She fronted first the sweeping hurricane
And foaming currents‡ of the Indian main:
Then William reign'd: such kings as he are few,
Undaunted chief, reformer bold and true:
When she, to prove her courage, Woodford bore
To brave the dangers of Columbia's shore;

* Bell's Steamer, Comet. See last Canto.

† A famous watering place, near Greenock.

‡ These currents are always very strong, and more especially so when aided by the wind and tide. The chief currents are the *Boca Grande*, or great throat, and the *Boca Tigris*, or the tiger's throat.

Through Boca Grande*, 'gainst current, wind, and tide,
Careering boldly, she their force defied;
When, lo! the sea-attorney, privateer,
And conscious villain, struck with awe and fear
To see her thus the wind and current spurn,
And demon-like with Stygian fury burn,
Her fire and vapour flying in the air;
No need was there to say, "Ye rogues, beware!"
Full sail they set—they cry, "The Devil's near!"
Without a tack, to right or left, they steer
To Trinidad, and run their ship a-ground;
Then swim on shore, o'ercome with awe profound;
Some are seen running up the mountain-side,
In thickets some their felon-features hide,
Leaving the gold and merchandise, their spoil,
Which doubtless cost them months of strife and toil,
With ship beside, to swell the mighty price,
Which they for sin made hasty sacrifice!
Of conscious guilt such is the awful power,
When Heaven's avenging anger seems to lower!
Woodford, more struck with wonder at the sight
Than e'en the pirates in their wild affright,
As yet but guess'd the cause, and wish'd t' explore
What made them flee thus hastily to shore,
And leave their vessel sinking to a wreck;
He therefore near'd her stern and went on deck:
Above, below, he no one could discern,
Whence he the cause of this strange act could learn:

* The great current, thus called, between Columbia and the island of Trinidad.

At length he forced a secret cabin-door,
And found a Spaniard stretch'd upon the floor;
Who now on board against his will remain'd,
A broken limb had there the wretch detain'd.
Sure he was now in Satan's dreaded thrall!
Aloud for mercy he began to call!
Though Woodford in mild tones the wight address'd,
His wild affright could scarcely be repress'd;
Ave Maria, misericordia! were
His only words, his supplicating prayer!
His fears by kindness were at length allay'd,
When he narrated, as already said,
That, quite appall'd by such a threat'ning sight,
They sought for safety by a sudden flight!

IV. Many fair SWANS of our bright ocean-train
Came forth to grace Victoria's golden reign,
Who, like their BROTHERS, rife with vigour grown,
Rose, high in fame with merchants of renown;
'Till every shore, through Europe's breadth and length
Own'd them supreme in vigour, speed, and strength!
The tourist, who all seas and climates dares,
E'en kings and queens, admired their splendid cars;
In which they courted or defied the breeze,
And proudly eyed the now-subjected seas.
In one of these Fate cast my lot to be,
A peerless dame, her name the VICTORY.*
Long, broad, and lofty; stately was her car;
Her heart of fire was hot for ocean's war,

* This was at that time a first-rate steamer, and in no respect inferior to those of the present day.

Its impulse beat with such tremendous force
As to outmatch, at least, "three hundred horse;"
And when her courage took the least alarm,
Full thrice this power soon nerved her vig'rous arm!
From Bristol city to the Cove of Cork,
A voyage twice a week was easy work
For her vast powers, though ninety leagues of sea
Between them roll'd its waves triumphantly.
Though adverse winds and tempests might delay,
They vainly strove to stop her on her way:
Admired was she as ocean's peerless dame,
Well she sustain'd the honour of her name!
In her grand car was my first voyage made
To Erin's isle, the glorious cause to aid
Of our old CHIEFTAIN'S LOCOMOTIVE RACE,
Whose grand achievements claim a future place.
The skies were bright, the waves half-lull'd to rest,
And gentle breezes fann'd us from south-west:
A tour of fair delight, unmix'd with pain,
Thus smooth and swift to skim the heaving main.

THE TEMPEST.*

V. My fate, resolved against my hopes to jar,
Sent me, once more, to try the VICTORY'S car;

* The tempest, about to be narrated, happened about the midsummer of 1837. The chief incidents that took place on that occasion are, as nearly as possible, the same as those noticed in the poem. The author, being one of the passengers, speaks of himself in the first person singular, contrary to his custom in the other parts of the poem.

My hopes were dark, for lack of Heaven's true light;
Which still, in mercy, deign'd to lead me right;
Hence I my mind began to reconcile
To fresh adventures in green Erin's Isle;
And took my post on deck, with bouyant heart,
From Bristol-quay to see the Victory start.
Prepared was she at morning's early gleam:
Strong heaved the pulses of her life-blood, STREAM;
And soon, exulting in her vap'ring pride,
She skimm'd along in Avon's swelling tide.
Greetings, 'twixt parting friends, on deck and land,
Were interchanged, by waving hat and hand,
Till swift through Avon's windings she withdrew
The anxious travellers from the gazers' view.
High rose the living rocks to left and right;
Here Clifton's splendid villas crown the height,
With bowers, like Eden's, when the world was young;
Gay were her flowers, and tall her poplars sprung;
Here gush the springs that give to sickness health;
And here the rich parade their pomp and wealth:
Next tow'ring cliffs exclude all further view,
A scene of wonder, if the sight be new.
But soon, emerging from this deep ravine,
The ocean gives to view its wat'ry scene,
Wherein the Avon's dark, deep flood is lost;
While far and wide expands the Cambrian coast,
A varied scene of woodland, hill, and plain,
Where Severn, foaming, meets his sire again.
Our OCEAN-QUEEN, as if in wanton play,
Cut the wild billows and career'd away,

Her canvas swelling with the fav'ring breeze,
She pass'd the swiftest merchantmen with ease;
Who, spite of envy, could not but admire
The vigour mounting from her heart of fire.
Some from her car look'd o'er the wat'ry scene,
Where Somerset displays its fields of green.
Town after town, with villas, groves, and farms,
Varied the flying landscape's living charms.
And soon Devonia's coast shews all its length;
Where Lundy's rocks spurn back the ocean's strength;
And where the Constable* of granite might,
When darkness hovers, holds the needful light.
The breeze grew strong, the waves shew'd crests of foam,
While sickness made our landsmen sigh for home.
This scene I won't describe.—I hasten'd soon,
With many others, to the grand saloon.
Tourists were there, and trav'llers mercantile,
In groups too, were, the sons of Erin's Isle;
All gay, her youthful beaux were shining forth,
Had seen the greatest city† upon earth;
While from their converse (any one could guess),
Of feasts and revelry to wild excess,
Their grov'ling minds had moved them but to see
Its gaudy side, and have what's called a spree.
Mere sensualists! such, I regret to find,
Is the low taste in most of human kind,
That e'en Augusta's high wrought works of art,
Can no ennobling thoughts to them impart!

* A rock so called, on which is a lighthouse.
† London.

Some pledged a friend, and some an absent flame,
And some O'Connell's now—historic name.
These form'd the noisy guests, that afternoon,
Who came to dinner in the grand saloon.
A naval captain, who gave little care
To all this clam'rous folly, too, was there;
Had seen much service through long lapse of years,
From Nile's dread fight to storming of Algiers;
In science learn'd, in mein and manners bland,
Join'd with hauteur, adapted to command.
An Irish 'squire and agriculturist,
Whose name, too, figured on the Epsom list,
Whom afterwards I often met elsewhere,
With me most blandly made acquaintance there.
Some three or four most soberly, meanwhile,
Conversed on trade, and matters mercantile,
To which they duly all attention paid,
Nor deign'd to notice once what others said.
The captain of the Steamer took, of course,
The carver's part: for wear he was the worse;
Was grey, yet hale; was wont to swear and pray
At the same breath: a good chap in his way.
While Erin's sons, loquacious, bold and bland,
Gave me their trades and views to understand;
And one there was that far surpass'd the rest
In bouncing words; was most superbly dress'd;
Chief tailor he of Cork, I soon could learn;
His own importance he could well discern,
'Mong rival beaux; (who all seem'd to confess
That gentlemen were chiefly made by dress)

Denounced the work of all his lapboard peers;
Supreme was he in managing the shears;
Five thousand pounds for cloth he had just paid,
Which now the Victory in her car convey'd!
This bouncing rigmarole, and such as this,
Was duly listen'd to without a hiss.
His hearers doubtless wish'd to keep at ease,
Who, as his customers, desired to please;
Some for grave reasons might perhaps keep still,
The dire non-payment of this tailor's bill!
As to the warrior, Irish 'squire, and I,
We thought ourselves at least a shade too high
To form critiques upon the tailoring art,
And all this time had form'd a group apart;
Our mutual converse tending to unfold
Our avocations, as already told.

But few at table had as yet quite done,
Save those whom sickness had compell'd to run;
When lo, the wind grew strong and veer'd around,
The vessel pitch'd, the waves began to bound,
With louder creaking of both cord and mast,
Which put at once an end to the repast;
Except the tailor, not yet satisfied,
Who, still voracious, at the viands plied!
High pitch'd the car, the sea began to roar;
The tailor, careless still, eat more and more!
But dire sea-sickness, all unwelcome, came,
With sudden pounce, upon his well-gorged frame;
The table, carpet, crimson-cover'd bench,
Received at once a most unsightly drench!

Full souse into the mess, O, sad to tell!
Our mighty tailor next quite senseless fell;
And, as a thing of course, the dire affair
Fell to the cabin-boy and steward's care!
From low ridiculous to high sublime,
'Tis somewhere said, we've but one step to climb;
And shall our Muse, who chooses for her theme
The mighty deeds of the great CHIEFS OF STEAM,
Not give a specimen, by way of fun,
How, with luxurious ease, this may be done?
Now, when our tailor made th' aforesaid mess,
The sad result of gluttonous excess;
With laughter loud, or that but half suppress'd,
A quick retreat was made by all the rest;
I and my party were the first on deck,
To leave this glutton in his beastly wreck;
A grateful change from this vile sink to climb
To view the ocean-scene, the true sublime.
The rolling waves from the Atlantic wide
Came swelling high, impell'd by wind and tide,
Were full a-head, and threw aloft the spray;
Yet still the VICTORY's car career'd away.
The eye, turn'd every way, could now command
Not e'en the Cambrian hills; no sight of land;
But Britain's grand commercial navy plied
Their course, with canvas spread on every side,
And, since the wind and tide were from the west,
The homeward-bound were with their favour bless'd;
The outward-bound had all to tack, perforce,
With all the tedium of a zig-zag course;

And doubtless, envious, saw the VICTORY steer,
Exactly as she wish'd, in full career.

VI. The glorious sun was now descending fast,
A sheet of flame he o'er the ocean cast;
In dismal rising clouds he next sinks deep,
The wind and waves with growing fury sweep!
The vet'ran captain well could understand
A raging tempest now was close at hand,
And straight, with ready oath, and then a prayer,
Bid all on deck for the event prepare;
(The sails had all been furl'd and well arranged,
When first the wind had to the westward changed;)
At once the steerage passengers and crew,
To make all safe to steady action flew.
A squall came next, aloft the vessel pitch'd,
The ladies squall'd too, and with sickness retch'd:
The tempest's awful rage had now begun,
The bucks of Cork for shelter quickly run.
Black clouds arose, the waves, the wind and rain,
In wild confusion swept along the main;
While merchant vessels flew, with well-furl'd sails,
Before their fury to the coast of Wales;
Where shelter from the tempest might be found,
In Milford Haven, by steep headlands bound.

I stay'd on deck, although advised to go
Down with the rest to the saloon below;
And, while the mountain waves roll o'er the deck,
From me the funnel kept their force in check;
I grasp'd a rigging chain fast in my hand,
And, spite of waves and pitching, kept my stand.

Meanwhile the tempest still increased its powers,
Clearing the main of every craft but ours.
In early youth I had a strong desire
To view the grand and great that men admire:
Nature's great works, Art's deeds of boasted worth,
For these I left the vale which gave me birth:
I'll have my wish, thought I, and now's the time
To view the Atlantic's wild and vast sublime.
I had no power, should shipwreck be my fate,
To thwart it now, I therefore stood sedate,
To see the winds and mountain-waves engage
In awful strife, and spend their mighty rage
Against our HEROINE's sword-pointed ear;
Who straight courageously repell'd their war!
High rose the vigour of her life-blood, STEAM;
Alone she struggled gloriously supreme;
She cleft the waves, defied their threatening force,
Repell'd or split those that opposed her course,
Spurn'd their wild fury back on either side,
Victorious she o'er wind and wave and tide!
Enough to recollect through future time
I've seen, thought I, of ocean's wild sublime;
And so no more. The last faint gleam of day
In clouds and darkness now fast died away.
Well drench'd with brine, with chilling cold oppress'd,
I found my way below among the rest.
Though still the storm held on its wild career,
The grandeur of the scene repress'd my fear:
'Twas truly grand, when in her fever heat,
To hear and feel the pulse of Nature beat;

Howe'er with horror view'd by all the rest,
With this dread scene my visions still are bless'd.
The scene is changed. Our tailor, most renown'd,
Among the passengers no longer found,
Asleep, now in his berth all careless lay;
The storm was nought to him, he snored away;
While from the rest I nothing else could hear
But humble vows, shrieks of despair and fear;
Save from the captain and some few beside,
Who either fear'd not, or their fears denied.
The captain's coolness was a thing of course;
He'd often been where perils were much worse,
Where tempests, driving on a rocky shore,
Increased impending danger three-fold more.
The shore was distant here, the depth profound,
Almost beyond all human art to sound:
By turns, below, to soothe their fears he strove,
Or went to aid and give commands above.
He own'd me bold so long on deck to stay;
Said he himself had once inclined that way,
To stand on deck the rising storm to view;
But he had alter'd, as in years he grew,
And prophesied that thus 'twould be with me!
And true, I own, has proved his prophecy.
To see this grand, though still terrific sight,
Where STEAM and tempest wild with fury fight,
And be within their jaws of deadly rage,
Is quite enough to witness once an age.
The pumps were now prepared, the heavy strain
Upon the car had made it leak amain,

(In storms this happens the best vessels known)
Our HEROINE brave, with an exulting frown,
Expell'd the water lodging in her car,
While with the storm she waged defying war.
Her chief attendant watch'd her "pressure-guage,"
Lest, urged too much, she'd split herself with rage;
For now her highest spirit* was put on,
The utmost that, with safety, could be done:
She kick'd the waves with such tremendous force
That now her power was full "a thousand horse;"
Meanwhile the stoker, toiling down below,
Still kept her heart of fire in fiercest glow.
The toil on deck oppress'd the wearied crew,
Who in a steamer always are but few,
And three of these by turns were now required
To tend the wheel and keep the course desired;
Which by the magnet, an unerring test,
Was shewn, as wish'd, to be directly west:
In that direction lay Cork's shelt'ring Cove,
From whence directly the wild TEMPEST drove,
Which still increased. The midnight hour was near,
While dismal darkness magnified our fear.
Some pray'd, some sighed for sweethearts, friends, and home,
Regretting much their folly thus to roam;
Some drown'd their fears in whisky's copious draught,
Caroused, swore, sung, and at the cowards laugh'd,
Inebriate fell, and on the carpet laid,
And, hog-like, wallow'd in the splash they made.

* High pressure, which in this case was augmented to thrice the usual power.

Their reckless blasphemy unwelcome rung
Upon my ears, as from a demon's tongue;
For HE, who bids the raging tempest sweep,
Could soon have still'd their mirth in endless sleep:
To WHOM, meanwhile, a humble, silent prayer
I straightway offer'd, as a duteous care.
Some still were sick, a few were sunk to sleep:
At length those waking paused in silence deep
To listen to the TEMPEST's wild career!
Reflection now in me awoke slight fear:
I knew the tempest's persevering shocks
Had worn and beaten down the strongest rocks;
And should it now, by long-continued war,
Once make a breach in our brave LADY's ear,
What would her almost godlike strength avail?
'Twere best beneath its power at once to quail,
And coward-like before its fury run,
As all the merchantmen before had done.
With thoughts like these I sunk in slumber deep;
And many more were now resign'd to sleep:
Its power Lethēan kindly seem'd to check
Th' effects of sickness and the fear of wreck.
My cares were thus at rest; I heard no more,
For full two hours, howe'er the waves might roar.

VII. A rolling noise on deck, a heavy crash,
With shrieks were heard, and soon a wave's broad splash
Of brine came foaming with resistless bound
The sky-light through, and drench'd the cabin round;
Put out the lamps, (the fire was out before),
And made those start then lying on the floor!

This all at once my dreams and slumbers broke!
Alas, in terror one and all awoke!
The scene can't be described! The raging waves,
All thought, would soon sing dirges o'er their graves!
But lo, the tailor, most heroic he!
He stamp'd, he plunged, and swore tremendously!
He cursed the TEMPEST and the VICTORY both;
The d——d salt-water would spoil all his cloth;
Enough, enough to break him up in trade;
He'd sooner have at once a wat'ry bed!
A sheet meanwhile was o'er the sky-light drawn,
(Through which before we could perceive the dawn,)
Which kept at once the briny flood at bay;
While darkness added to the wild dismay!
The tailor's blasphemy, the others' moans,
Their humble pray'rs and penitential groans,
Produced a strange sensation in the mind,
Not soon forgotten, nor with ease defined!
"Lord, how the waves rush in!" one shrieking cried!
The pitching threw the flood from side to side,
Which in the dark, made this appear as true;
While still confusion wild and wilder grew!
"My wife and babes, O Lord, be thou their friend!"
"Thou led'st me, Pat, to meet this dreadful end!"
"O, Norah dear, no wedding day for me!"
"My cloth is spoil'd—confound this stormy sea!"
"O holy Patrick!"—"Virgin, mother dear!"
From diff'rent tongues confusedly reach'd my ear.
I heard the captain's voice in soothing tone;
But, 'midst the noise, 'twas clearly heard by none;

He raised his voice, but still with slight regard;
With much ado, at length his words were heard:
When it appear'd, he'd hasten'd down t' inform
His frighten'd passengers, that by the storm
A mast was borne, which, thrown with all its weight,
Fell on the sky-light, bulged its iron-grate,
Broke in the glass, and through the frightful rent
The foaming brine its swelling flood had sent!
That brightness in the sky, towards the west,
Show'd that the storm would quickly sink to rest;
'Twas gentler now: there was no cause to fear!
This news was hail'd with a tremendous cheer!
The lamps, with some delay, were now restored,
By which saloon and sky-light were explored;
The tailor too, inform'd his cloth was safe,
Half-doubtingly relax'd his angry chafe;
Though he and others felt no small distress,
From the vile sousing of their late-trim dress:
Those in the lower berths were quite as bad:
But wet, or dry, the hearts of all were glad.
Meanwhile the flood, withdrawn from the saloon,
Disclosed lost shoes, hats, 'kerchiefs, widely strewn;
Which soon were claim'd, well drench'd with brine of course;
Their owners pleased their damage was no worse.
The vessel's pitching less was well perceived;
From shipwreck's dread all now were quite relieved;
The well-fill'd whisky bowls produced once more,
And all was joy where all was grief before!
A bowl was order'd for the sailors bold;
A bottle each for those, who, in the hold,

Supplied our LADY what she might require
To keep her courage up, her heart on fire!

VIII. 'Twas day-light now, the skies besides had clear'd;
And soon on deck we all with joy appear'd.
More gentle grew the wind and ocean both,
The latter heaving waves with crests of froth,
The last weak efforts of their beaten wrath,
Quick by the VICTORY whirl'd from out her path.
Thus struggled Ajax greatly and alone,
When all his friends were either slain or gone,
Against the fury of the Trojan host;
Who, foil'd and breathless, found their labour lost.

The wind veer'd south, great speed the VICTORY made:
How much the tempest had her course delay'd
Could not be known; too far were we from shore;
Cork's Cove a hundred miles a-head or more.
The sea still calmer grew as we went on;
The fav'ring breeze, and six hours rapid run,
Brought Erin's hills at length full to the view;
Which by her sons were hail'd with raptures new!
And soon her southern coast shows all its length
Of high-piled rocks which foil the ocean's strength.
At length her scenes of woodland, mead, and grove,
Glow gay and green around Cork's crystal Cove;
To Passage-quay* right soon the VICTORY bore;
Anon secure all stand on Erin's shore.

* Passage was then the port of Cork for large vessels, from which city it is six miles distant.

END OF CANTO VI.

THE

STEAM ENGINE;

OR, THE

POWERS OF FLAME.

CANTO VII.

MARINE LOCOMOTIVE POWERS.

ARGUMENT TO CANTO VII.

I. The great riches, both vegetable and mineral, of India, the Ophir of King Solomon: The long voyage to that country greatly reduced through the Steam-communication by inland seas and the Isthmus of Suez.—II. Project for reaching New York in the same manner: Its failure prophesied.—III. This great project successfully tried: Betting for and against its success.—IV. The British Queen, her grand success.—V. The President, his total wreck.—VI. The Flame-powers of War: Their great prowess.—VII. The comparative merits of oak and iron: Numerous important applications of the latter: Iron preferable to wood for steamers in general: The Iron Flame-powers, the Fire-king and Flambeau: The iron steam boats on the Thames.—VIII. The iron Flame-power, Great Britain; and the still larger ones now being built by Brunell and Russell.—IX. Deleterious effect of sea-water on the Flame-powers: Seward's method of cure not efficient.—X. Hall's method of cure completely successful.—XI. Devices for propelling the Flame-powers: Various kinds of paddle-wheels and screws: Maudslay's feathering screw.—XII. The late war with Russia, in which the Ocean Flame-powers took a conspicuous part.—XIII. Verses—Bellona's war-cry.—XIV. Triumph of the Western powers over Russia, both by sea and land.—XV. Verses—Fall of Sebastopol.

THE

STEAM ENGINE;

OR, THE

POWERS OF FLAME.

CANTO VII.

MARINE LOCOMOTIVE POWERS.

I. Hail realms where Nature's choicest bounties grow!
Realms, where the Ganges' sacred waters flow;
Where Indus proudly rushes to the main,
Whose five-fold streams enrich th' extended plain.
No land on earth such splendid prospects yields;
Few like extent; none such luxuriant fields:
All other climes their sev'ral products bring;
But here all fruits in vast profusion spring!
The Ophir famous, in the days of yore,
For richest spices, gems, and golden ore!
Yet still, alas, these riches tempt the sword,
Successive prey to many a foreign lord!
Each dynasty, still sinking by degrees,
Effeminated by luxurious ease,
And ending soon in a degenerate race,
To the next conqueror's bold advance gave place.

And last of these, so sunk was Hindostan* !
Were British merchants, who her plains o'erran;
So vast a conquest o'er a land so far,
Must e'er be thought a mighty feat in war !
The Hindoo, weak, submissive, gentle, mild,
Received command, as a mere passive child;
Slave to idolatry and lawless powers,
Unmurmuring, he his servile bonds endures.
In this fair land, all, save the human race,
Is vigour, grandeur, and exalted grace;
E'en to her birds, whose plumes of richest dye,
Her flowers, her groves, alike delight the eye !
(On which young bards, in gay descriptive song,
Are wont to chant exuberantly long).
Inviting scenes to those who spurn their home,
On high emprise, in Indian fields to roam !

May we, as rulers of this vast domain,
By truth and justice long confirm our reign !
But this, not done, would leave us but the name
Of vile oppressors, stain'd with vice and shame,
And, in our turn, to be soon dispossess'd,
For our unchristian deeds, by Heaven's behest !
But let us hope the Hindoo's bondage may,
Through GOSPEL's mighty spread, relax its sway;
And what began for filthy lucre's sake,
May Christian virtues in the East awake !

* Hindoostan, or India, was repeatedly subdued by foreign conquerors, from the time of Tamerlane the Great to its final conquest by the British East India Company. It originally consisted of thirty-two kingdoms, hence the term "realms," used in the Poem.

Long was the voyage to this distant shore,
Round Afric's southern Cape, in days of yore;
But now, the sons of progress have in view
More speedy transit, by a project new,
For the marine, majestic POWERS OF STEAM,
As if to realize wild Fancy's dream,
By inland seas*, and courier† swift in speed,
O'er th' Ægyptian Isthmus, now succeed
To bring the mails from India's sultry clime,
In five short weeks (1), one-fourth the usual time:
Thus made they fractions of both time and space,
(This feat was destin'd William's reign to grace,)
With full assurance to make good their way,
And reach their port on the appointed day!

Thus Britain's empire in the gorgeous East,
By means that few predicted, grew at least,
In point of distance, but a minor work
To reaching far Columbia's mart, New York:
Thus came an all-unhoped and welcome rise,
To our then-vast commercial enterprise!

II. To reach New York, the sons of progress true,
With equal speed, keep anxiously in view;
'Tis in their thought by day, by night their dream;
But vain the hope that the young CHIEF OF STEAM
Can e'er accomplish this important task!
"For how," grave, calculating merchants (2) ask,

* The Mediterranean and Red Seas, and from the latter, by the Indian Ocean, to Bombay, &c.

† The mails, passengers, &c., were, and still are, conveyed by camels across the Isthmus of Suez, at the rate of twenty miles an hour.

" Can he find room, e'en in his spacious ear,
" To stow his forage* for a shore so far?
" And leave due space for freight of merchandise
" To liquidate th' enormous outfit's price!"
This scheme, " by balance-sheet," they soon make plain
To be absurd, as well as madly vain!
For loss and profit never fail to rise
As all-important in commercial eyes.
Still, 'gainst the sage predictions of these seers,
Trusting in STEAM, his hope young Progress rears;
Besides, the famous prophecy(3) of Fitch,
Exalts these views still to a higher pitch;
And, back'd by Liverpool's wealth-weighty power,
Onward was sped the all-important hour,
Which gave great SIRIUS (4) birth in all his force,
Worthy his SIRE, his power " five hundred horse;"
His oaken car, of more than wonted strength,
Was neatly tapering, seventy yards in length;
Nine hundred tons the burden of his hold;
A scheme, so vent'rous, so gigantic, bold,
Of Liverpool's bright sons of enterprise,
Began to baffle much " the little wise;"
Who now their hasty calculations rued,
Lest, as false prophets, they should thence be view'd!
While the GREAT WESTERN (5) mounts his ocean-car,
'Gainst wind and wave prepared at once to war,
And, arm'd at least with twice his rival's power,
Or other SEA-CHIEFS', at his natal hour,

* Coals, of which large steamers require several hundred tons for a long voyage.

He was, and is, the chief of all his race,
For active contest 'gainst both time and space;
Thus two to one the chance against the seers,
While sunk their hopes, and buoyant were their fears.
But while the OCEAN-CARS were yet untried;
Those, who had thus so proudly prophesied,
Could not but feel themselves deep in a scrape,
And tried manœuvres to effect escape!
Their wond'rous strength, their cars' unwonted size,
They urged, alike had caught them by surprise:
The forage question, which their hopes sustain'd,
Could not so prudently be now maintain'd.
No doubt they wish'd to soothe their mental pain;
Both might be crush'd by ice-bergs in the main;
Or all the perils of rocks, storms, and waves,
Might, fierce conspiring, make the deep their graves;
Rather than once appear in mortal eyes
As the propounders of prophetic lies.

The scheme is tried; and shall it prosper too?
Yes; what can't STEAM and gold united do?
Near the commencement of Victoria's reign,
Both SEA-CHIEFS started on th' Atlantic main;
While all the merchantmen they met or pass'd,
Long looks of wonder on the HEROES cast;
Their proud, majestic march, their stately air,
Their god-like prowess, and their length of car,
Made gazers all, with great reluctance, see
Their own comparative nonentity!

III. Meanwhile, the tidings are spread far and wide,
That this experiment was being tried;

A scheme no longer by the Fates revolved,
A problem under process to be solved;
While, e'en with more than Epsom-like parade,
Their weighty bets (•) the adverse parties laid;
One, that success would both the CHIEFS attend,
One, that 'twould prove a failure in the end*,
That all such schemes were vain and empty boast,
Which, at full stretch, would ne'er repay their cost!
'Twas yet unknown the seers began to rue
They'd made prediction which might prove untrue.
The sums, that then were destin'd to change hands,
Would purchase Sutherland's wide ducal lands!
But what the adverse party's dire dismay
To hear both reach'd New York the self-same day;
That the GREAT WESTERN made th' Atlantic tour,
With average speed of full ten miles† an hour,
And thus beyond all hope, and even praise,
Was on the ocean only fourteen days?
The SIRIUS‡, too, whose speed was somewhat less,
Still flush'd the hopes of all who wish'd success
To STEAM'S BRIGHT CHIEFS, the ocean's destined peers,
To the confusion of the croaking seers!

* These bets were made entirely on the expectation that the project would ultimately prove a failure, (for which a time was named,) on account of the expense of the Steamers exceeding the returns made by the carriage of mails, passengers, and goods, which last would be comparatively small, through the necessary supply of coals taking up so large a quantity of the tonnage of the vessels; not that it was impossible, if the projectors choose to carry it out at a serious loss.

† This was thought a very great speed at that time, especially as the winds were unfavourable, throughout almost the whole voyage.

‡ The Sirius sailed from Cork, and the Great Western from Bristol, the former four days sooner than the latter.

In short, success completely crown'd the scheme,
So long reputed a Utopian dream!

IV. The splendid laurels, thus by Commerce won,
To more gigantic projects still led on.
Next on the rolling wave the BRITISH QUEEN(7),
In all her pomp and majesty was seen;
In prowess o'er her sisterhood supreme,
Th' acknowledged empress of the dames of STEAM!
Her power "one thousand horse;" in vain the storm
With all its rage assail'd her stately form;
And, what in commerce was a thing as rare,
Two thousand tons she in her hold could bear;
While her saloons, in decorations grand,
Rivall'd the regal palace of her land!

V. The PRESIDENT (8), in power and length of car,
The next surpass'd his predecessors far;
He skimm'd th' Atlantic with unwonted speed,
And of all rivals took decided lead.
On him, alas, Misfortune slily rush'd!
By icebergs, in the dark, his car was crush'd.
Their masses floating then to southern skies,
Gave ample grounds for making this surmise.
He and his host all sunk to rise no more,
No trace of either found on any shore
Among his passengers the brave and great,
Renown'd in commerce or affairs of state,
Lie, with the humble crew, deep in the main;
For whom their weeping friends inquire in vain;
Whether by long protracted suff'ring worn,
Or sudden mandate from existence torn,

In mercy Heaven forbade the world to know;
Lest fruitless tears should swell the tide of woe;
For all in myst'ry wrapp'd, the pathless waves
Roll o'er their now-almost forgotten graves!

VI. But Britain's enterprise receives no check
From one misfortune, one mere casual wreck.
See next the WAR-CHIEFS (*) in their lofty cars,
Th' especial favourites of mighty Mars,
The dreaded SONS of thunder, flame and fire,
A race well worthy of so great a SIRE,
Who now triumphant skim the rolling seas!
Such are GREAT WELLINGTON, MILTIADES*,
And all the rest of the majestic corps,
Who watch the least alarm on every shore;
And guard the Islands of the great and free,
With more than mortal care and energy.

VII. The heart of oak is doubtless strong and good;
With our forefathers 'twas the favourite wood;
And hence its use in chariot, plough, and car,
In mill-work, and in ships of trade and war.
IRON, so Vulcan says, is better stuff
For ev'ry thing, so hard, elastic, tough:
Besides, he thinks, it has a prior claim
To man's regard, in being proof to flame!
His sons, the engineers, think this is right;
With all the race of smiths, both black and white.
And what is STEEL† but iron modified?
Whence comes the sword, the mighty warrior's pride;

* War-Steamers were begun to be built to a considerable extent about this time.

Mr. Bessemer has lately discovered a new, speedy, and comparatively cost-less process, for converting iron into steel. If this process fully accomplish, as

Whence clock and watch works have their moving springs ;
The modern lyre, too, its harmonious strings ;
The chief essentials of mechanic art,
Of which the edge-tool forms the leading part ;
Whence magnets, which " with living instinct move,
And veer for ever to the pole they love ;"
Iron gives vigour to the STEAM-CHIEF'S frame ;
Guns, mortars, numerous things of minor fame ;
E'en great Agricola's machine, the plough,
Iron its share of old, all iron now !
Doubtless, were iron half as scarce as gold,
Its value would increase ten thousand fold !
But Heaven's just hand has niggardly supplied
The ore desired by avarice and pride ;
While MIGHTY IRON'S truly useful ore
Is wide o'er earth diffused in bounteous store !
" And sure," they say, " it must be better far
" Than even oak to form the STEAMER'S car,
" So much exposed to the fierce tempest's shocks,
" To moving sand, lee-shores, and hidden rocks ;
" Where stoutest oaken ships are wreck'd or lost ;
" But, made of iron, would be bulged at most !"
These and like reasons, urged in various ways,
Have now prevail'd in these our modern days :
Hence the FIREKING and FLAMBEAU'S [10] stately forms,
No frames like theirs to brave the raging storms,
In iron chariots cleave the rolling main,
By Neptune own'd the brightest of his train,

it already appears to do, the desired transformation, it will doubtless be reckoned among the greatest inventions of the present age.

The grand BLACK SWANS of all his ocean-brood;
And hence their CYGNETS* on the island flood;
We see them daily skim the classic Thames,
And other streams of less illustrious names,

VIII. GREAT BRITAIN(11) next in power rose highest far;
Immense the fabric of her iron-car:
Swift o'er the Western wave she made her way,
And still maintains her vigour to this day.

Brunell and Russell, at the present hour,
Rear FLAME-CHIEFS' iron cars, in size and power
Surpassing far e'en Wonder's wildest dream,
The more than vast Leviathans of STEAM:
Hence, we've a lively hope to see at length,
Fair Commerce rest on STEAM's all boundless strength,
And that the iron-car alone shall be
Her future chariot on the rolling sea.

IX. While our young SEA-CHIEF drank the inland flood,
Pure flow'd the current of his living blood;
A healthy vigour mounted through his frame,
That mark'd the mighty lineage whence he came;
But when he ventured on the rolling main,
Compell'd his beverage from thence to drain;
Hence, in his lungs the ever-boiling brine
Deposits form'd adhesive and saline,
Corroded, poison-like, his iron-frame,
And damp'd the active vigour of his flame.
"To blow"(12) this matter from his lungs, ere yet
Its liquid form in solid masses set,

* The small iron-steamers on the Thames, and other rivers.

Was practised long, once almost every hour;
But this had still no proper healing pow'r.
Still the vile canker on his vitals prey'd,
That e'en his iron-frame with speed decay'd;
While "blowing out" thus often to repeat,
Abstracted greatly from his vital heat,
And check'd the vigour of his constant play,
Till Seward[13] tried a more efficient way;
His brine-receptacle and saline guage,
In some degree, were destined to assuage
The slow and dire effects of his disease,
From drinking sal-ammoniac from the seas.
This long was thought a most efficient cure;
At length, 'twas seen the briny drug impure
Still to his iron vitals found its way
To taint his frame with premature decay:
The dire effects of this was clearly seen
In both the SIRIUS and the BRITISH QUEEN.[14]
What great physician shall be look'd for next,
Since more than Seward find themselves perplex'd?

X. Lo, a physician greater still than all,
With added proofs of skill came forth, 'twas Hall![15]
And most successful was his new device,
In estimation far beyond all price,
Contrived to strike at the disease's root,
And therefore radical beyond dispute;
Since from the boiling brine his life-blood, STEAM,
Rose cloud-like, pure as from the mountain stream.

And to the air-cell* thus soon found its way,
Where jet of cooling brine was wont to play;
Which, while it thus condensed his vap'rous blood,
Infused therein its deleterious flood;
This poisonous mixture through his lungs and veins,
By pulse† heaved back, diffused disease and pains;
Which all physicians, previous to that day,
Had found no proper mode to keep at bay.
Hall's cure was radical, as we've just said:
By countless tubes he artfully convey'd
Through the new cell the ocean's cooling brine,
Which, with his blood not suffer'd to combine,
Was quite efficient to precipitate
Its vap'rous form to a pure aqueous state.
Thus from his system Hall kept poison out,
And put disease and canker to the rout.

XI. Various devices great mechanics gave
T' impart his action to the crested wave:
The old plane paddles, still in common use,
Some thought the utmost power could not produce;
Divided ones, by some, were next devised;
While the cycloidal were by others prized;
Their curve, so thought the scientific grave,
Conform'd the best to ocean's heaving wave;
And Morgan's novel paddles, too, were tried;
But these and those alike were thrown aside:
For when to Barlow all these schemes were shown,
By his experiments he soon made known,

* The condenser. See Canto III. † The air-pump.

As well as by Mathesis' rigid test,
That old plane paddles were by far the best:
But Paucton's snake-like screw([16]), behind the car,
The best propeller for the CHIEFS OF WAR,
Is safely placed beneath the rolling sea,
And thus preserved from scaith of gun-shot free.
Rennie's conoidal triple-bladed screw([17])
Displaced the last, and full attention drew;
Ericsson, of aërial-engine fame,
For his six-bladed one advanced his claim;
Three schemes of hope* 'twas his to noise abroad,
And all, alas, have gone perdition's road!
While Seguin, Foulton, Cartwright, Shorter, Burns,
Their screws of various forms produced in turns;
Each push'd his project with the wonted zeal
Which all inventors are well known to feel.
But MAUDSLAY's† FEATHERING SCREW([18]) of double blade
Threw these, and all the rest, into the shade;
With which GREAT WELLINGTON, and all his train,
Are wont with majesty to cleave the main.

* Ericsson's first great project was the locomotive, Novelty, in conjunction with Braithwaite; which broke down in contending for the premiums on the Manchester Railway, in 1829. His second was the Screw-propeller, just referred to. And the third was his late expensive and abortive attempt to substitute heated air for steam, chiefly with a view to economize the use of fuel in Marine Power.

† In addition to this splendid and successful Invention, *Messrs. Maudslay, Field, and Co.*, have greatly improved the Marine Engines, used in the navy and other steamers. An *ancestor* of the Messrs. Maudslay was the Inventor of the self-moving slide-rest in the lathe; from which all the other valuable Surfacing Machinery was immediately deduced, which gives the present great perfection to the Steam-Engine. This Surfacing Machinery is now manufactured, to the highest perfection, by *Mr. Joseph Whiteworth*, of Manchester.

THE LATE WAR WITH RUSSIA.

XII. A prosp'rous peace, for forty years maintain'd,
While growing glories were by Commerce gain'd,
Had sunk our naval powers to deep repose,
Not threaten'd now by their once-daring foes;
Save, when these SONS OF THUNDER, FLAME, AND FIRE,
In mimic conflict*, dissipate their ire:
When, lo! the tyrant of the frozen North,
Vast legions of his serfs paraded forth
To seize the Moslem's rich and fair domain,
And o'er the East alone in triumph reign,
With views disguised by diplomatic art;
But Freedom's sons resolved his scheme to thwart.
To change his purpose words in vain were tried;
When mighty Mars came forth in all his pride,
Rush'd in full panoply among the host,
(His dread Divinity, some thought, was lost,
Or but at most a famous ancient name,
Now only borne by the GREAT CHIEFS OF FLAME,)
Join'd Freedom's ranks, call'd forth to deadly fight
The boasting Czar and every Muscovite;
Who dared but eye askance the angry nod
And awful frown of war's redoubted God,
With Dame Bellona in her iron-car;
While thus aloud she raised the cry of war;
As oft she'd done with dire effect before,
From Jena's field to Marathon's of yore!

* The grand naval reviews at Spithead.

BELLONA's WAR CRY.*

"Scots wha ha'e wi' Wallace bled."

XIII. Sons of heroes, Briton, Gaul,
Join the ranks at Glory's call,
Ready in her cause to fall,
Or win proud victory!

Press in front of Freedom's war;
Spurn the pride of haughty Czar,
Despot of the wilds afar,
Of frozen Tartary!

Rush, YE OCEAN-POWERS OF FLAME,
Make the boasting Tyrant tame;
Who o'er Europe dares to claim
Uncheck'd supremacy!

'Neath "the Cresent's silver bow,"
Russian slaves lie slaughter'd low*:
Still their numbers overflow,
Urged on by tyranny!

Beaten by the valiant Turks,
See, the baffled tyrant lurks
In his high embattled works,
To plan fresh treachery!

* These verses are slightly altered from a copy by the author, printed for private circulation, in June, 1854, in which the successes of the allies were in some degree anticipated.

† Omar Pasha's victories over the Russians near the Danube.

Watch, ye patriotic band,
Stratagems by sea and land;
Worthy of the coward's brand,
He seeks ascendency!

Not as Freedom's wreath was won
Gloriously at Marathon;
But he goads his millions on
The Moslem treacherously;

Who, of Paynims' ancient brave,
Boldly spurns to be a slave;
Proud then let the Crescent wave,
O'er freemen in dread panoply!

On, ye triple warlike corps,
Spurn his legions, waste his shore;
Let not Russia's Eagle soar
O'er Europe, sunk in slavery!

XIV. This was enough! at once the bold and brave,
With FLAME'S DREAD CHARIOTEERS on ocean's wave,
Who long had sigh'd to have a grand champaigne,
Exulting rush'd to join war's dreaded train!
While ready! ready! was the gen'ral cry!
(For Gaul's and Briton's heroes never die!)
And many a wight, who dreaded war before,
With new-born courage, join'd th' embattled corps;
Some, casting fear aside, for sake of change,
Thought this the time to have a wide-world range;

E'en those, by want or by misfortune press'd,
Deem'd this a chance to get their wrongs redress'd;
And fearless join'd the mighty host of war,
Alike prepared to curb the boasting Czar!
To other bards our Muse right freely yields
Freedom's vast triumphs in Crimean fields;
How Sweaborg, Bomarsund, alike proclaim
The dire effects of Britain's POWERS OF FLAME;
How round the Euxine coast, both near and far,
The fallen ramparts tell sad tales of war;
While weak Odessa, left unscathed alone,
Proved mercy, e'en in anger, could be shown;
What cowardice the Czar's vast fleets display'd,
Behind their granite walls securely laid,
Not daring once to front the kindled ire
Of our dread OCEAN-CHIEFS OF FLAME AND FIRE,
Who, both on Baltic and on Euxine main,
Annihilated the proud despot's reign;
How great th' achievements of the bold and brave,
Who still survive, or sleep in honour's grave;
Who then so nobly fought in Glory's van,
And gave great names to Alma, Inkermann;
The final triumph of fair Freedom's sword
Is now her task most proudly to record!

THE FALL OF SEBASTOPOL.

XV. FIERCE grew the front of Freedom's war,
When Britain leagued with Gaul;
While sunk the pride of despot Czar
By this vast *Bulwark's* fall!

Enormous cost, with grave design,
Had raised the triple mound,
Replete with bastion, tower, and mine,
The spacious haven round.

Where the proud Tyrant vainly thought
His fleet would safely moor,
Set Europe's navies all at nought,
And threaten Moslem power!

At length, the haughty Czar decrees
The downfal of his foe;
But Freedom's sons, from western seas,
Resolve to thwart the blow!

Sebastopol! the time has come
To prove thy vaunted might;
Though long protracted was thy doom,
While raged the deadly fight!

FLAME POWERS by sea, and troops by land,
Pour'd down bombardment dire;
Still in their shaken works they stand,
Through thunder, smoke, and fire!

For still the Czar, with despot-pride,
To slaughter yields his slaves;
And thousands daily sunk and died
To fill unhonour'd graves.

At length the fatal sulphur-showers
More thick, more deadly fly!
Alas, thy boasted fleet and towers
In wreck and ruin lie!

But from thine ashes hence shall spring
Imperishable fame,
Exulting borne on Freedom's wing,
To each proud Victor's name!

END OF CANTO VII.

THE

STEAM ENGINE;

OR, THE

POWERS OF FLAME.

CANTO VIII.

LOCOMOTIVE POWER.

ARGUMENT TO CANTO VIII.

[The subject introduced by a previous review of roads, railways, &c.]

1. Greece, so famous for the early cultivation of the liberal arts, architecture, and science, was completely destitute of good roads, and still continues so to this day.—II. The first good roads were made by the Romans, when their empire had risen to greatness, as the Appian way, &c. These famous roads were neglected during the ascendency of the Popes in the middle ages: The splendour of the Gothic cathedrals, erected about this time.—III. The age of Chivalry, the Crusades: Good roads not considered necessary in those times: The feats of chivalry acquired a great part of their fame from bad roads.—IV. The warfare of the rival creeds long carried on, which, finally subsiding, gave a new impulse to road making, hence the modern British turnpike, and similar good roads in some other countries.—V. The oaken railway in the mineral district near the Tyne: The "undulating" railway-system of Mr. Buddle.—VI. Cast-iron railways at Penrhyn and by the Tyne: their great efficiency: The Iron-bridges at Colebrook-dale and Wearmouth.—VII. Birkenshaw's malleable rails, superior to the cast-iron ones.—VIII. The "navvies," their great strength and rude habits.—IX. The modern railway-system: Stephenson becomes conspicuous as an engineer: Baker's scientific method of laying out railway curves: The exertions of Pease to procure legislative powers for constructing the first public railway (the Stockton and Darlington).—X. The first efficient Locomotive produced by Trevithick and Vivian: His great strength.—XI. Pre-conceived defects of the first Locomotives: These defects afterwards proved not to be real.—XII. Stephenson, Losh, and Dodd produce greatly improved Locomotive Charioteers, so that their final success begins now to be certain.

THE

STEAM ENGINE;

OR, THE

POWERS OF FLAME.

CANTO VIII.

LOCOMOTIVE POWER.

I. To lofty tones the Muse's lyre was strung,
When Homer flourish'd, and when Greece was young;
Hence long renown to those who conquer'd Troy,
And quench'd the flame of Priam's wanton boy.
Thence sprung the sister-arts, with peerless grace,
The god-like virtues of Platonic race,
And that grand impulse of the reas'ning mind,
Which from the brute distinguish'd human kind;
Lawgiver, orator, historian, sage,
"The holy lights of each succeeding age,"
Were destined there to find their bless'd abodes:
There rose the fanes of their immortal Gods,
On fluted columns, tapering, graceful all,
While gorgeous sculpture mark'd each capital.
Mathesis' light, that first in Egypt shone,
From Grecian sages added lustre won.

All these, descending to immortal Rome,
In Gaul and Britain, find their final home.
Yet still the sons of Greece, in all their pride,
Lack'd an essential ne'er to them supplied:
For when they journey'd to a distant town,
On embassies, or errands of renown,
Or to consult, at Delphi's hallow'd shrine,
The virgin-priestess' oracles divine;
So bad the roads, so tedious the delay,
'Twas well to make some twenty miles a day.
Their tott'ring car, their wheels without a tire,
Were ever sinking axle-deep in mire:
While, vex'd and harrass'd, they implored their gods
To help them forward on these plagny roads.
Thus the great founders of the arts plunged on,
In war and peace alike, from sire to son.

II. But to the rising power of Rome we owe
The first good roads that we on record know:
Hence antiquarians still some relics meet
Of the famed Appian Way(1) and Watling Street:
A journey then reach'd fifty miles a day,
While charming prospects cheer'd the pleasing way.
But when Rome's empire fell by barb'rous force;
Then, by degrees, these famous roads grew worse:
For centuries, kings and peers, in rich attire,
On horseback proudly plunged through slough and mire;
For roads had vanish'd now beyond all hope;
While in his glory rose the mighty Pope,
With all his countless host of priestly powers:
These were the church's splendid, golden hours:

Then sprung the gorgeous Gothic Fanes* that vied
With Greece herself in architectural pride.
Majestic grandeur mark'd each sacred pile,
The cluster'd column and "the long-drawn aisle,"
Strong, cruciform, replete in every part
With richest Sculpture's almost-worship'd art.
And though with justice we the men have blamed,
Whose heads and hands these gorgeous structures framed,
As truth's inveterate, persevering foes;
Yet still their stately Gothic grandeur throws
Around their names a halo half-divine,
Through countless ages, yet unborn, to shine.

III. These works, with chivalry, knight, 'squire, and page,
Engross'd men's minds throughout "the middle age:"
Their deeds all glory, bright their Christian hope;
While grew infallible th' encroaching Pope!
'Twas glory's height to plunge through slough and mire,
To kiss the toe of Rome's usurping sire,
While ever and anon, in grand crusade,
High feats of Christian valour were display'd!
Roads† still grew worse; indeed, the roads that were,
Were mired knee-deep for want of due repair.

* The Gothic Cathedrals, which, throughout Christendom, amount to several hundreds, are most of them elaborate and gigantic specimens of their style of architecture; and if to these we add St. Peter's at Rome, St. Paul's at London, and St. Sophia at Constantinople, (which are all, I believe, in the Grecian style,) their aggregate cost of erection, though distributed over several centuries, would approach the nearest of any of the great works of man to the vast cost of our modern Railways.

† Notwithstanding the good example set by the Romans, in the days of their great power, of making excellent roads, such as the Appian way (*regina viarum*) already noticed, and numerous others; it is well known, from history and other records, that the roads, in the palmy days of the Popes, and during the collateral

Still plunged the pilgrim, kiss'd his Cross again,
No "slough of despond" could his zeal restrain;
His eye was fix'd on endless bliss above,
No toil too great to win a SAVIOUR's love!
Could he, th' elect of the great TRIUNE GOD,
Regard the roughness of an earthly road?
That led to happy realms of endless light,
'Twas good to him,—such were his views of right!
The vast cathedral's Heaven-directed spire
Show'd the warm ardour of his Christian fire;
In truth it was no evanescent spark!
Then why, ye zealots, call these ages dark?
They left their fanes, revered in Gothic pride,
By which alone their times are sanctified!
To worship Heaven, the roughest ways they trod:
Judge not, ye zealots, 'twixt men and their God!
They left the iron-railways to engage
Their sage descendants of the present age.

IV. Then all the nobles felt a lofty pride
On horse-back, arm'd in panoply, to ride;
Hence the renown'd Equestrian Orders came,
Prolong'd with honours high in modern fame.
Their horses, too, were all of mettle good;
With all the fire of high Arabian blood*;

times of the Crusades, were so bad that the armies of the Crusaders preferred marching through the open fields, and cutting their way through the forests, rather than make use of the existing miry and impassable routes of transit. There was in those times very little commercial or other intercourse, even among the people of the same kingdom, the natives of its different provinces regarding one another as foreigners.

* The Arabian breed of horses was first obtained in England, and throughout Europe generally, from the horses taken from the Saracens in the Crusades; but there have been numerous importations of the same breed since that time.

With riders bold were wont to prance and bound,
Leap widest ditches, plunge through gulfs profound!
Such were the feats that men could then admire,
The charger mounted by brave knight or 'squire.
Good roads were therefore things quite out of course,
Not wanted then, by either man or horse.
The feats that gave to chivalry a name,
Gain'd from bad roads full half their boasted fame;
While knight and charger had an equal share
Of honour's meed in eye of lady* fair!
Who, with her page and gay attendants, rode
To view the feats of tournament abroad,
And mark'd him well, who, by his daring deed,
To throw his rival could the first succeed;
And gave her heart and hand to that proud knight,
That thus could fearless ride and bravely fight.

These feats are still admired in various climes,
At least in part, e'en in the present times.
In hunt and steeple-chase, we've champions bold,
And true admirers of these feats of old,
Who nobly shine, and with all might oppose
The railway-makers, as their greatest foes†;

* There were no carriages used in those days, except in the streets of large towns. The ladies, when they went to any great distance from home to view the feats of chivalry, &c., rode on horseback astride like the men, previous to the time of Queen Elizabeth; in whose reign, it is said, a Queen of Hungary first introduced the use of the side-saddle.

† It is well known that most of the great landowners of this kingdom, who were fond of the chase, were strongly opposed to the construction of railways, both on account of the obstructions, which the embankments, &c., made to field-sports, as well as on account of a preconceived idea that the noise of the trains would frighten their game from the preserves.

Whose vile obstructions, loudly they complain,
Will soon destroy their bright equestrian reign
Who does not know what wreaths of fame adorn
The boldest horseman after hound and horn?
What crowds pursue on foot, till out of breath,
To have it said they witness'd reynard's death?
Were't not for those, we'd have no chance to see
The slightest trace of ancient chivalry;
We wish good sport to this great modern corps;
And now return to the great deeds of yore.

V. Next came the warfare of the rival creeds;
Both sides could show their lists of glorious deeds;
Their Christian valour in the deadly fight;
Their saints and martyrs fled to realms of light.
Still they plunged on and fought like Christians true;
Victory or glorious death full in their view:
In these high matters all engaged of course;
The roads with mud and mire grew worse and worse!
This work, so pious deem'd, was carried on
Three centuries full, and nothing else was done;
Till kings and subjects both began to feel
A coolness damp their hot religious zeal;
And, tired of strife, began to look abroad,
And, here and there, repair'd or made a road.
And these some hardness next were seen t' acquire;
Carts were not dragg'd, as erst, nave-deep in mire;
Their great convenience soon was felt by man;
The highway-system thus at length began.
And lo, full soon, went forth the high commands
Of regal lords, for roads in foreign lands!

Not last nor least were British turnpike-acts*,
Grand roads were form'd, where once were marshy tracts ;
Bridges and drains, embankments high were made,
And sure foundations for the works were laid.
The roads went briskly on, were still more prized,
Were smoothly finish'd, next MacAdamized†,
Display'd the vast resources of each state,
Where'er their lengthen'd lines might penetrate.
Then could the chaise move full twelve miles an hour,
Where erst it scarcely could accomplish four!
The carriers' vans, stage-waggons, farmers' wains,
Moved forth with ease on their firm-gravell'd plains ;
Nor were the wheels in ruts and gulfs bemired;
The horse, un-whipp'd, performed the task required.

VI. But far above all roads of ancient fame,
Or great MacAdam's still more recent claim,
Were those of oaken rail, a deft design(²),
Which first were witness'd on the banks of Tyne ;
On sleepers deep imbedded firm they lay;
And smooth, beyond example, was the way.
The friction thus reduced, one horse did more
Than the united strength of three before!
Where quick descent might make the waggon's train
By gravitating force, run down amain,

* The first Acts of Parliament for Turnpike Roads were granted in the early part of the reign of George the Third, previous to which time, all the roads of this kingdom were almost impassible by carriages, especially in wet seasons.

† MacAdam's highly improved system of making common roads, was begun in Scotland about the year 1815; and in time was adopted throughout the whole of the United Kingdom; and lastly in the streets of large towns.

The break was press'd upon the wheels t' impede
The first attempt to gain immoderate speed.
On these grand roads, with plane of long incline,
From rising ground to quay, on Wear or Tyne,
Firm on the summit fix'd, the windlass strong,
With rope of hempen strength, both tough and long,
Guided the loaded wagons down the plane,
And, balanced, brought them empty back again.

Our HERO, too, on summits takes his place,
The sloping rails descending to each base;
Where, firmly fix'd, by his unbounded strength,
With cables sometimes full three miles in length,
He up the steep draws the long waggon train,
And with like ease remits it down again.
This is "the system undulating" named;
The scheme is by ingenious Buddle claim'd.
Thus over hill and dale, stone, coals, or ore,
STEAM's pliant power conveys to ocean's shore;
Thence o'er the waves, to be disparted forth
To every mart, east, west, or south, or north.

VII. More smooth and strong still grew the oaken rail,
By added coat of heavy iron mail.
At Penrhyn next, all in cast-iron(3) shone
The polish'd way, its sleepers massive stone,
The rails, "fish-bellied," fix'd with nicest art,
In even rows, just two feet six apart.
On this metallic line, one single horse,
Beat more than forty's full united force,
On the best roads to our forefathers known,
Whether close pavement, or embedded stone.

The eighteenth century just its course had run,
When this important way was first begun;
And quickly spread the fame of its design,
Among the colliers of the Wear and Tyne;
There iron-ways in all their strength were laid,
On which the coals were to the quays convey'd;
For Cambria's mines, and those of Colebrook Dale,
These useful roads were destined to prevail.
Here first an iron bridge* from cliff to brae,
Spann'd the deep vale where Severn's waters stray.
Next Wearmouth Bridge(4), of architecture rare,
Of vast proportions, height, and stately air,
In all the strength of iron, great and grand,
And rainbow-like, the Wear's deep valley spann'd;
Beneath its arch full sail the vessels ride;
Thus did at Rhodes the vast Colossus stride.

VIII. While great improvements in the iron-ways,
In mining lands, call'd forth deserving praise;
Cast iron, though for hardness so renown'd,
Was, notwithstanding, far too brittle found:
Full oft, in all its strength, the massive bar
Snapp'd suddenly beneath the loaded car.
Costly repairs the miners all foresaw;
Till Vulcan sent his pupil, Birkenshaw!
His rails were malleable, and, therefore, tough,
Not to be fractured, stern, tenacious stuff!

* This was the first cast-iron bridge in England, and, probably, in the whole world. It was planned and executed by Mr. Reynolds, but it is greatly inferior, both in dimensions and splendour of style, to many other more modern erections of the same kind.

No hammer's weight, by Cyclop's vigour slung,
To form their flanges on the anvil rung;
No vice or chisel, grating file, or drill,
Was used to show the fabricator's skill;
All these, unneeded here, were laid apart,
So great was Birkenshaw in Vulcan's art!
By Rolling Mill he these tough rails produced,
And these, without improvement, still are used.
No hammer-mark, unseemly weld, or flaw,
Was in the work of famous Birkenshaw:
All smooth and neat they came from his machine;
To be admired, they had but to be seen.
The iron way was now both hard and tough,
To jolt, rebound, and heaviest pressure proof!

XI. Next was display'd the excavator's skill
To raise the vale and sink the lofty hill,
And make those noble roads approximate
To little short of a true level state.
Hence sprung those men of giant strength of frame,
Since known as "Navvies"(6) of road-making fame;
Hard was their toil for sixteen hours a day;
For which of course they had essential pay.
While daily thus these modern Sampsons toil'd,
Much did they eat of beef both roast and boil'd;
More did they drink; their thirst was aye encore;
And loud they bullied, vapour'd, storm'd, and swore,
By way of pastime, as their toil went on,
Alike too, when their daily task was done.
Thus toiling long, and frequent drinking deep,
Throughout the week they'd little time to sleep,

When Sunday came, they had no thought to pray;
But drank or slumber'd through the holy day.
Wild impious runagates, no duties taught,
Daring they set all piety at naught.
Though civil life encompass'd them around,
They in its virtues no communion found:
In vast Herculean toil alone they hoped;
If debts encumber'd, to new lines they "sloped."*
Such were the men, the freest of the free,
Wild, uncouth sons of savage-liberty;
Such were the men that gave their powerful hand
To every task that Stephenson had plann'd:
They gave foundations to the iron roads,
Those wond'rous works, surpass'd alone by God's!

X. By tunnels next were pierced the towering hills,
And lofty arches spann'd ravines and rills;
Slight rising or descending paths were found,
Howe'er might undulate the destined ground(7);
The min'ral mass was moved with ease to shore,
Though thought impossible not long before.
Sometimes t' avoid th' abruptly rising ground,
Its base with winding curve was swept around;
T' avoid the river and the deep ravine,
A like precaution in the work was seen.
In these gigantic works first Stephenson
The engineer's redoubted merit(8) won;
His famous works, on Stockton-way design'd,
Show'd the conceptions of a master mind.

* A cant term used by the navvies for running away in debt.

Here first was given, with scientific skill,
The law(9) to wheel to right or left at will,
T' avoid the hill, the dell, and form the line
In curves of graceful winding serpentine:
No turns abrupt were here allow'd t' impede
Or to derange the train's increasing speed.
For here our HERO'S SONS(10), in iron-mail,
First show'd unwonted speed upon the rail;
Whence the grand impulse to those projects came
Of greater scope and more extended fame.
As the projector of this useful line,
Pease(11) has the claim, he form'd its first design;
His calculations, on firm basis laid,
Secured him friends and funds his scheme to aid.
Great was his struggle, greater was his tact,
'Gainst powerful foes to make his scheme a fact:
And though abuse and wrath assail'd his cause,
He triumph'd with unanimous applause.
Such are the toils that men are doom'd to prove,
That from the path of custom dare to move.
But we must take a retrospective glance
At the first efforts and the grand advance,
Of our great HERO'S LOCOMOTIVE race,
Now taking rank in honour's envied place.

XI. Great Watt, whose name stands forth in bold relief,
As foster-father to our IRON-CHIEF,
From that event ere twenty years had run,
Bespoke his future LOCOMOTIVE-SON.(12)
But his prediction of this wond'rous birth,
By patent-herald publish'd o'er the earth,

Was countermanded by decree of Fate:
Since Watt, already greatest of the great,
Would, by success in this, leave all his kind
At sightless distance, hopelessly behind:
Indeed, mankind could scarce appreciate,
When thus announced, a birth so truly great;
Hence Watt's ill-timed suggestions on this score
Remain'd unfruitful twenty years or more;
When Fate relax'd her seeming harsh decree,
And our great HERO'S SECOND PROGENY,
The future boon, which was for man design'd,
Fell to the care of the capacious mind
Of Trevithick(13), who now, with Vivian's aid,
For the event full preparation made:
And, lo, he gave the wond'rous GIANT birth;
No greater monster moved before on earth!
The Titans' race not half so strong and great,
Although, as yet, but in his embryo state.
Whate'er was there of famous Watt's device
Was doubtless to be prized above all price.
In all the strength of iron was his frame;
While winding tube convey'd the scorching flame
Through his vast lungs, to chafe his heart of fire,
And make with speed his vap'rous blood aspire;
Which, by a pressure of unwonted stress,
Was destined with vast energy to press,
Within his chest, by a quick "double stroke;"
And living vigour all at once awoke,
That urged his car along the iron-road,
Six miles an hour, with twenty tons his load!

This feat was done on famous Merthyr's rails;
And eyed with wonder by the sons of Wales;
Who own'd, while standing far aloof through fear,
That Gwydyr, famed of old, was scarce his peer!

XII. His frame did few essentials then embrace,
Now found in YOUNGER BROTHERS of his race:
His joints less pliant, he was wont to spurn
Th' attempt to make him right or left to turn:
Besides, 'twas thought, on polish'd rising plain,
His utmost efforts would be found in vain
Firmly to make his chariot-wheels adhere,
To move the pond'rous load in full career.
A roughness added to the wheels and rails,
To give due friction(14), was employ'd in Wales;
'T was Trevithick's device thus to correct
What he assumed to be a great defect.
While Blenkinsop improved the last design
To move the chariot on the steep incline;
His rack, and cog-wheel-work(15), a plan quite new,
From the Leed's miners thund'ring plaudits drew;
But though the scheme was crown'd with full success,
The noise and friction made its value less,
And Chapman's eight-wheel'd chariots(16) next were tried,
A vain expedient, and soon thrown aside.
While Gordon's scheme, and Branton's long-legg'd car
Fail'd to secure the wish'd-for end by far;
The last, at furious rate, plough'd up the road,
And threw the stones and gravel wide abroad.
The wear and tear, and consequent expense,
In all these futile projects were immense;

Thus clearly showing that the grand career
Of our YOUNG LOCOMOTIVE CHARIOTEER
Was not begun; save just to show how great
His power could prove, while yet in embryo state;
And show, besides, his foster-fathers still
Were unacquainted with due rearing skill;
Whose ingenuity was thrown away,
In vain attempts to make a grand display;
Not naming all the hopes and wishes cross'd,
The almost-broken hearts, and fortunes lost.
While Ridicule, on such occasions bold,
On those mishaps was ready to lay hold,
With an exulting sneer, and grin as broad,
As she, some dozen years before, bestow'd
On the abortive efforts, made to rear
His BROTHER, the great ocean-charioteer;
And gladly would have moved th' unthinking crowd
To show, as erst, disapprobation loud;
But all her best exertions only drew
Ill-omen'd whispers, from a captious few.
But soon to put an end to every sneer,
And give the sons of progress welcome cheer;
On Wylam line, our then-call'd "Iron-horse" *
Was found possess'd of all-sufficient force(17),
On the smooth rail to move the heavy train,
On great variety in slope of plain.

* This name was commonly given to the early and imperfect Locomotives: they were large, lofty, rough, and cumbrous; and made a loud and disagreeable noise, when in motion, arising from the general defective mechanism of their parts.

Success in this attempt, thus fully tried,
Set every friction-scheme at once aside.
Thus all in vain much time and cash were spent,
For lack of making due experiment;
The sole criterion that could well detect
A mere assumed or preconceived defect.

XIII. Next Stephenson[18], with Losh and Dodd combined,
Improved the plan by Trevithick design'd;
Their double power, on cranks turn'd different ways,
Secured their purpose far beyond all praise:
Our HERO now to right or left would swerve,
And suit his motions to the winding curve;
Though noise and friction of his joints were still
A great draw back on both his strength and skill;
Yet full six miles an hour, on varying plain,
This Giant moved the heavy loaded train;
While of his load, when disencumbered quite,
He moved full twelve, then a surprising sight!
This gave the friends of progress wider scope
T' expect far greater feats with ardent hope;
And that the embryo CHIEF, with vigour rife,
Would show developments of perfect life;
That soon the LOCOMOTIVE'S NATAL HOUR,
In all his pomp and panoply of power,
Would be announced with prouder swell of mirth
Than that which mark'd his OCEAN-BROTHER'S birth.

END OF CANTO VIII.

THE

STEAM ENGINE;

OR, THE

POWERS OF FLAME.

CANTO IX.

LOCOMOTIVE POWER.

ARGUMENT TO CANTO IX.

I. Ancient and modern heroes; their comparative merits: A striking likeness, in one particular, between the ancient heroes and the modern Locomotive Flame-powers: The great energy of the Locomotive, called the Iron-Duke.—II. Achilles, the great Flame-charioteer; his triumphal procession, and distinguished passengers.—III. The muse undertakes to describe the rise and progress of his predecessors, and the fortunes and misfortunes of their foster-sires.—IV. The premiums for competition by race against time by the Locomotive Powers on the Liverpool and Manchester Railway, in 1829.—V. Description of the spectators of the race.—VI. Description of the three Champions, the Rocket, Sansparell, and Novelty.—VII. The Race: The Novelty and Sansparell successively break down, to the great disappointment of the spectators.—VIII. The Rocket wins the race: Great joy and loud exultation of the assembled multitude.—IX. The Rocket successfully repeats the race: Similar demonstration of joy again repeated.—X. Banquet and great rejoicing on the occasion at Liverpool.—XI. Reflections on the great result, and its probable effect on the destinies of mankind.—XII. Vision of the world, regenerated by the Gospel and the Powers of Flame.

THE

STEAM ENGINE;

OR, THE

POWERS OF FLAME.

CANTO IX.

LOCOMOTIVE POWER.

I. The haughty victor, with his laurel crown,
And all his boasted trophies of renown,
His captives chain'd to his triumphal car,
Th' insulted pledges of successful war,
Hail'd by the crowd's continued loud acclaim,
Mistakes such levity for virtuous fame;
While maid's and widow's bitter tears are shed,
That for her love, this for her husband dead;
Who spurn'd the conqueror's domineering pride,
And for their country and their freedom died.
Bards and historians have consenting said,
Of such materials all true glory's made,
Yes, so it was, and well such vain displays
Suit the barbaric pride of ancient days:
With such they erst delighted to prolong
The living energy of epic song.

Hence Homer, Virgil, Tasso, well might write
On war and havoc, then the world's delight;
Their splendid models in this form have come
To modern times from ancient Greece and Rome;
But they, indeed, could find no nobler theme,
Unknown to them th' heroic POWERS OF STEAM!

We grant the dauntless chief deserves applause,
Who lifts his sword in virtue's sacred cause;
Of these our Muse could many a name recall;
But, lest deem'd partial, she declines them all.
No doubt the heroes of the bards of old
Were brave and noble, in close combat bold;
Their deeds so daring and divinely great,
That modern chiefs would fail to imitate.
Indeed, so honour'd from primordial claim,
In men's regard, are chiefs of ancient fame,
That e'en our HERO's heaven-descended race
Have from their names a bright reflected grace;
Hence great Achilles, and Atrides' son,
Thus in new forms to modern vision shown,
With hearts all flame, and coats of iron-mail,
Encounter Priam's sons upon the rail,
Their feats of single prowess, great and rare,
Surpassing theirs whose honour'd names they bear.
Hence e'en the Iron Duke, great Wellington,
Though honour'd for his "hundred battles won,"
Is, when compared with the great chiefs of Troy,
In personal feats, an undistinguish'd boy;
And, as the hero of an epic lay,
Would, like Prince Menschikoff, make no display;

His great achievements, the result of tact,
He, not heroic in pure Trojan act,
In tilt, and tournament, and daring deed,
Which gain'd old chieftains honour's glorious meed,
Must yield his name to the young CHIEFS OF STEAM,
To be of honour the eternal theme.
Hence IRON DUKE, on the Great Western line,
Moves his long train with energy divine!
The bard has said, (who shall his word belie?)
The mighty hero's name shall never die!
Such heroes flourish'd in our native clime,
Whose names shall still endure to latest time:
And such were Percy, Douglass, and Rob Roy,
Of fiery clay, like the great chiefs of Troy.
But they contended on a narrow stage,
In feud and foray spent their martial rage,
Which could have more than Trojan honours won,
E'en more than rivall'd famous Atreus' son.
While thus they fought, and blow exchanged for blow,
Mild friendship's hand they gave their fallen foe;
Such was their spirit, mighty to command,
Or meet the weak with mien and manners bland;
'Mong modern heroes, these stand forth supreme,
And have no peers, save the bright CHIEFS OF STEAM!
For these possess the reckless rage of those,
Which 'twixt the two one striking likeness shows;
If you'd be safe, avoid their iron-path,
Nor join their train, should they give signs of wrath:
For death and havoc marks their rear and van,
Without respect to laws decreed by man!

II. Triumphant was the burst of rapt'rous joy,
That hail'd our HERO'S young victorious BOY,
The great opponent of both time and space,
Brave young ACHILLES(1), chief of all his race,
When in the pride of his paternal strength,
With splendid train of more than civic length,
He first by Thames in all his pomp was seen,
His triumph graced by Britain's virtuous Queen,
By prince, by senators, and Lords of state,
With minds replete with skill to legislate,
Journeying for pleasure, or their wish'd-for home,
Or regal Windsor's high embattled dome;
While merchant, agriculturist, alderman,
And every grade, from peer to artizan,
The knowing sage, the clown devoid of thought,
By casual conflux there together brought,
Were borne with more than e'en the fabled speed
Of famed Arabian prophet's flying steed;
Or like the meteor shooting through the sky;
Or like the lightning's gleam, quick flashing by.
Ajax pursues, but not his friend to gain,
An equal distance still divides each train;
Hector by both is met, their speed at par,
Short time for greeting, none at all for war.
And though he bears a name so great of yore,
The Trojan tournaments are tried no more:
Save when his rivals take him by surprise,
Dread is the conflict that may then arise;
While slaughter, wounds, and desolation dire,
Mark the wild sallies of his glowing ire!

Away dread wrath, nor scenes of peace invade!
Where he to commerce gives his powerful aid,
Aids, too, the sons of Ceres and of Pan,
And all the peaceful arts ennobling man.
Although 'tis his in guardianship's despite,
To speed bold lovers in their secret flight;
With equal stratagem he can withdraw
The thief and swindler from the toils of law;
Meanwhile a power*, to whom he's close allied,
Betrays the secret they would gladly hide;
And thus jocosely shows them, to their cost,
That all their cunning is but labour lost!
The ardent tourist who gay scenes admires,
To join his train with rapt'rous joy aspires:
Scene after scene by turns are quickly pass'd,
A flying panorama wild and vast;
Where villas, spires, bow'rs, meads, and woodlands vie,
In rich variety, to charm the eye:
To give this scenery a magic stroke
He speeds in darkness through the rifted rock.
Now deep ravine awhile obstructs the view;
Anon fresh beauties strike the eye anew.
Such are the scenes, e'en more than Tempe gay,
That happy Britain's length and breadth display!
Such are the men of human kind the lords,
To whom ACHILLES his vast powers accords;
And bears them forth behind his flying car,
On high emprise or pleasure, near or far!

* The Electric Telegraph.

These grand processions, and their rapid flight,
Give e'en accustom'd eyes profound delight;
But to the stranger's view, the whole would seem
The gay creation of a pleasing dream;
Some happy land of superhuman race,
Not of this earth, nor yet of heav'nly grace,
A seat of men with more than magic might,
Between terrene abodes and realms of light;
Till he, from his enchantment roused, is told
The feats of glory that his eyes behold,
Are earthly all, and no ecstatic dream,
The mighty deeds of the bright CHIEF OF STEAM!

III. Our Muse who graciously has borne along
The CHIEF'S MARINE on the full tide of song,
Designs forthwith to trace the grand careers
Of their fam'd brothers, the young CHARIOTEERS:
She further shall record who have the claim
As foster-fathers to these SONS OF FLAME,
Whom now the world regards as half-divine;
What stages mark'd the progress of their line,
Before mankind were destined yet to see
ACHILLES shine in all his majesty.

IV. At length the road, so great in modern fame,
From whence the rest in quick succession came,
From Liverpool to Manchester was made,
Th' embankments firm, the rails securely laid,
Surpassing far the famous Appian way,
Or aught of Rome's, in her most glorious day!
Its great projectors, merchants much renown'd
For enterprise and wealth the world around.

Were all assembled, gravely to decide
What mode of transit should be then applied,
That would be worthy of a road so great:
" Horse-power " scarce found a single advocate.
Our HERO, so renowu'd for peerless strength,
With iron chains of full three miles in length,
Was first proposed to draw the pond'rous train,
As practised still from quay to min'ral vein;
But this was over-ruled, and 'twas decreed
His car-borne SONS their SIRE should supersede,
Whose grand displays of embryotic power
Presaged full life at no far distant hour.
A large attractive premium(²) straight was named,
To be by foster-father duly claim'd,
Who could produce, and with full vigour rear,
A high courageous, mettled CHARIOTEER,
Well train'd for action, of sufficient power
To move full thrice his weight ten miles an hour:
To be compact in form, of six tons weight,
Not like his SIRE, unmanageably great,
Nor yet like him, the ladies to provoke,
By puffing forth volcanic clouds of smoke;
But to inherit all the majesty
That marks their most illustrious pedigree.
For each YOUNG HERO, thus bespoke, beside
Touch'd off with father Watt's artistic pride,
A further premium would be gladly paid,
When all experiments were duly made.
The day was fix'd for trial to take place;
When, lo! competitors in this grand race,

Lured by strong hopes to gain the princely prize,
Beyond what turf-men view with anxious eyes,
Began to show their high artistic power,
Each on his scheme for the eventful hour.
Of time, there was allow'd full six months' space
To train the hopeful CHAMPIONS for the race.

V. Th' important day(3) arrived of joy and pain,
'Twas near the close of our Fourth George's reign,
A day with lasting honours to be crown'd,
When, with a flourish of exulting sound,
Our HERO's last-born race of CHIEFS OF STEAM
Began to realize the golden dream
Of father Watt, which Fate's severe decree
Forbade him in this mortal life to see.
Rainhill, the place so famed for trial, lay
Upon the summit-level, near midway
Between the towns, to which the iron-rail
Forms a connecting link, o'er hill and dale.
A flat half-league was that day glory's track,
Twice five times traversed from the goal and back,
In three hours time, with thrice their weight of train,
Would honour's post, and the grand premiums gain!
Where they some days had practised to mature
Their strength and speed, these premiums to secure.
Vast crowds came there at morning's early gleam,
To view the contest of the POWERS OF STEAM;
Who, on the rail, in high heroic heat,
Stood forth for action at all points complete.
Peers, senators, and ministers of state,
Merchants, and cotton-lords—the modern great,

Agents for Cambria's and Northumbria's mines,
The learn'd in science, magistrates, divines,
With lawyer, turf-man, and the country 'squire,
Shone in the assembled crowd in gay attire;
And many more, from foreign lands remote,
Th' unique occasion, there together brought;
While thick and thicker still assembled there,
The weaver, spinner, tailor, carpenter;
A countless rabble of coal miners too,
Known by their sickly frames and sable hue;
E'en the great labours of the plough stood still,
As well as all the arts in shop and mill;
For all, who could, on that eventful day,
Attend the race, to Rainhill found their way.
The rail-directors, of their station proud,
Form'd a conspicuous group among the crowd,
And last, not least, were mighty Vulcan's peers,
Distinguish'd by the name of engineers;
His humbler sons from all the forges round,
In leather aprons, in close groups were found,
To view th' expected triumph of their art,
And form'd a black and brawny group apart.
This was their gala-day of high delight,
The prize once won, to have a spree at night,
With ale and brandy mix'd, call'd Leyland cream,
And pledge with glee the bright young CHIEFS OF STEAM,
Near whom they stood and push'd "the tailors" by,
Such they call'd all who ventured to come nigh.
High was their praise of iron strong and tough,
For roads and all things else the proper stuff;

While well assured was Vulcan's every son
The splendid prize would soon be more than won:
And as the time of starting now drew near,
Took special care to keep the railway clear;
Full at "the tailors" hurl'd a brick or stone,
Or bid them, with tart impudence, begone,
If once they dared come on, or near the way,
The path of Glory, on that glorious day!

DESCRIPTION OF THE CHAMPIONS.

VI. Four great competitors 'gainst time and space,
At first with full assurance, took their place;
But one, at length, the mighty task declined;
And all the glory to his peers resign'd.
The Rocket(4) now stood ready on the rail,
In pond'rous coat of polish'd iron-mail,
To whom great Stephenson was foster-sire;
His lofty bearing bid the crowd admire;
And most recondite was his splendid frame,
And much was there that Stephenson could claim.
His heart of fire was double eased around,
Save where his vital breath an entrance found;
Between these casings the hot crystal flood
Quick vap'ring rose to form his living blood.
The fabric of his lungs to Booth(5) was due,
By countless breathing pipes piereed through and through;

Through these th' ignited air found ready way,
And raised his life-blood to high active play,
That to the ample chest rush'd from its source,
And gave his members quick and vig'rous force
And thence sublimed into his bronchial shaft*,
Quicken'd his breath with hot and furious draught.
Thus, ever glowing, were his members rife
With all the energies of vig'rous life,
To drive courageously his splendid car,
With more than speed of meteoric star.
Such was the fabric of this CHIEF OF FLAME;
And such the parts from whence his vigour came!
A SON well worthy of his god-like SIRE,
Destined by turns to bid the world admire!
Hackworth was foster-sire to SANSPAREIL(6),
His form and action both presaging well.
Here Trevithick's design again we view,
With much beside to Hackworth's genius due,
That chiefly rested on improvement's ground;
No new device throughout his parts was found,
Save that his breath aspired in furious draught,
As in the ROCKET, through his bronchial shaft;
While grand mechanical effect was seen
To vie with outward form of polish'd sheen.
All glorious he in each beholder's eyes,
Deem'd sure by all to win the splendid prize!
Braithwaite brought forth his champion, NOVELTY(7),
Brimful of spirit, fire, and force was he;

* The Funnel.

And, like his rivals too, possess'd great part
Of Trevithick and Vivian's powerful art.
His breathing apparatus fresh and new;
To Ericson this rare device was due;
From Vulcan's air-machine* its model came;
And high it chafed his heart to active flame.
High rose his life-blood with courageous heat;
His mail resplendent and his bearing great,
Displaying much of his paternal might,
He from the crowd drew plaudits of delight!

THE RACE.

VII. The CHAMPIONS stood prepared, and drew all eyes:
Quick to their posts the wards and pages† rise!
The umpires each in his selected place,
Booth gives the signal to commence the race!
The NOVELTY(8) begins in full career,
While from the crowds rings forth a hearty cheer!
Away! away he drives his pageant car;
The time-piece shows his speed surpasses par!
And more than this; he had the previous day,
In speed and action, made a grand display!
The first length finish'd with his loaded train,
With like eclat he now returns again.

* The Forge-bellows. † The Enginemen and Stokers.

With vast increase of flying speed, once more
He then anew repeats the distance o'er;
Hail'd loudly champion 'gainst both time and space,
Full well assured were all he'd win the race!
A bootless hope: alas! and must we say,
His vap'rous blood, forced to excessive play,
Bursting a vein, foam'd through the iron-wound,
Spread fear and danger 'mong the crowd around!
To heal the part in vain was present skill;
His efforts fruitless, and his car stood still:
He now withdrew, all hopes of glory lost,
Deplored by all—by Braithwaite doubtless most!

But SANSPAREIL(9) proceeds with great eclat,
Is destined now the crowd's regard to draw;
And persevering with increasing pace,
Performs in still less time th' appointed space.
Eight times the distance o'er the course was done;
And sure were all the prize would soon be won;
The time-piece show'd his chance was doubly fair,
To reach the goal, and have an hour to spare!
Ah, Hackworth! why not thy young CHIEF enclasp
In brass and iron of a tougher grasp?
No more, no more he draws the crowd's acclaim,
All dislocated falls his splendid frame!
No remedy for lack of prudent thought
To aid the foundering CHIEF can now be brought;
Hence, like the NOVELTY, with deep regret,
He quits the field—his sun of glory set!

VIII. This second failure, spreading general gloom,
Left but one hope of triumph yet to come.

The ROCKET, from the first deem'd sure to win,
With vap'ring brilliancy moves out and in!
The eyes of all are turn'd, 'twixt hope and fear,
On him alone. No voice is raised to cheer.
The last turn made leaves little left to do;
Full speed he comes, with glory's goal in view!
Scarce could they pause until his task was done,
When with a deaf'ning cheer the prize was won!
It's repetition was prolong'd of course,
Till e'en the forgemen's leather lungs were hoarse.
The mighty task perform'd in style so prime,
Three-fourth an hour there still remain'd of time!

IX. The VICTOR now his task repeats again,
The banners flying on his car and train.
Those lately hoarse, had now themselves regaled;
With deaf'ning cheers once more the VICTOR hail'd;
While Stephenson, his foster-sire revered,
Now on the train, alike was loudly cheer'd;
While out and in, and to and fro again,
In grand procession, thus he moved his train,
And gain'd the goal triumphantly once more,
His task perform'd much sooner than before!
The cheers more loudly still were now renew'd,
Till hoarseness once again their powers subdued!
Ten leagues an hour, the greatest speed he made,
The average half, by many turns delay'd.

PROCESSION AND BANQUET.

X. Thus was the prize by ROCKET doubly won,
To the high praise of Booth and Stephenson:
And now was crown'd the VICTOR of the day
With laurel boughs, with flowers and garlands gay.
Meanwhile the crowd took in a strong regale
Of Leyland cream, of gin, and foaming ale;
That now their lungs, with hoarseness dull before,
Were well prepared for a profuse encore!
Nine cheers, vociferated long and loud,
Again announced the triumph from the crowd!
While still the forgemen's mighty lungs gave birth
To demonstrations of o'erflowing mirth!
But many a heart was there downcast and sad:
How could the vanquish'd[10] now, in truth, feel glad?
Yet slight was the appearance of alloy
Amid the gen'ral flow of heartfelt joy.
Thus on to Liverpool they bent their way,
With music, banners, and with garlands gay;
On chariot, horseback, and on foot they sped,
The VICTOR proudly the procession led:
While cheers, from every town as they sped on,
Were raised for STEAM, for Booth and Stephenson;
And cheers responsive rung with might and main,
From those attending, and upon the train!
Thus they, with rapt'rous joy and bright display,
Reach'd Liverpool before the close of day:

Where the directors and the railway great
Received great Stephenson in gorgeous state.
Scenes of festivity throughout the town
Were destined next the glorious day to crown;
But chief was that where met the railway-lords;
The wines and banquet best that earth affords:
While was presented first to Stephenson
The double prize* the ROCKET just had won;
His health too drunk with such profuse encore,
When nine times nine were pledged, still nine cheers more!
For Booth, the VICTOR, and directors all,
Rung thund'ring plaudits through the crowded hall.
Thus rapture crown'd the day till morning light,
That usher'd forth the STEAM-CHIEF in his might!

XI. The tide of joy, that swell'd with high career,
To hail the advent of FLAME'S CHARIOTEER,
Was now with all its surging tumult past;
For man's delicious raptures never last;
Which would exhaust by such excessive play,
In little time, his tenement of clay;
Unlike the SPIRITS, which, in iron's strength,
Retain their vigour for an age's length.†
I paused to think what glories might be won,
By active progress in the feats begun;
Which just had been the weighty moving cause
Of joy, exhaled in torrents of applause;

* One thousand guineas.

† It is no uncommon thing, in the mining district, for the immense pumping engines to continue working at full stretch, night and day, for the length of time stated in the poem, with only very slight interruptions for adjustment.

While the predictions of the FLAME-CHIEF's might,
To Worcester made, through vision-hallow'd light,
And other mandates, more than half-divine,
Which onward sped the glories of his line,
Might now, with ample hope, be well surmised,
As in full progress to be realized;
And what was done, though for the sake of gold,
A glorious future would at length unfold:
And, pond'ring whether years or centuries still
Would be required this promise to fulfil,
I found the world had sunk in slumbers deep,
And I, alike, was soon o'erpower'd by sleep.

VISION

OF THE WORLD, REGENERATED BY THE GOSPEL AND THE POWER OF FLAME.

XII. I dream'd I walk'd, in raptures high,
Through realms of sunny clime,
Not of this earth; they seem'd to lie
Beyond the bourne of time.

Nor did they seem all heav'nly fair,
But happy fields between
This lowly earth of vexing care
And the celestial scene.

Vast gorgeous temples, through the land,
Rose to creation's GOD,
With marble mansions, truly grand,
For humbler man's abode.

Some trees were rich with fruitful store,
Some redolent with bloom,
Some aromatic spices bore,
Such as from Ophir come.

The fields, in emerald green array'd,
Were glorious to behold;
The flowers the richest dyes display'd,
Such Eden's were of old.

Nor lust's nor vice's snares perplex'd
This bless'd estate of man,
Such as this lower world had vex'd,
Ere Virtue's reign began.

No jealous rivalry was there,
'Mong swains to love inclined;
And every maid was modest, fair,
And virtuously kind.

No labour long and hard oppress'd
The happy human race,
Save pleasing tasks with bracing rest,
In this exalted place.

No beast, throughout its breadth and length,
Was e'er compell'd to toil;
For POWERS of superhuman strength
Gave culture to the soil.

The chariots here, in gorgeous train,
Sped swift in pageant tours;
And vessels on the rolling main,
Moved by these MIGHTY POWERS.

From the vast prowess of THIS RACE,
I some conjectures drew;
But all possess'd a nobler grace
Than what e'er met my view.

I'd seen these god-like POWERS before
On this our lowly earth;
Was present at th' auspicious hour,
When they received their birth:

Yet here I miss'd the vexing cares,
The avarice and pride,
The loud contentions, angry jars,
Which man from man divide.

My wonder deep one standing near
At once deign'd to explain;
"Behold," he said, "the destined sphere
"Of GREAT MESSIAH'S reign!

" He slavish toil and care destroy'd,
" By aid of THESE VAST POWERS;
" While bliss, like Eden's, is enjoy'd
" In this bright land of ours!

" And strangled by HIS mighty hold
" Are vice and sin and woe;
" As holy prophets had foretold
" Some thousand years ago!"

Th' advancing day's tumultuous noise
My happy slumber broke;
From raptures of celestial joys,
To real scenes I woke;

Not without hopes the time would come,
When earth would be renew'd,
With all such glories in their bloom,
As I in vision view'd!

END OF CANTO IX.

THE

STEAM ENGINE;

OR, THE

POWERS OF FLAME.

CANTO X.

LOCOMOTIVE POWER.

ARGUMENT TO CANTO X.

I. The acknowledged pre-eminence of the Locomotive Powers: The Rocket, Arrow, Phœnix, Meteor, and Star.—II. The great speed and power of the Arrow tested.—III. The grand Procession at the opening of the Liverpool and Manchester Railway, in 1830: The accidental death of Huskisson, the great financier, and other remarkable incidents: The acclamations of the people, who witnessed this most gorgeous and novel procession.—IV. Increased vigour and speed of the Locomotives, Victory, Sampson, Miltiades, Hercules, and Ajax.—V. Great extension of Railway through England: Wild speculations in these projects.—VI. The first Railway-mania: Great capital involved on this occasion: The landed-interest: Magnificence of the Railway-projects, and losses of the shareholders.—VII. Opening of the Great Western Railway: The stage-coaches begin to disappear: The Locomotives, Northern Star and Hecla: Disasters by collisions, &c., on the railways: Progress of Railways in Belgium and the United States.—VIII. The Electric Telegraph.—IX. The Second Railway-mania and further great extension of Railways: This mania, like an epidemic, spreads over almost all Europe and the British Colonies.—X. The famous Tubular Viaducts: The Railways and the great works, connected with them, surpass all previous parallel in point of magnitude and cost in any age of the world.—XI. Great progress of Railways and Locomotive Charioteers throughout Europe: Their progress suddenly arrested by the French Revolution of 1848.—XII. Hector, the Iron Duke and other Locomotive Charioteers attain the great speed of sixty miles per hour: The omnipotence of steam to diffuse over the world all the blessings predicted by the Genius of his power.

THE

STEAM ENGINE;

OR, THE

POWERS OF FLAME.

CANTO X.

LOCOMOTIVE POWER.

I. These are the times which Fame henceforth shall crown
With all her laurell'd emblems of renown;
The times, which man, in each succeeding age,
Shall mark with triumph in historic page,
As those from whence his race began to hold
A rank so high above his sires of old,
For tours, perform'd with Magi's fabled speed,
And all that's great in high artistic deed:
Since now the ROCKET from his foster-sire
Had gain'd such matchless speed, such strength, and fire;
With all th' essential parts that art could give,
To make his line in future glory live.
Though new arrangements still these parts required,
To make his action such as was desired;
But these improvements were, at least in part,
Soon superadded by assiduous art:

And hence the ARROW(1), PHŒNIX, METEOR, STAR,
With others, soon surpass'd the Rocket far.
The grand result was still increasing speed;
Thus giving hopes the horse would soon be freed
From daily degradation, toil, and pain,
To rove the fields in pristine ease again;
And that a power heroic, swift, and strong,
Could now with glory all his toils prolong.

II. But six short months their course had scarcely run,
Since at Rainhill the envied PRIZE was won;
When was announced a private gala-day,
On which the ARROW made her great display:
Her foster-sires were Booth and Stephenson,
Their choicest skill throughout her frame was shown:
The tubes that pierced her lungs were threefold more
Than gave the ROCKET his vast powers before.
She proved, indeed, a DAME of god-like fire;
Her speed and strength bid all alike admire!
Twelve miles an hour, on undulating plane,
She moved with ease ten times her weight of train,
But twenty in an hour she moved in state,
And drew besides a train of thrice her weight;
With twice this speed upon the level road,
She shot along with the same mod'rate load.
Such were the feats and speed proposed to grace
The grand procession, destined to take place!
Such was the vigour, with the help of gold,
That STEAM could thus, in this short time, unfold!
While those, just named, and more of giant-power,
Were all prepared at the appointed hour!

THE PROCESSION OF THE LOCOMOTIVE FLAME-POWERS.

III. The stations all, in architectural pride,
And splendid viaducts strong, high, and wide,
Essential parts of this grand line of lines,
Are now completed on the best designs.
"By why," some say, "all this magnificence?"
"Why thus so lavish in mere vain expense?"
Ten leagues of road to cost a million round,
Made in those days a most tremendous sound!
And hence the would-be wise were quick to say
The line would ne'er th' enormous cost repay!
Some, e'en among its patrons, ill portend,
Watch with distrust, and dread how all will end.
But we shall leave what men might think or say;
For now arrives the grand procession-day(*),
The POWERS OF FLAME and railway-art to crown,
With a high triumph worthy their renown.
At Liverpool's grand station now await
The CHARIOTEERS in more than Eastern state:
Broad waving banners every train display'd,
And every train its own resplendent shade:
Northumbrian, Phœnix, North Star, Rocket, Dart,
In this procession, took the leading part;
While Comet, Arrow, Meteor, took the rear,
In the same order as their names appear;

'Twas a serene and mild September day,
That witness'd thus the Steam-Chiefs in array!
Peel, Wellington, with peers and statesmen great,
Shone in Northumbrian's train in gorgeous state;
Foreign ambassadors the Phœnix bless'd,
With their attendants, in strange costumes dress'd;
The most of this great diplomatic corps
Ne'er once had seen FLAME-CHARIOTEERS before;
Of Britons, too, there were full many a one,
Who ne'er had seen them, either SIRE or SON;
But soon as seen, their supernatural frame,
Like fabled dragons, breathing wrath and flame,
Could to their wondering eyes at once unfold
The mighty CHIEFS, they had not to be told!
Great merchants, cotton-lords and magistrates,
With country 'squires proud of their wide estates,
Mine-agents, architects, and engineers,
With Barlow and his scientific peers,
In the next six promiscuous took their post,
Completing thus the long procession's host:
While every place, that could a view command,
Was fill'd with crowds to see a sight so grand;
The great NORTHUMBRIAN, flaming in the van,
The vast procession now at length began;
While, in their turns, the rest got under way;
The whole producing a unique display:
No mighty pomp of farthest Eastern clime,
Nor civic show of old or recent time,
In splendour, length, and in majestic speed,
Might dare to vie with this, much less exceed!

While acclamations echoed loud and long,
As they proceeded, from th' assembled throng:
And, though deep gorges for awhile withdrew
The gorgeous pageant from the people's view;
But, soon emerging, a fresh crowd was there,
Whose loud acclaim again rung through the air:
Now the embankment show'd its long array
To eager crowds, assembled all the way:
The lofty viaduct improved the show;
Where, from the vessels in the stream below,
The wondering bargemen view with wild delight
The speed stupendous, and th' unwonted sight:
While cheers repeated rose with might and main,
Responsive echoed from the pageant train!
The trains are stopp'd, the MIGHTY CHIEFS OF FLAME
To quench their thirst the crystal waters claim;
While from their post the great in crowds alight,
When by a line-train, in its hasty flight,
Though striving to avoid it, Huskisson(3)
By unforeseen mischance was over-run.
The stroke, alas! was death in shortest time;
Thus fell the great financier in his prime!
This fatal chance not only caused delay,
But damp'd the joy that erst had crown'd the day.
At length the Steam-Chiefs with replenish'd force,
To Manchester pursued their pageant course;
A grand reception there secure they found;
And though acclaim still made the air resound,
The blithe response was clogged with grief's alloy,
The fate of Huskisson still chill'd their joy.

The mutual greetings and the banquet o'er,
The Steam-Chiefs, in procession as before,
With equal pomp and eight-fold gorgeous train,
Forthwith returned to Liverpool again:
While still the eager crowds, we scarce need say,
Their progress hail'd with plaudits all the way.
Now in conclusion, 'twould be vain to tell,
How high at Liverpool was rapture's swell!
How rich the banquet and how choice the wines,
Where thus in state the mighty Arthur dines!
While eloquence, like the occasion, rare,
May be inferred, since Peel and Brougham were there!
Such to the world our CHIEFTAIN'S first display;
Many we've seen since that eventful day;
But these were witness'd with a calmer view,
Not, like the first, with awe, when all was new!

IV. The CAR-BORNE FLAME-POWERS on the Stockton way
Made like advance in vigour ev'ry day;
The tubes through which they breathed were so increased
As to impart a double heat at least,
And make their life-blood with such vigour rise
As struck their foster-fathers with surprise!
And soon great MADAM VICTORY we see
Surpass her brethren's speed and energy.
She now could move, such her transcendent power,
An hundred tons full twenty miles an hour!
But SAMPSON'S strength was such as to prevail
With more than twice that weight upon the rail!
The action 'twixt his potent arms and wheels
By new arrangement further strength reveals:

Hence Etna, Saturn, and Miltiades
Move with unwonted energy and ease;
But Hercules and Ajax, less in speed,
In strength are found all others to exceed.
Thus rose our Hero's sons with matchless grace,
His second high heroic, vap'ring race;
And shed fresh lustre on the names they bore,
Long honour'd in recorded deeds of yore.

V. Thus did the work, so gloriously begun,
With equal glory keep progressing on,
Which gave the sons of enterprise new hope
Of full success to schemes of wider scope.
Hence iron-ways(4) of vast extent were plann'd,
To join commercial marts throughout the land.
These all diverging from the central mart*,
Join'd the chief seats of trade in every part:
A glorious scheme it was confess'd by most,
But still involving an enormous cost;
On which sage calculators all maintain'd
Unwonted rates of interest would be gain'd!
The splendid profits, thus held forth to rise,
All glorious shone in speculators'(5) eyes!
Who now with eagerness rush'd forth to join
A scheme that promised to increase their coin;
Most splendid bubbles in the air they blew,
And much attention to new projects drew;
While one just then began to rear his crest,
A bubble-blower far beyond the rest:

* London, as the central mart of trade, was now, for the first time, made the point, from which all the projected railways diverged to the provincial towns.

He and his tricksters led their dupes with ease
To sanction any project they might please:
To some of these full patronage they gave,
While others they but used to play the knave:
And multifarious were their wild designs,
Their opposition, and their bubble-lines(6):
Thousands of shares on these strange schemes they sold
At profits such as to secure them gold;
Thus many they contrived to circumvent,
Who 'd to deplore their cash thus vainly spent.

VI. The grand result of all the schemes brought forth,
Save Fudgson's projects, own'd devoid of worth,
Involved one hundred millions capital,
Subscribed by jews and gentiles, great and small.
A scheme so vast and so magnificent
Had in all previous times no precedent!
'Twas called the railway-MANIA, though indeed
'Twas nothing to the one yet to succeed.
But ere they legal sanction could command
For all the railway-projects now in hand,
The landed-interest(7) had to be o'ercome,
Some by large bribes, by shares unpaid-for some;
A few exceptions, both in lords and 'squires,
Were found more moderate in their desires.
Thus were the works, meant for the public good,
Made means of gain for a rapacious brood;
But spite of reckless peculation, still
Magnificent were the displays of skill;
Hence viaducts of an unwonted size,
In architectural pride, began to rise;

No vale so wild and deep throughout the land,
But it was soon by these vast structures spann'd;
No mountain-ridge so vast in width and height
Which now the tunnel did not perforate;
E'en the primeval granite rock gave way,
No more a barrier than mere sand or clay;
Deep were the open cuts, th' embankments high,
The whole defying Appian rivalry.
Thus the amount of labour and expense
Full soon appear'd, beyond all hope, immense;
While blunders,—difficulties unforeseen,
Delay'd the mighty works and raised the spleen
Of speculators to unwonted height,
Their shares still sinking at a rapid rate.

VII. At length the famed Great Western line was laid,
And open'd publicly with vast parade;
Not far behind in point of grand display,
Than that which mark'd the last procession day,
While the stage-coaches, our fore-fathers' pride,
Were now by turns completely thrown aside,
Not able to compete in fare and speed,
Nor splendid show with STEAM'S high vap'ring steed.
Among the rest shone forth the NORTHERN STAR,
Full forty miles an hour he drove his car,
A hundred tons and more his lengthen'd train,
The first grand triumph of Victoria's reign;
And equal feats were by the HECLA done,
The splendid works of famous Stephenson;
And many more there were of equal fame,
Each honour'd too, with high heroic name.

Full oft so high their vap'ring courage rose,
That, Greek and Trojan like, they got to blows;
These sad collisions were for ever rife
With dreaded danger, wounds, and loss of life,
To those that journey'd on their flying trains,
Not calculating on such rough campaigns.
Full oft they ran away, or split with rage:
These sad disasters, in the journals' page,
Call'd forth denunciations(8) on the scheme
Of iron-ways and all the POWERS OF STEAM!
" Why not," said they, " resume the turnpike ways,
" And good old maxims of our fathers' days;
" For who would trust their lives to demons' ire,
" That reckless rises from their hearts of fire?"
But these, the sad result of accident,
'Tis hoped assiduous care will quite prevent.
Howe'er, no matter how the journals rail'd,
Or how much slander private tongues retail'd,
The iron-ways and Steam-car enterprise
High in the world's esteem began to rise.
New schemes in foreign lands were seen to start,
In which king Leopold took a leading part:
The Locomotive-ways by him design'd,
In Belgium, prove a more than kingly mind;
While like grand schemes in the United States
Were now progressing at most glorious rates.
But cautiously all this was view'd in Gaul,
'Twas thought, through fear of lacking capital;
While nought was done in any other state,
Where railways form'd a theme for grave debate;

And the opinion entertain'd by most,
Was, such vast schemes would ne'er repay their cost.

VIII. The next grand adjunct to our HERO's cause,
That claim'd at once unanimous applause,
Was Wheatstone's Telegraph(9), (the Semaphore
By this was number'd 'mong the things of yore,)
This modern prodigy transports the mail
Unseen by human eye o'er hill and vale;
Th' Electric current from Voltaic pyre,
Impetuous urged along th' extended wire,
Deflects the magnet, varied signs displays,
That thus man's thoughts a thousand miles conveys,
With speed at par with th' ethereal light,
Uncheck'd by tempests or the glooms of night!
Nor do meanwhile its needful signals fail,
At every station on th' extended rail,
To point out dangers threat'ning near or far
The glorious march of STEAM's triumphal car.
But now th' admired Electro-type of Bain
Imparts the signs so rapidly and plain,
That thence is read the express from distant climes,
With the same ease as you would read the "Times!"
Thus train'd, the light'ning gives essential aid
To Britain's state-affairs, her arts and trade,
And guards with arm of superhuman might
This favour'd land of liberty and light.

IX. Extension vast in iron-ways afar,
And in the speed of Locomotive-car,
In speculators' dividends, beside,
Produced concurrently a full spring tide

In these affairs. Nay, their magnificence
Of all things earthly now took precedence:
This gave the second RAILWAY-MANIA([10]) rise,
With all its multifarious enterprise.
New schemes, not even dream'd of once before,
Were lauded loudly, puff'd off even more
Than e'en the grand trunk-system that imparts
Connection to our chief commercial marts.
Nor was this MANIA, this eccentric roar,
Confined alone within Britannia's shore;
It made its way at that eventful time
To every land without respect to clime!
Vast were the schemes that now came forth in France,
Though not so wont in Britain's wake t' advance.
Europe was smitten to the very core,
And thence the MANIA raged from shore to shore:
East and West Indies groan'd 'neath the disease,
Its virulence uncheck'd by rolling seas.
Nay, e'en Van Dieman's Land and New South Wales
Determined, like the rest, to have their rails.
The cholera of burning Tropic climes,
The epidemic dread of modern times,
Ne'er on this earth spread to such breadth and length,
Nor ever moved with half this MANIA's strength,
Nor with a hundredth part of its vast speed,
Such was its rage and such its "act and deed!"

X. These projects throughout Britain now went on
With more precision than they'd ever done.
Till spite of numerous blunders and delays,
A splendid system of grand iron-ways

Soon spread, like net-work, all the country o'er,
Embracing all its marts from shore to shore.
Among the works of architectural pride,
Which for its novelty the rest outvied,
The TUBULAR VIADUCT(11), so ably plann'd,
In iron's strength, the arms of ocean spann'd;
The grand design of Junior Stephenson,
No nobler work by him was ever done;
Its weight ten thousand tons, and raised by means
Of well combined hydraulical machines;
While for a span of such unwonted length,
Fairbairn's rare cell-work gave the needful strength;
These cells abstruse lie hid from human gaze,
A stretch of art unknown in former days!
Here Amos' genius was employ'd t' impart
This vast Herculean feat of lifting art.
Aloft in air this massive structure stands,
And the high praise of all the world commands!
Full sail the ships, uninterrupted, ride
Beneath its span on ocean's heaving tide.
For all the mighty works that then were done,
Or still in progress in this Isle alone,
The sum required was vast beyond all bounds,
In all, 'tis said, three hundred million pounds.
No works so truly great, since time began,
Were ever witness'd by the eye of man!
The Pyramids of Egypt's elder day,
The amphitheatres, the Appian way,
The temples, aqueducts of ancient Rome,
With e'en St. Peter's still more modern dome,

And add to these the mighty Gothic fanes,
That cost the pious so much toil and pains
Through Christendom—all works deserving praise,
Yet all were trifles to these iron-ways!

XI. While soon were join'd with these metallic bands
The regal seats of European lands,
Embracing in their routes their various marts
And other seats of commerce and the arts.
Nor were these works in high artistic pride
By Britain's previous efforts far outvied,
Such were the works that gave their needful aid
To Locomotive progress and parade!
But these vast schemes upon the Continent
Were insufficient to produce content;
For Liberty, regaining power once more,
Meanwhile arose, as 'mong the Gauls before;
On this occasion she less wrath display'd;
Though much bad council all her actions sway'd;
But not alone in Gaul her power prevail'd,
All central Europe now her empire hail'd.
She promised to mankind a grander scheme
Than iron-ways and all the POWERS OF STEAM!
These projects soon stood still throughout those lands,
As Jouffray's did before, at her commands:
The mightiest kings began to fear her frown;
While some resign'd, some wore a tottering crown.
She straight advised those skill'd in club-debate,
To turn their minds to rule and legislate:
But soon contention 'mong her fav'rites rose;
From rough abuse they came to bitter blows;

While much confusion and great loss of life
Resulted from this legislating strife:
Thus proving she by no means understood
What constituted real human good,
And that, as erst, she but usurp'd the name,
To which she made an ostentatious claim.
Short time she govern'd with eccentric sway;
Her boasted power still sinking to decay:
While soon aspired, her feats of folly done,
The mighty Dynasty Napoleon;
When all the arts and STEAM's neglected power
Arose with glories brighter than before.

XII. Unscathed, though threaten'd, was our favour'd isle,
On which true Liberty is wont to smile:
'Twas here, as erst, the Locomotive race
And iron-ways held on their active pace:
Great HECTOR now stood forth with peerless grace,
The champion of the Locomotive race:
The IRON DUKE[12] on the Great Western rail,
Next far surpass'd in splendour of his mail,
In eagle-speed and energetic power,
His vap'ring brethren, previous to that hour;
Full sixty miles an hour he could maintain,
Throughout his journey with his gorgeous train.
While, on the Northern rail, the CRESTED SNAKE
Bid wonder through Northumbrian lands awake;
Now striving to approach, if not exceed,
The famous Iron Duke, in strength and speed;
Which now may be regarded as mature,
For greater would be reckless, insecure.

And, so omnipotent the Powers of Steam,
O'er all things earthly still they rise supreme;
Henceforth those blessings to diffuse afar,
Both by terrene and by Neptunian car,
As promised by the Genius of their power
To all mankind before their natal hour.

END OF THE POEM.

ADDITIONAL NOTES.

ADDITIONAL NOTES

TO

CANTO I.

No. (1), Page 4.

Captain Savery first applied the Power of Steam to drain the Cornish mines, in the reign of William III., A.D. 1689. Capt. S.'s engine was similar to that invented by the Marquis of Worcester, about 30 years previously; but its first practically useful application is due to Savery. See *page* 35, *and Additional Notes* to Canto II., No. (3).

No. (2), Page 5.

An erroneous opinion is very generally prevalent, among those who have never taken the trouble to acquaint themselves with the history of the steam engine, that Mr. James Watt was the sole inventor of this splendid power; the efficiency of which he so much improved that it was afterwards usually called Watt's engine.

No. (3), Page 6.

The first account we have of the application of steam, as a moving power, dates as far back as 120 years before the Christian era. Heron or Hero, commonly called the *elder*, a famous mathematician of Alexandria, during the reign of Ptolemy Philadelphus, invented a rotatory machine, the moving power of which was steam. A description of this apparatus is preserved in Hero's *Spiritalia*, published by the Jesuits in 1693; and a copy of this highly curious work is now in the

library of the London Institution. Hero's apparatus is described in Lardner's *History of the Steam Engine.*

No. (4), Page 6.

This apparatus is fully described in the *foot-note, page* 7. In its most simple form, it only produces a strong blast of steam, which may be used to turn a wheel, as described in the note referred to. It is undoubtedly of great antiquity.

No. (5), Page 6.

The *foot-note, page* 7, also sufficiently explains this very interesting application of steam, as a moving power; which, it appears, was never used except for amusement.

No. (6), Page 10.

That water could be converted into steam, is a fact which must have been well known from the time fire itself was first discovered; and it is very probable that the mechanical effects of confined steam, may have been frequently witnessed long before any one thought of applying its force to any useful purpose.

"The Greeks and Romans were not ignorant that steam is capable of acquiring a prodigious mechanical power; they went so far as to explain, by the sudden conversion into steam of a great body of subterraneous water, those frightful earthquakes which, in a few seconds, drive the ocean from its natural boundaries, overthrow from their very foundations the most solid monuments of human industry, cast up dangerous rocks in the midst of unfathomable seas, and raise lofty mountains in the very heart of continents"—M. Arago's *Eloge*, p. 26.

No. (7), Page 10.

"Ancient history informs us, that on the banks of the Weser, the god of the Teutones of old, sometimes showed himself unpropitious, by a sort of thunder-clap, immediately succeeded by a cloud which filled the sacred enclosure. The statue of the god Busterich, discovered, it is said, in excavations, clearly shows the method by which the pre-

tended miracle was effected. The god was of metal; the head was hollow, and contained an amphora (about nine English gallons) of water; wooden plugs closed up both the mouth and another opening above the forehead; live coals, dexterously placed in a cavity of the skull, gradually heated the liquid. Very soon the generated steam forced out the plugs with a loud report; it then escaped with violence in two streams, and raised a thick cloud between the deity and his stupified worshipers."—M. Arago's *Eloge*, p. 28.

No. (8), Page 11.

"In 1605, Florence Rivault, a gentleman of the bed-chamber to Henry IV., and preceptor to Louis XIII., discovered that the strongest bomb-shell, containing water, is sure to explode when it is put in the fire, after having been strongly plugged, and otherwise secured by hoops of the toughest brass; that is to say, when the steam is prevented from diffusing itself freely through the air as it is generated. The power of steam is here shown to be capable of a clear proof; while it also presents itself as a frightful instrument of destruction."—M. Arago's *Eloge*, p. 30.

No. (9), Page 11.

De Garey, a naval officer in the Spanish service, as early as 1543, invented a Steam Engine to propel a ship on the sea, it is said with some success, at Barcelona; but as this is a marine power, a further account of it is given in Canto IV., *page* 70, and in the *Additional Notes* to that Canto, No. (4).

No. (10), Page 11.

La Branca, an Italian architect, poduced a machine, which was somewhat like that moved by Jack of Hylton, already described. It consisted of a copper vessel partly filled with water, (in the original figure made in the form of an ornamental head,) and was furnished with a pipe, through which the steam was propelled, and striking against the vanes of a wheel, readily gave motion to a pestle and mortar, which was used in a chemist's laboratory. His work,

entitled *La Machina*, was published at Rome in 1629, and is exceedingly rare. See M. ARAGO's *Eloge on Watt*, note, p. 26.

No. (11), PAGE 11.

The expansive power of steam was shown by means of something like a piston and cylinder, by Solomon De Caus, about the year 1630; but no useful mechanical advantage was, it appears, attempted to be obtained from the apparatus.

No. (12), PAGE 12.

There is no account given, in the Holy Scriptures, of what was the nature of the implements made by Tubal-Cain.

No. (13), PAGE 13.

(*The figures of reference to this note were inadvertently omitted.*)

The Crater, or Golden Cup, one of the constellations between Leo and Hydra, is the first vessel in the shape of a cauldron or boiler, of which there is any record; and it is said by the classic authors, to be the work of Vulcan, and to have been used by the gods to drink their nectar.

No. (14), PAGE 15.

The Marquis of Worcester was long imprisoned in the Tower of London, in the time of the Commonwealth, for imputed treason against the State, and allayed the tedium of his confinement by study and experiments on the Power of Steam, from which it is highly probable that the almost-divine impulse of mind was produced, which led to the construction of the first efficient power of this kind.

No. (15), PAGE 16.

It appears that the Marquis either was, or believed he was, destined to produce an efficient Steam-power, judging from his devout prayer to Almighty God, on the subject referred to, as well as from other documents, which are still extant. See the following Note.

No. (16), Page 16.

The Marquis of Worcester's Hundred Inventions, usually called "The Century of Inventions," which include the Steam Engine, are here introduced in the form of a Vision; which is, doubtless, the most appropriate form for the present purpose; especially as the Marquis, on account of the novelty of his views concerning the Steam Engine, of which he is now considered the real inventor, as well as concerning his other inventions, most of which have been perfected since his time, was called a visionary, a vain schemer, &c., almost up to the present time. He was, in fact, a truly great man, and lived before his greatness could be appreciated by mankind. See *Partington's Edition of his Works*, also Lardner's *History of the Steam Engine*, p. 34, 7th edition.

In 1663 appeared the first edition of the Marquis' *Century of Inventions*, and on the 3rd of April, in the same year, a bill was brought into Parliament for granting to him and his successors the whole profits that might arise from the use of an engine, described in the lxviii. article of the *Century*.

The second edition of the *Century* was published in 1664; the third in 1767; the fourth in 1778; the fifth in 1786; the sixth in 1813, and the seventh in 1825, by *Mr. Partington*.

The following is the lxviii. article of the *Century*, on which, and on the two concluding articles, the Marquis' claim, as inventor of the Steam Engine, rests:—

"I have invented an admirable and forcible way to drive up water by fire; not by drawing or sucking it upwards, for that must be, as the philosopher terms it, *infra sphœrum activitatis*, which is but at such a distance. But this way hath no bounder if the vessels be strong enough. For I have taken a piece of whole cannon, whereof the end was burst, and filled it three-quarters full of water, stopping and screwing up the broken end, as also the touch-hole, and making a constant fire under it, within twenty-four hours it burst, and made a great crack. So that having a way to make my vessels so that they are strengthened, by the force within them, and the one to fill after the other, I have seen the water run in a constant stream forty feet high. One vessel of water rarified by fire, driveth up forty of cold water, and a man that tends the work has but to turn two cocks, that one vessel of water being consumed, another begins to force and

refill with cold water, and so successively; the fire being tended and kept constant; which the self-same person may likewise abundantly perform, in the interim between the necessity of turning the same cocks."

This experiment was made in the year 1663, and Dr. Lardner observes, that the account is "sufficiently distinct and explicit to enable any one possessing a knowledge of the mechanical properties of steam, to perceive the general nature of the machine described."

No. (17), Page 22.

This refers to articles lxviii., xcix., and c. of the Marquis' *Century of Inventions*, as well as to another of his publications, in which he enumerates several of the advantages to be derived by mankind from their application; among others he states, "to draw or hale ships, boats, &c., on rivers against the stream; to draw carts, waggons, &c., as fast without cattle as with; to draw the plough without cattle. The uses to which it can be applied, being very difficult, if not impossible, to name at the same time."

ADDITIONAL NOTES

TO

CANTO II.

No. (1), Page 31.

In the hundredth and last article of the Marquis of Worcester's *Century*, he says, "A water-work is, by many years experience and labour, so advantageously by me contrived, that a child's force bringeth up, an hundred feet high, an incredible quantity of water, eveu two feet in diameter. And I may boldly call it, *the most stupendous work in the whole world.*" He then goes on to state several of its other uses, &c.

As every thing connected with so remarkable a discovery as that of the Steam Engine, should be properly noticed, the Marquis' prayer on that occasion is here given, as showing, at the same time, his pre-eminent piety, as well as his great joy on the successful result of his discovery.

"*The Lord Marquesse of Worcester's ejaculatory and extemporary thanksgiving Prayer, when first with his corporal eyes, he did see finished a perfect trial of his Water-commanding Engine, delightful and useful to whomsoever hath in recommendation either knowledge, profit, or pleasure.*

"Oh! infinitely omnipotent God! whose mercies are fathomlesse, and whose knowledge is immense, and inexhaustible; next to my creation and redemption I render thee most humble thanks from the very bottom of my heart and bowels, for thy vouchsafing me, (the meanest in understanding,) an insight in soe great a secret of nature, beneficient to all mankind, as this my water-commanding engine. Suffer

me not to be puffed upp, O Lord, by the knowing of it, and many more rare and unheard off, yea unparallcled inventions, tryals, and experiments.—But humble my haughty heart, by the true knowledge of myne own ignorant, weake, and unworthy nature: proane to euill, O most mercifull Father my creator, most compassionatting Sonne my redeemer, and Holyest of Spiritts, the sanctifier, three diuine persons, and one God, grant me a further concurring grace with fortitude to take hould of thy goodnesse, to the end that whatever I doe, unanimously and couragiously to serve my king and country, to disabuse, rectifie, and convert my vndeserved, yet wilfully incredulous enemyes, to reimburse thankfully my creditors, to reimmunerate my benefactors, to reinhearten my distressed family, and with complacence to gratifie my suffering and confiding friends, may, voyde of vanity or selfe ends, be only directed to thy honour and glory everlastingly. Amen."

The Marquis of Worcester's Steam Engine, it appears, consisted of three principal parts, a boiler and two condensers, with a suitable arrangement of pipes and valves to connect them, as well as to make the water rise to the proposed height (100 feet). He also appears to have first employed the principle of condensation to give effect to the operations of his engine.

No. (2), Page 32.

In this construction of a Steam Engine, Professor Papin, for the first time, about the year 1683, introduced the cylinder and piston, which he took from the air-pump of Otto Guertriche. He also used the cylinder for a boiler, having a portable fire below it, which it was necessary to withdraw every time the steam was required to be condensed. It will be easy to see, under these circumstances, that the operations of his engine would be extremely slow. He, however, pointed out in his writings a more complete method of operation, which was never carried out at Paris, owing to the troubles arising from the revocation of the Edict of Nantes. Papin, being a Protestant, was obliged to leave France; he first came to England, where his projected engine was not sufficiently encouraged. He afterwards went to Germany, and his project was patronized by the Elector of Hesse. See *pages* 33 and 34; *also Note* (6) *to this Canto.*

No. (3), Page 35.

No real benefit appears to have arisen from the application of the steam engine, for about thirty years after the death of the Marquis of Worcester, when the first really practicable engine was produced by Capt. Savery, in 1689, in which, like the Marquis' engine, there is no piston or cylinder, and like his, it consisted of a boiler and two condensers; the boiler supplied the condensers alternately with steam, while the two latter fed the working part of the apparatus. The superstitious notions of the illiterate miners concerning this stupendous power, when first introduced, are recorded in pages 36 and 37 of the Poem.

The chief objection to Savery's Steam Engine was the great quantity of power and heat, and consequent cost, uselessly expended. Besides, on account of the increasing quantity of water, then beginning to be generated in the mines, the necessity for an improvement in the construction of steam-power caused an endeavour to be made to meet the difficulty.

No. (4), Page 37.

The atmospheric steam-power comes next in order, and its claim to practical utility dates as early as 1703; when it was invented by Thomas Newcomen, a native of Dartmouth, in Devonshire; who, in conjunction with Savery and Cowley, took out a patent for it,—Savery having a claim on account of his having previously a patent which included the condensing principle. Instead of using steam at a great heat, and consequent high pressure, as in Savery's engine, Newcomen proposed to move a piston in a cylinder, by raising it by the force of steam; then by condensing it, and depressing the piston by the pressure of the atmosphere. Hence this steam-power was called an "atmospheric engine."

The principle of this engine may be explained as follows:—the pump-rod, which is attached by a chain to one end of a large working beam, which moves on its centre: the other end of the beam is attached to the end of the rod of the piston, which works in the cylinder. Now, if a vacuum be produced below the piston, it will be forced down by the pressure of the atmosphere, with a force amounting to 15lbs. to the square inch, and the piston of the pump-rod will be drawn up the

barrel of the pump by the action, thus produced, of the great beam: the steam, being admitted below the piston in the cylinder, would press upwards on the piston, which would be raised, and the pump-rod would descend; and by this alternate motion, the action of raising water would be continued.

The cylinder communicates with the boiler by a pipe, furnished with a valve, called the throttle-valve. To produce the condensation of the steam, the cylinder was placed within an outer case, into which, when required, water was admitted, and as soon as the condensation was effected, the water was drawn off. But Newcomen soon discovered a great improvement in the method of condensing the steam, by means of a jet of cold water, which was introduced into the cylinder by a pipe from a cistern of sufficient height (33 ft.) to counteract the atmospheric pressure, and it was found to produce the desired effect much more speedily. This plan of condensation, with some modification, is still in use.

No. (5), Page 39.

The discovery of the speedy method of condensation, by Newcomen, and the consequent great increase of power in the Steam Engine, was the cause of great joy among all the parties connected with the Cornish miners; who assembled on the occasion, (as was the custom in times within the author's remembrance, when any great achievement of this kind was accomplished,) and gave vent to their overflowing rapture in tumultuous Bacchanalian revelry, accompanied by the songs, produced by the local bard of the time, as described in the poem.

No. (6), Page 42.

Professor Denis Papin, under the patronage of the Elector of Hesse, about the same time as Newcomen produced his improved Steam-power, also produced a power, in many respects similar to Newcomen's; but on account of the very little intercourse between England and foreign countries, at that time, it is very clear that the two projects were carried out quite independent of one another.

In this Steam-power of Papin's, the safety-valve and four-way-cock were first introduced.

The efficiency of this power of Papin's, gave rise to a long contest between England and France respecting which country had the claim to the invention, as stated in the Poem. See the following Note.

No. (7), Page 43.

Newcomen discovered condensation by jet, and added the great beam to his Atmospheric Engine. Papin introduced the piston and cylinder, which he took from the air-pump, as already noticed in the foot-notes to the Poem. Papin's other improvements are pointed out in the preceding Note.

No. (8), Page 44.

To keep the engine at work, two boys were required, one to attend the fire, and the other to turn alternately the two valves for admitting and cutting off the supply of steam to the cylinder, and allowing the condensing water to enter when required. It is related that one of these boys, named Humphrey Potter, an ingenious youth, was tempted by a strong desire to escape from his monotonous work, and to effect his purpose, he soon discovered a contrivance by which he might gratify his wishes. On observing the ascending and descending motion of the great beam, in reference to the labour of his own hands, in alternately raising and depressing the levers of the valves; when the beam arrived at the top of its play, it was necessary to close the throttle-valve by raising a lever, and open the injection-valve by raising another. This he accomplished by attaching strings of a proper length to these levers, and tying them to the beam. The levers required to be moved in an opposite direction, when the beam was at its lowest point. This he accomplished by strings passing over rods or pulleys. In short these contrivances gave the most perfect regularity and certainty to the motion of the valves, by which the steam engine became, for the first time, an automaton. This great improvement again gave rise to demonstrations of joy, similar to those mentioned in a previous Note.

At the beginning of the last century, the Steam Engine had made great progress, not only in Cornwall, but also in the coal-mining districts, and in 1718, the patentees erected an engine for the owners of a colliery in the county of Durham, where several hundred horses had

been employed for raising the water. On this occasion Mr. Beighton materially improved the engine by making it self-acting in a very superior manner, and divesting it of nearly all the complicated contrivances, which had been previously used for that purpose.

The "Atmospheric Engine," thus improved, was used in the mining districts for upwards of 50 years. It was, moreover, considered a stupendous power; no one, during this long lapse of time, had sufficient ingenuity to superadd the great improvements, of which it was afterwards found susceptible.

ADDITIONAL NOTES

TO

CANTO III.

No. (1), Page 51.

We now come to a new and distinct era in this history of this important power, and in referring to the labour's of Mr. James Watt, we may almost speak of his Engine as the gigantic offspring of a hand and mind giving birth to an automaton, even more powerful than the fabled ones of the magi and enchanters of the days of old.

Mr. Watt's attention was first particularly drawn to the Steam Engine in 1765; he was, at this time, a mathematical instrument maker, and a model of a Newcomen's engine was sent to him to repair. Having noticed its imperfections, and duly considered the improvements of which it was susceptable, he made no experiments; but, from his peculiar strength of mind, at once perceived every step that was necessary to effect his purpose. The first great defect he discovered, was the much greater amount of steam introduced into the cylinder to raise the piston than was necessary, as shewn by calculation: besides, the temperature of the steam was greatly lowered by its coming in contact with the sides of the cylinder and piston, which had been necessarily cooled by the injection of the condensing water. Hence it occurred to him, that the condensation of the steam ought to take place at a distance from the cylinder, that the temperature of the latter might not be lowered, and a great saving of steam and fuel would in consequence be effected. To carry out this plan, he connected to the bottom of the cylinder, a pipe furnished with a valve, and communicating with a large vessel, kept constantly cool by being surrounded by cold water. On opening the valve the steam in the

cylinder rushes into the cold vessel, and is instantly condensed, a jet of cold water, from another pipe materially assisting the rapidity of the process. The piston will now be forced down by the pressure of the atmosphere, and the temperature of the cylinder and piston will remain unaltered. This, as was foreseen, produced not only a great saving in the expense of fuel, as well as contributed to accelerate the action of the engine.

Watt's next great improvement was, in closing the top of the cylinder by a heavy iron-disc, through an air-tight hole in the centre of which the piston worked. In this arrangement, steam, with an elastic force greater than that of the atmosphere, could now be admitted above the piston, and the heat kept up in the cylinder by the total exclusion of external air. The Atmospheric Engine of Newcomen was thus converted into a Steam Engine, with at least thrice the power at less than half the expense for fuel.

No. (2), Page 52.

The "self-acting damper" was introduced at the same time to keep the heat of the fire to the boiler constant. The "self-acting water-feeder" to the boiler was invented by Brindley, and was in use in the engines of Newcomen, long before it was employed by Watt.

No. (3), Page 53.

The "Governor" is a most ingenious piece of mechanism, which had long been used to regulate the motion of wind-mills, by the centrifugal action of its two spheres, supported on levers, placed obliquely to the horizon, and joined to a vertical spindle; the whole revolving with the machinery of the engine. These spheres, by their action, communicated by a cord from the levers to the throttle-valve, admit the supply of steam to the cylinder with great regularity.

No. (4), Page 54.

The impressions, produced on the author's mind, when a boy, were such as described in the Poem, on first seeing the stupendous efforts of a pumping engine, belonging to Mr. Lambton, afterwards Earl of Durham, for draining several contiguous coal-mines, near Chester-le-

street, in the County of Durham. It was said to be of 1000 horse-power, few engines, at that time, being of equal or greater power.

No. (5), Page 55.

About the end of the last, and the beginning of the present century, Watt's "single acting" engine began to be much used for supplying large towns with water, and for draining marshes in various parts of this kingdom.

No. (6), Page 55.

Another great improvement was introduced by Watt, by making the engine "double acting," or, as it is sometimes called, "double-stroke." This was effected by allowing the steam to enter alternately above and below the piston, a vacuum being also produced at the same time, at the opposite side of the piston. This improvement adapted the engine, with the help of the "*parallel motion*," which Watt invented at the same time, to produce a steady power for propelling revolving machinery; since by this new arrangement, the piston-rod would either draw or impel the great beam, and thus impart, through the crank, a steady motion to the fly-wheel.

No. (7), Page 56.

The great efficiency of steam-power in propelling, in the most steady manner, revolving machinery in our numerous manufactories, is too well known to require any further comment in this place.

No. (8), Page 56.

Mr. Arkwright's invention of spinning machinery, which was the forerunner of so many other inventions, both in the spinning and textile departments, dates about the end of the last century. The resulting changes in the industrial habits of the people of not only this but other nations, are too well known to require a further recital than is given in the Poem.

No. (9), Page 57.

Mr. James Watt was born at Greenock, in Scotland, in 1736. He

soon acquired great proficiency in mathematics and the classics, as well as in several modern languages, and in chemistry; but it was not till he had become established, as a mathematical instrument maker, in 1763, that he turned the attention of his powerful mind to the steam engine, which resulted in the great improvement of that splendid power, already described.

It might be supposed that these great discoveries, which are so highly appreciated at the present day, would have ensured for their inventor immediate wealth and fame; yet no such thing was the result. The discovery, first described, is of the date of 1765. Two years passed away, and hardly any progress was made in attempting its trial on a large scale; and it was not till 1768 that Watt could find any one willing to advance the capital, which would be required to build an engine of sufficient size. However, in 1769, a patent was obtained for fourteen years, but Mr. Roebuck, his partner in the undertaking, failed. At length, in 1773, Mr. Boulton, of Soho, purchased the share of Mr. Roebuck, and, at great expense, obtained a renewal of the patent. After some time, by the exertions and influence of Mr. Boulton, Watt's engine became fully adopted, both for the drainage of mines, &c., and for the propulsion of machinery; and the great inventor was ultimately enabled to retire from business in considerable affluence.

Watt died in 1819, having lived to see the full adoption of the splendid power, which may be said to be almost entirely a creation of his own, not only in this kingdom, but in every other enlightened nation in the world. His character, both in public and private life, is in no degree overrated in the Poem.

ADDITIONAL NOTES

TO

CANTO IV.

No. (1), Page 63.

The great war-steamer, Wellington, of 131 guns, was built in 1852; and employed as the chief war-steamer in the Baltic fleet sent against Russia, in the late war with that country. This large Marine Power is too well known to require further details here.

No. (2), Page 66.

Some men of ardent minds, in the province of invention, think that Steam, as a moving power, will be soon superseded by electricity or some other moving agent; and Mr. Ericsson actually induced a company of gentlemen, in 1854, at considerable cost, to put on board a vessel, a Marine Engine, the moving power of which was heated air. After several unsuccessful experiments the project entirely failed.

In support of these views, Dr. Lardner says, "we may safely pronounce that before many years have passed away, philosophy will point out sources of inexhaustible power in the phenomena of electricity and magnetism. The alternate decomposition and recomposition of water by magnetism and electricity, has too close an analogy to the alternate processes of vaporisation and condensation, not to occur at once to every mind; the development of the gases from solid matter by the operation of the chemical affinities, and their subsequent condensation into the liquid form, has already been essayed as a source of power. In a word, the general state of physical science at the present moment, the vigour, activity, and sagacity with which

researches in it are prosecuted in every country, the increasing consideration in which scientific men are held, and the personal honours and rewards which begin to be conferred on them, all justify the expectation, that we are on the eve of mechanical discoveries still greater than any that have yet appeared; and that *the Steam Engine itself, with the gigantic power conferred upon it by the immortal Watt, will dwindle into insignificance in comparison with the energies of nature which are still to be revealed; and the day will come when that Machine, which is now extending the blessing of civilization to the most remote skirts of the globe, will cease to have existence except in the page of history.*" This prophecy of Dr. Lardner, we may safely affirm, will never be fulfilled till all the accessible supplies of coals, not only in Britain, but in the universe, are exhausted; it being pretty evident that no chemical means of generating power can be found so cheap and convenient as that at present used in the Steam Engine.

No. (3), Page 67.

The utility of Steam-power is always considered in a commercial point of view; or, in other words, its cost, including the interest of the required capital, must not exceed the value of the work done; and in some of the mining districts, where coals are abundant, the cost of this vast power is very trifling, when compared with the great amount of work produced; and which, in many cases, could not be done at all by any other power.

No. (4), Page 70.

The Marine-Power of De Garey dates as far back as 1543, (see *note* (9) *to Canto* I.,) the account of which was found in the library of the University of Salamanca; but, without giving any further description of it than that its moving power was steam, and that the inventor was rewarded for his ingenuity by Charles V. of Spain. This power, it appears, was soon laid aside, chiefly for the reason given in the Poem.

No. (5), Page 71.

Mr. Jonathan Hall or Hull, as early as 1736, obtained a patent for

what may be strictly called a Steam Boat. As this is the oldest claim on record in England, it may be interesting to give the patentee's description of the steam-apparatus of his invention.

"In some convenient part of the tow-boat there is placed a vessel about two-thirds full of water, with the top close shut. This vessel being kept boiling, rarifies the water into steam, which being conveyed through a large pipe into a cylindrical vessel and there condensed, makes a vacuum, which causes the weight of the atmosphere to press on the vessel, and so presses down a piston that is fitted into this cylindrical vessel, in the same manner as in Mr. Newcomen's engine, with which he raises water by fire."

"It has been demonstrated that when the air is driven out of a vessel of thirty inches diameter, the atmosphere will press on it to the weight of four tons, sixteen hundred weight, and upwards; and when proper instruments for this work are applied to it, it must drive a vessel with great force."

He then proceeds to describe the machinery for moving the paddle-wheels, which appears to be very ingenious, and not much different from that at present used.

No. (6), Page 72.

The Marquis de Jouffray, in 1781, built a Steam Boat, at Lyons in France, of the great length of 150 feet. His first experiment partially failed, on account of his Steam-Power being too weak; but before he could get this replaced by a stronger power, and his experiment fairly tried, the Revolution broke out, and the Marquis felt himself obliged to seek refuge in a foreign land; thus all the great hopes, which he had formed for the full success of his project, were frustrated.

Notes No. (7) and (8),

on the French Revolution, are omitted, as having no particular bearing on the subject of Steam-Power.

No. (9), Page 75.

Des Blanes, of Trevoux, obtained a patent for a Steam Boat, thus usurping the Marquis de Jouffray's project during his exile; but he never succeeded in carrying it out, on account of its great expense.

No. (10), Page 76.

Ramsay and Fitch, in the United States, in the years 1782 and 1783, produced a Steam Boat, with some slight success, at Philadelphia, to navigate the river Delaware. It appears that the great cost of the project prevented their being able to carry it out with full success. Fitch's famous prophecy, that the Atlantic would be navigated by steam-power, proved a great stimulus to all succeeding projectors.

No. (11), Page 76.

Serrati's project, in Italy, was much extolled and supported by the Pope, in 1788; but from his employing far too weak a Steam-Power, his scheme was completely unsuccessful.

No. (12), Page 76.

Mr. Miller, of Dalswinton, in Scotland, put an engine on board a vessel in 1788, and his experiment was so successful that a larger vessel was tried the following year, on the Forth and Clyde canal, with still greater success; but it was obliged to be laid aside, with much reluctance, on account of the great injury which the paddle-wheels did to the banks of the canal. On the grounds of the successful result, thus obtained, many think that Mr. Miller ought to be considered as the first whose name should be recorded as the foster-father of Marine-Power.

After this period many plans were devised to carry out this project, but in no case with success.

No. (13), Page 77.

Lord Stanhope, in 1795, attempted to propel a vessel with paddles, resembling the feet of a duck. This idea was originated some years previously by a Swiss clergyman, named Genovois, who brought model of his project to England. Lord Stanhope's Steam Vessel on this plan, after repeated trials, proved completely unsuccessful.

No. (14), Page 77.

The Marquis de Jouffray had now returned to France, and at-

tempted to resume his experiments; but M. de Blanch, as well as M. des Blanes (see No. (9) had taken out patents for steam vessels, during the Marquis' absence.

No. (15), Page

Mr. Symington, the American Ambassador at the court of France, in 1798, obtained a patent, dependent on his successfully navigating a Steam Vessel in the following year, at the rate of four miles per hour; he, in the mean time, made experiments in France; but his chief project was conducted by his partner, Fulton, at New York; however, being unable to obtain the requisite speed, the completion of the project lay open to others.

ADDITIONAL NOTES

TO

CANTO V.

No. (1), Page 84.

Fulton, after the failure of Mr. Symington's project, in which he was engaged both as manager and partner, still kept in view a design for carrying it out; and having at length obtained the aid of a wealthy supporter and partner, he, in 1807, succeeded in fully realizing the project. The peculiar incidents connected with the first voyage of his steamer, are detailed at full length in the Poem.

Fulton, in consequence of his complete success on that occasion, is the acknowledged father of Marine Locomotive Power, especially in America; notwithstanding the claims urged by the friends of Miller of Dalswinton, as having preceded Fulton nearly twenty years. See *Note* (12) *to Canto IV.*

No. (2), Page 85.

The engine used by Fulton, on this occasion, was of five horse-power, which was much greater than those used by any preceding projectors, however insignificant it may be regarded at the present day; as much greater powers are now used in the common passenger-boats on all navigable rivers. This sufficiently accounts for Fulton's steamer not being able to make more than four or five knots an hour.

No. (3), Page 89.

This is an incident, of which I have read in a history of the

Grecian feats, performed at Elis, and other places; but I cannot now refer to the work.

No. (4), Page 89.

Only a few days elapsed after Fulton's successful attempt in steam-navigation, until his countryman, Stevens, also launched a steamer, with considerably greater success; but Fulton had obtained an exclusive right to navigate the waters of the State of New York. Stevens, therefore, determined on the then-bold experiment of taking his vessel by sea to the river Delaware. In this he was completely successful; and was consequently the first man who navigated the ocean by Steam-power.

The terror of the crews of sailing vessels, at the unexpected and demon-like sight of Stevens' Flame-power, was such as is described in the Poem.

No. (5), Page 91.

There is a slight anachronism respecting this remarkable incident, which took place some few weeks afterwards, as described in the Poem.

No. (6), Page 92.

Leaving our American brethren to pursue their projects in steam-navigation, in which they continued to make improvement, we now turn our attention to Europe, where such projects were not introduced with full success, till several years later. In 1811 the first steamer was launched by Mr. Bell, in the waters of Great Britain, at the port of Glasgow. It was called the "Comet," from the great Comet which made so extraordinary an appearance in the heavens at that time. The engine of this steamer was only of four horse-power; and the vessel had also a great draught of water; both of which are disadvantageous to steam-navigation. It was soon found that engines of much greater power were required; but this increase of power involved also a very material increase in the size of the engine, and the space it would then occupy on board of the vessel would be more than could be well spared. To avoid this necessary increase of size, high pressure engines were adopted; but accidents were frequently

occurring, from the bursting of boilers, notwithstanding all the care of the owners; and these occurrences were more disastrous in America than in Great Britain.

No. (7), Page 92.

Mr. Dawson launched his steamer, at Belfast, also called "Comet," about the same time: his engine was more powerful than Mr. Bell's. This steamer successfully crossed the sea, and plied on the Thames, being the first that was ever seen on that river. Actions at law were commenced by the Waterman's Company against this encroachment on what they conceived to be their privilege; in consequence of which the "Comet" and other steamers, which had then been built, withdrew for a time from the river.

No. (8), Page 95.

Steamers became general throughout Europe and America from 1816 to 1820, for inland navigation; among which Dodd's Commerce and Majestic made a conspicuous figure. The latter crossed the sea to various places on the continent, and in its voyage to Lisbon, successfully making its way against a heavy storm in the Bay of Biscay, and thus giving ample grounds for hope that the ocean would soon be regularly navigated by steam, as prophesied by Fitch. See *Note* (10), *Canto IV.*

Alarming accidents became very numerous about this time, chiefly from the adoption of the high pressure principle in the engines of the steamers. These accidents were more frequent in America than in this kingdom; where, however, they were sufficiently numerous to attract the attention of Parliament; and a Committee sat to inquire into the cause of these disasters. To discover a remedy many plans were suggested, but not generally adopted; the consequence was the continued recurrence of fresh accidents, which were still more numerous in America, so much so, that the editor of a paper published in 1825, observes, "It has been estimated that nearly 1500 persons have lost their lives in the United States during the last three years by the bursting of the boilers of steamers."

It will be perceived, when the causes of the bursting of boilers are explained, that, with the precautions now taken in their construction and management, the two principal causes of these dreadful accidents

may be guarded against, with a considerable degree of certainty. One of the chief causes consisted in the boiler not being sufficiently strong to bear the pressure to which it was subjected; but at the present time boilers are always constructed so as to sustain a pressure twice or thrice as great as that to which they are proposed to be subjected; and to discover that they are capable of sustaining this pressure, the boiler is "tested;" which is done by filling it with water, and by means of an hydraulic press, forcing the fluid to press with the required pressure, against the inner part of the boiler.

Another means of precaution is the application of the safety-valve, which being loaded with a requisite weight, rises when the pressure within the boiler exceeds that weight, and thus allows the steam to escape; and so careful are many of the owners of steamers for the safety of their passengers, especially in this country, that there are generally two safety-valves applied to each boiler, one of which is out of the reach of the engineer, that he cannot tamper with it, by over-loading it, or tying it down.

Here this question will naturally arise, Is it possible that any man can be so regardless of his own safety as to run the risk of an accident, to which himself would be most exposed, should it happen? Such occurrences are by no means uncommon; for the engineer is as proud of the speed of his steamer, as the rider, or jockey in a race, is of the swiftness of his horse, and both of them have been known to risk their own lives to excel their rivals. In consequence of this recklessness, in cases where high pressure engines were used, accident frequently occurred in this country; and the following evidence, given by Mr. Henry Maudeslay, the eminent engineer, before a Committee of the House of Commons, shows that accidents are almost impossible where low pressure, or condensing engines are used; and at the same time it displays the recklessness of some men for the sake of rivalry, as well the danger of high pressure engines, when under the controul of careless men. He observes, "I would not go from here to Margate in a high pressure boat, because there are many reasons why that may become much more dangerous, and no more advantageous to the public generally, or to the individuals. A low pressure engine has a very high power; a high pressure engine has a higher power according to its height of steam. It is pretty well understood that a gentleman who engages in a Steam Boat Company, seldom attends to the engine himself, but leaves it to his men. I built the 'Regent' Steam

Boat last summer, with a low pressure engine. There was a dispute between two men, and one of them swore that he would blow his boiler up but he would beat the 'Regent' in coming up. The man certainly did exert himself as much as he could, and kept his steam as high as he could get it, and it flew out of the safety valve very frequently; and he hurt his boiler materially by doing so, but he did not beat the 'Regent;' but if it had been a high pressure engine, he would either have beat her or blown up his boiler, because he had the power in his own hand." And when asked if the engineer of a condensing engine could not fasten down the safety valve, he replied, "It would be folly to do so, because if the engineer be at all acquainted with his business, he must know that if the steam be raised beyond five or six pound per inch in a condensing engine, its power will not be thereby increased." Thus we perceive that as things are now managed, there is very little risk of danger on board of an English steamer with a condensing engine.

The first steamers that plied on the Thames were, Bell's Comet, Dodd's Commerce and Majestic, as already noticed, and others. One of these boats went from London to Margate in a day, and returned the next. "The Thames" conveyed passengers from London to Gravesend and back in the same day. These steamers on the Thames soon drove out all the passenger-sailing vessels: even the much improved Gravesend boats, which left regularly at the time of high water, began rapidly to lose all their patronage; and yet the steamers, by which they had been driven out, were but very moderate vessels, when compared with the passenger-steamer of the present time. Not only was the accommodation bad, but the clanking of the engine was enough to give a nervous person the headache; such was the defective state of the mechanism of the Marine Engine at that time; while the foul grease, with which the machinery was supplied, had a tendency to induce sea-sickness, even when the water was perfectly calm.

No. (9), Page 96.

Mr. Napier of Glasgow was the first who rejected the old method of making his vessels round, both at stem and stern, by adopting long and neatly tapering ends, in their place, as well as giving considerably greater length to the keels. In this form his steam vessels were found to sail much faster than others with the same or even greater power in the engine. A splendid specimen of this kind of

steamer he produced in the Rob Roy; which was employed between Glasgow and Belfast. Napier's other steamers, which soon became numerous, were employed on various stations, and first brought the mails from the Continent and Ireland, instead of the common sailing packets previously used for that purpose. One of his steamers was, I believe among the first that crossed the Atlantic to Boston, in America, to which the verses, entitled "The Ocean Steamer," in the Poem, refer. The cabins of his vessels were also among the first that were decorated, and made otherwise tolerably comfortable; but these improvements were greatly inferior to what we witness at the present day.

At this time passenger steam boats began to be common, not only on all the navigable rivers in this kingdom, but on most of those of other countries of Europe.

ADDITIONAL NOTES

TO

CANTO VI.

No. (1), Page 104.

The Elizabeth was built, about the year 1813, by a wealthy brewer of Glasgow; and was so called from the name of his only daughter. Her saloon, or rather cabin, was fitted up in a superior manner, and her speed greatly exceeded that of Bell's Comet, which was then plying on the Clyde, and which, on account of its general inferiority, had little chance to compete with the Elizabeth. Her decorations, such as they were at that time, attracted great attention, and probably set the example to the projectors of other steamers, to have similarly fitted cabins in such of their vessels as were intended for the conveyance of passengers.

No. (2), Page 104.

The first Steamer in the West Indies.

"Sir Ralph Woodford told us, that when this steamer was first started, he and a large party, as a mode of patronizing the undertaking, took a trip of pleasure in her through some of the Bocas into the main ocean. Almost every one got sick outside, and, as they returned through the Boca Grande, there was no one on deck but the man at the helm and himself. When they were in the middle of the passage, a small privateer, such as commonly infested the gulf during the first troubles in Columbia, was seen making all sail for the shores of Trinidad. Her course seemed unaccountable; but what was their surprise, when they observed that on nearing the coast, the privateer

never tacked, and finally that she ran herself directly on shore, her crew, at the same time, leaping over the bows and sides of the vessel, and scampering off as if they were mad, some up the mountains, and others into the thickets. This was so strange a sight, that Sir R. W. ordered the helmsman to steer for the privateer, that he might discover the cause of it. When they came close, the vessel appeared deserted; Sir Ralph went on board of her, and after searching various parts without finding any one, he at length opened a little side-cabin, and saw a man lying on a mat, evidently with some broken limb. The man made an effort to put himself in a posture of supplication; he was pale as ashes, his teeth chattered, and his hair stood on end. 'Misericordia! misericordia! Ave Maria,' faltered forth the Columbian. Sir Ralph asked the man, in Spanish, what was the cause of the strange conduct of the crew:—"Misericordia!" was the only reply.

"'Do you know who I am?' said the governor.

"'The—the—O Seguior! Misericordia! Ave Maria!' answered the smuggler.

"It was a considerable time before the fellow could be brought back to his senses, when he gave this account of the matter;—that they saw a vessel apparently following them, with only two persons on board, and steering, without a single sail, directly in the teeth of the wind, current, (which runs like a river through the Bocas,) and tide;

'Against the breeze, against the tide,
She steadied with upright keel:'

that they knew no ship could move in such a course by human means; that they heard a deep roaring noise, and saw an unusual agitation of the water, which their fears magnified; finally, that they concluded it to be a supernatural appearance, and accordingly drove their own ashore, in an agony of terror, and escaped as they could; that he himself was unable to move, and that when he heard Sir Ralph's footsteps, he verily and indeed believed, that he was fallen into the hands of the evil spirits."—*Six Months in the West Indies.*

ADDITIONAL NOTES

TO

CANTO VII.

No. (1), Page 125.

Our Eastern Empire was brought within the reach of the giant-power of Steam, in the reign of William IV. Steamers regularly leave Southampton twice a month; and proceed up the Mediterranean, by way of Malta, to Alexandria; then, by a short over-land route, across the Isthmus of Suez, the passengers and mails reach the Red Sea, where a Steamer is waiting to convey them to Bombay. This passage from Southampton to Bombay is frequently effected in less than five weeks; or, if the traveller choose to take the railways across France to Marseilles, and from thence by steamer to Malta, the journey may be accomplished in four or five days less, or in little more than a month.

No. (2), Page 125.

It had been long contemplated to start steamers across the Atlantic for New York; but this project was much discouraged by various grave, calculating merchants, headed by Dr. Lardner, who considered that the great quantity of fuel, required for so long a voyage, would take up so much of the tonnage of the steamers, that there would be no room for merchandise to liquidate the great expense of the project. This surmise, which afterward proved to be false, had the effect of delaying the experiment for some time.

No. (3), Page 126.

This prophecy of Fitch was much referred to by the projectors of Transatlantic Steam Navigation, (see *Note* (10) *to Canto IV.*) which served as one incentive to pushing the project, as well as a strong wish of the friends of progress to see the experiment fully tried.

No. (4), Page 126.

At length two companies were formed to try the great and hazardous experiment of crossing the Atlantic by Steam. This idea was considered so rash, that half the community would not believe that such a project was started for some time. The speculators, however, proceeded to their work; one of the companies built the Sirius at Leith in 1837. Its measurement was 450 tons; its engine was about 300 horse power; its length was nearly 180 feet, and its extreme width nearly 26 feet. The power of the engine is over-stated in the Poem, on account of having obtained incorrect information, when it was written, and the error was not perceived till the part, were it occurred, had gone through the press.

No. (5), Page 126.

The Great Western was built at Bristol, in the same year that the Sirius was built; but by a company in opposition to that of the Sirius. The Great Western measured nearly 700 tons, and was of nearly 500 horse power; was 208 feet in length, and 28 feet in width.

The Sirius sailed from Cork, on the 14th of April, 1838; (see the preceding note,) and the Great Western from Bristol, on the 7th of the same month. They both reached New York on the same day, the Great Western having been little more than a fortnight in her passage across the Atlantic; and the Americans were not a little surprised at the appearance of two such large steamers, in their waters at the same time. The Great Western has been very recently taken from the Transatlantic line of packets, after nearly twenty years of successful voyages.

No. (6), Page 128.

The betting, on this occasion, was probably without precedent in extent. See the *foot-note, page* 128.

No. (7), Page 129.

The British Queen was built at London, in 1838; her tonnage was 2016; her length, on the upper deck, 245 feet; breadth, within the paddle-boxes, 40 feet; and her horse power is over-stated in the Poem, for the same reason as that of Sirius; see *Note* (4) *to this Canto.* This Steamer, at the time of being launched, was greatly superior to any other in existence, in size, power, and splendour of construction.

No. (8), Page 129.

The President, after making several Transatlantic voyages in a most satisfactory manner, became due, on her return voyage, in April, 1841; but was never more heard of. How this splendid vessel was lost remains unknown, the conjecture, stated in the Poem, is probably correct. The President was built at London, in 1839; tonnage 2366, length 243 feet, breadth 42 feet, and the power of the engine nearly 700 horse.

No. (10), Page 131.

The Fire-king and Flambeau were the first iron steamers of note, which were used as trading vessels, and have been found to answer fully the purposes of their projectors.

No. (11), Page 132.

In the year 1843, the Great Britain, of less tonnage, but of greater length and power than the "President," was launched at Bristol. She made several Transatlantic voyages most admirably. In 1846 she met with a severe disaster by running ashore in Dundrum Bay, on the coast of Ireland. Since this has been got over, she still succeeds as before. The tonnage of this Steamer is 1950; horse power 1000; length 274 feet, and breadth 48 feet.

The iron Steamers of Brunel and Russell are of such vast dimen-

sions, that they will be capable of taking cargoes thrice as great as the largest existing steamers; and they will be provided with engines of proportionate power; but as neither of them are yet launched, (March 1857,) it would be improper to give further details, as the efficiency of such very large vessels remains to be proved.

No. (12), Page 132.

The operation of "blowing off" the saline matter from the boiler, before it can form into solid masses, was performed at regular intervals of about an hour; but this method has been in a great measure superseded.

No. (13), Page 133.

A system much more preferrable than that of "blowing off" has been for some time introduced by *Mr. Joshua Field*, of the firm of *Messrs. Maudslay, Sons, and Field*, by which the brine is constantly and uniformly abstracted, in a fixed and determinate proportion to the feed water, by means of a set of "brine-pumps," worked by the engine. Mr. Seward's method, for effecting the same purpose, is not at present much used.

No. (14), Page 133.

The destructive effects of corrosion, caused by the saline deposits were, I understand, first observed in these steamers.

No. (15), Page 133.

Hall's method of preventing corrosion, though much admired on its first introduction, has been found not near so efficient as was expected, and has, I understand, been discontinued in many of the modern built Steamers.

No. (16), Page 135.

The propulsion of vessels by the screw is not of recent invention; Mr. Paucton, in 1768, published his theory of the screw-propeller; other inventions followed, which were never adopted in practice.

Dr. Shorter succeeded in propelling a vessel by the screw in 1802; but, as no power was at that time known for driving his screw with proper effect, it fell into neglect. Several patents for screw-propellers were afterwards taken out; but failed either through neglect or inefficiency.

No. (17), Page 135.

Messrs. Rennie produced their conoidal triple-bladed screw, which at first promised some success; but Mr. Smith, whose name is inadvertently omitted in the Poem, was next the most successful in this department of propulsion. He took out a patent in 1837: his screw, after several modifications, was found efficient, and has long been adopted in practice. Seguin, Cartwright, Fulton, and Lowe also produced their screws, or rather modification of previous ones, which have never been fully adopted.

No. (18), Page 135.

The most ingenious production of this kind is Maudslay's "double-bladed, feathering screw;" its peculiar advantages are as follows:—

1st.—To enable a vessel fitted with it to proceed under canvas alone, without the necessity of the screw being raised out of the water, and without the immersion of the screw offering any resistance to the onward progress of the ship.

This is accomplished by placing the blades fore and aft, in a line with the keel, and in a vertical position.

2nd.—An alteration of the angle of the blades at pleasure, to suit the varied circumstances under which the screw may be employed, which is of especial advantage in long voyages, when sailing and steaming are combined, and admits of a great saving in the consumption of fuel, and a high speed of vessel being maintained.

By altering the angle of the blades the screw may be made to advance through the water at a greater velocity, with a reduced number of revolutions of the engine; thus following up the speed obtained by the ship under canvas, and using the engine as an auxiliary power only.

Both the first and second operations are effected in a few minutes from the deck, by mechanical means, while the vessel is under weigh, by one man, and in any weather.

"The *self-acting slide-rest*, which was invented by the *late Mr. Henry Maudsley*, is of the utmost importance for perfecting and accelerating the construction of machinery. Before its invention, cylindrical turning was a work of manual labour, and was attended with so much difficulty and expense, when the cylinders were either large in diameter or of considerable length, that it was necessary to avoid using them as far as possible; and plane surfaces being even more expensive, in consequence of the very imperfect and laborious operations of chipping and filing them, many very valuable inventions could not be carried into effect on account of the inaccuracy and expense attending their construction. The invention of the self-acting slide-rest, forming an all-important part of the planing machine, has entirely removed both these difficulties, and cylindrical turning and planing are now the cheapest and most perfect of mechanical operations."

Messrs. Maudsley, Sons, and Field, have greatly improved the Marine Engines used in the British navy and other steamers, to which the self-acting slide-rest contributed in no small degree; and from which invaluable invention all other *surfacing machinery* was immediately deduced; which not only gives the present perfection to the Steam Engine, but to all revolving or other machinery where accurate surfacing is required.

Surfacing Machinery of every kind is now manufactured, to the highest perfection, by *Mr. Joseph Whitworth* of Manchester.

ADDITIONAL NOTES

TO

CANTO VIII.

No. (1), Page 146.

"This was called the Queen of Roads, as Statius the poet sings:—

Appie Longarum teritur regina Viarum.

This road was first constructed by Appius Cladius, the censor, 310 years before the Christian era; it was repaired and laid down in many places with new silex by Trajan, and in all probability, made entirely anew from Beneventum to Brundusium; several of the milliaria are still standing along the Pontine Marshes, bearing inscriptions which tell us that Trajan laid it down with silex, at his own expense, *Silice suâ pecuniâ strarit*, and the dates square with the 104th year of the Christian era. We have a graphic description of the Via Appia given by the secretary of Belisarius in the sixth century, which it will be interesting to hear. "To traverse the Appian way," says Procopius, "is a distance of five days' journey for a good walker, and it leads from Rome to Capua; its breadth is such that two chariots may meet upon it, and pass each other without interruption, and its magnificence surpasses that of all other roads. For constructing this great work, Appius caused the materials to be fetched from a great distance, so as to have all the stones hard and of the nature of millstones, such as are not to be found in this part of the country; having ordered this material to be smoothed and polished, the stones were cut in corresponding angles, so as to fit together in jointures, without the intervention of copper, or any other material to bind them, and in this manner they were so firmly united, that

in looking at them one would say they had not been put together by art, but had grown so upon the spot, and notwithstanding the wearing of so many ages, being traversed daily by a multitude of vehicles and all sorts of cattle, they still remain unmoved, nor can the least trace of ruin or waste be observed upon these stones, neither do they appear to have lost any of their beautiful polish; and such is the Appian way." Whatever we may say about our modern railways, and great works of the present century, the paving of Appius Claudius, made just 2161 years ago, might be safely recommended to the study of the curators of Oxford Street, and the Marylebone vestry, the next time they lay their heads together to make a wood pavement. I shall give but one specimen of the form of those ancient Itineraries to which I have alluded, by taking the journey from Rome to Capua, properly called the Via Appia; the further distance, from Capua to Brundusium, must be considered as an addition made subsequently. The Itinerary of Antonius gives the stages and distances thus:

Ariciam	M. P. XVI.
Tres Tabernas	M. P. XVII.
Appii Forum	M. P. XVIII.
Tarracinam	M. P. XVIII.
Fundos	M. P. XVI.
Formiam	M. P. XIII.
Minturnas	M. P. IX.
Sinuessam	M. P. IX.
Capuam	M. P. XXVI.

The Via Appia coincides with the modern road that now leads from the church of S. Cesario, where the Via Latina branches out from it, to the church of S. Sebastiano; continual traces of the old pavement may still be seen, as the way runs between the naked masses of sepulchres to the ruins, commonly called Roma Vecchia; a little beyond those ruins, which appear to be the remains of a castrum, the old via falls in with the modern road to Albano, which leaves Roma by the Porta S. Giovanni Laterano; at ten miles from the site of the ancient Capena gate, which stood under the Thermæ of Caracalla, is to be recognized the site of the ancient Bovillæ; and in going from thence, the Via Appia passes through the slope of the Alban hills, and reaches the Valley of Ariccia; here we find the first great work which belongs to this queen of Roman ways. The modern road

passes through the town of Ariccia, but the old via passed beneath it, having to traverse a valley, and to sustain its level. It is here that we find those magnificent substructions to which I have already alluded; the whole extends for a length of 100 geometrical paces, and the greatest depth or elevation is 33 feet; the whole is a solid mass, except three arches, used for economising of materials, and for greater solidity; and I do not perceive that in the whole sixteen miles which we have now travelled from Rome on this via, that there are any great cuttings or levellings which would pass the ordinary labour of laying down a road; from Ariccia we descend to Genzano, and approach the Lake of Nemi.

"The Via Appia having now reached the edge of the Pontine Marshes, runs in a dead flat to Terracina; the next two stages (mutationes) after Ariccia, brings us to names consecrated in sacred history; the Christians of Rome thought it not a journey too far to go out, some thirty-three miles, and some fifty-one, to meet the Great Apostle of the Gentiles coming from Puteoli, at Apii Forum and the Three Taverns. But at Terracina it was necessary to cut away the rock, to make room for a passage between Anxur and the sea shore; the white rocks of Anxur still shine in the sun, as they did when Horace made his journey to Brundusium, and I consider this passage of the rocks of Anxur to have been the second great work in making the Via Appia. Sixteen miles further is the town of Fondi, and it is easy to see that much labour has been expended about that ancient town, and about Itri, in carrying on the straight line of road, but after clearing Formia, near the present Mola di Gæta, the difficulties must have ceased; the famous Minturnian Marshes might require a large quantity of the rubus and fistucationes of Vitruvius, to gain a solid bottom, but nothing serious obstructs the engineer until he arrives at Capua, having affected a distance of 142 miles. There is one particular in which the engineering of Roman roads and modern railways coincided, they both pursue a straight line, both filled up hollows, or bestrode valleys and glens by viaducts and bridges, both cut through hills, and cleared away opposing rocks, and even a tunnel is not wanting to compare with some of our own, in the Grotto of Posilipo, near Naples, and the cuttings of the rocks of Anxur may be placed at humble distance with the blasting of the cliff at Dover. But in making these comparisons, it is always to be borne in mind that the ancients had no gunpowder, and wanted all those mechanical

inventions which modern science has given us; but even in a comparison of manual labour and quantity of material, it might, I think, be shown that all the great works of the Roman Empire would hardly equal in the aggregate, the works which now exist in a single, and that the most contemptible, province of the dominions of Augustus Cæsar."—*Extract from a paper read by Rev. R. Burgess, B.D., before the Royal Institute of British Architects.*

No. (2), Page 151.

It was long well known, especially to practical mechanics, that the wheels of carriages encountered a small amount of friction, when they roll upon a smooth surface; and it was found that a horse could drag a much heavier load on a hard, smooth, and level road, than it could on one with a rough surface. Railways or tram-roads were first constructed to gain this advantage in the transit of heavy goods. These were almost exclusively confined, in the first instance, to the neighbourhoods of coal-works, and merely consisted of wooden beams or rails laid down along the road. To make a railway of this kind, the ground was first levelled so as to have a slight inclination towards the quay from which the coals or other minerals were to be shipped. Strong pieces of timber, about six feet long and five or six inches in thickness, are laid across the road, at about the distance of two feet from each other, which are called *sleepers*. Upon these sleepers other long pieces of wood, called rails, about four or five inches square, are laid in the direction of the road, and four feet and a half distant from each other, on which the wheels of the waggon ran. It was found that the advantages gained by a wooden railway of this kind, having a declivity of about 50 or 60 feet in a mile, are so great, that a single horse would take down waggons containing from 10 to 12 tons, and bring the same waggons, when empty, back again. It appears from records that the first wooden railways were used in the neighbourhood of Newcastle in 1680, for conveying coals from the pits to the quays on the river Tyne.

The next improvement of the wooden railways consisted in nailing long, flat iron-bars on the surface of the rails. This change in construction was found to reduce the friction so very considerably that one horse did more than three on the oaken rails.

No. (3), Page 152.

At Penrhyn, in 1801, the first railway was constructed entirely of cast-iron rails, which were fixed in sleepers of stone; on this road it was found that one horse could do more than forty on the best common roads; and cast-iron rails soon afterwards became common in all the mining districts.

No. (4), Page 153.

The famous cast-iron bridge, over the Wear, at Wearmouth, near Sunderland, in the county of Durham, was built by Rowland Burdon, Esq., of Castle Eden; it consists of a single arch, the span of which is 236 feet, its rise 34 feet, and the height of the crown of the arch above the river 100 feet, being nearly the same height as the Britannia tubular bridge. It has an uncommonly light and elegant appearance; and in this respect, is unequalled by any other structure of the same kind. It was built in 1796.

No. (5), Page 153.

(*The figure referring to this note was inadvertently omitted.*)

Cast-iron rails were soon found far too brittle, and malleable rails were adopted in their stead, which were much more expensive, their manufacture being attended with a great amount of heavy manual labour; which was soon almost entirely superseded by the invention of the rolling-mill, by which the rails were formed in a very superior manner, and with much less cost. This invention is claimed by Mr. Birkenshaw of the Bedlington Iron-works, in the county of Durham; though the suggestion was doubtless due to one of his foremen, named Rodham.

No. (6), Page 154.

The "Navvies" began to form a distinct class at the time, when the inland navigation of this kingdom was so much extended, hence the term "Navvy," a corruption from navigator; their more appropriate name being Excavators.

"The original Navvy has no home, and the immense demand for his services, occasioned by the rapid extension of the railway-system,

has caused the ranks of these men to be recruited from all quarters, and the peculiarities of the 'Navvy' have thus, to a considerable extent, been toned down to the level of ordinary labourers. The 'Navvy' is, from his avocation, stronger than the average of working men; his wages are higher; he has broken loose from local ties, or the influence of a permanent residence, and he has become one of a band similarly circumstanced with himself. The body of 'Navvies' are to him what relations and fellow-parishioners are to other labourers—what the men of the same regiment or shipmates are to the soldier and sailor.

"The agricultural labourer with his ten shillings a-week, affects to look down upon the 'Navvies,' who repay him with scorn and rude practical jokes. The raw recruit into the Excavators' army is subjected to treatment of this description, in which the strong veteran is apt to forget that all are not so thoroughly hardened to excessive toil as himself. The thorough-bred 'Navvy' is sure of assistance from his brethren wherever he goes—'a share of their supper, a share of their bed.' The Excavators scorn parish relief, and seek support in sickness from benefit clubs, or the charity of their fellows. Many 'Navvies' have laid by money, and not an inconsiderable number have raised themselves to be sub-contractors, though among them, as among every other class, the prudent are in the minority; they are rude and boisterous, not depraved; they buffet each other lustily in their cups; they take pleasure in making supercilious boors and townsmen stand in awe of their rude strength; and they are jealous of the interference of the police."

No. (7), Page 155.

About the year 1820, and afterwards, high embankments, viaducts, and tunnels began to be constructed in the mining districts, where the natural surface of the ground was very uneven; and winding directions were taken for the routes of transit, by which the acclivities and declivities of the ground were to a great extent avoided.

No. (8), Page 155.

The Stockton and Darlington Railway was opened on the 27th of September, 1825; its length, including an extension to Wilton-Park Colliery, was 27 miles; for which the sanction of an Act of Parlia-

ment had been previously obtained. This line was the first that displayed any thing like modern skill in its construction, which was ably conducted by the late Mr. George Stephenson, who afterwards become so eminent as a Railway Engineer, as well as a first rate projector of improvements in the Locomotive Engine.

No. (9), Page 156.

The author first gave the mathematical investigation, and the methods of laying out railway-curves on the ground, &c.; which have since been fully adopted in practice, not only in this kingdom, but in foreign countries. These methods were produced at the commencement of the railway-era, and were first published in 1837, in the *Gentleman's Diary* for the following year, no other author having previously published on the same subject. These methods, with considerable improvements, were afterwards published, in the author's *Railway Engineering*, in his *Land and Engineering Surveying*, and in *Nesbit's Surveying*.

No. (10), Page 156.

Some of the improved Locomotives were among the first, which were successfully employed on the Stockton and Darlington Railway, and succeeded in obtaining a speed of upwards of twelve miles an hour, which, at that time (1827), was considered quite as much as would be required for any purpose of transit.

No. (11), Page 156.

Mr. Pease and his colleagues had a most formidable opposition to encounter, in their endeavour to obtain legislative sanction for the construction of the railway referred to, from the opulent coal-owners of the Tyne and Wear districts. His ultimate success doubtless led to the speedy adoption of the railway-system.

No. (12), Page 156.

Mr. James Watt, in the year 1785, obtained a patent for a Locomotive Engine; but it appears that this project was never fully carried out, as railways were then wanting to afford it complete success.

No. (13), Page 157.

The earliest successful Locomotive was patented by Messrs. Trevethick and Vivian, in 1801; and was employed on a railroad at Merthyr Tydvil, in 1803, for the conveyance of coals. The shaft of the flue in this engine was conducted, I believe for the first time, through the boiler, thus giving a great additional power to the heat of the furnace.

No. (14), Page 158.

Trevethick had a preconceived idea that the Locomotive would be completely inefficient, when it had to ascend a plane having a slight acclivity; to remedy this defect, he applied a roughness to the wheels and rails to give what he considered the proper amount of friction.

No. (15), Page 158.

Blenkinsop's carriage, with a cog-wheel working into a continuous rack on the railway, succeeded well on a very steep incline, at a colliery near Leeds; and is still employed in similar situations. This project was, however, proposed as a general remedy for the preconceived defect of the Locomotive, when employed on planes of slight inclination.

No. (16), Page 158.

Chapman's eight-wheeled carriage, as well as Gordon's, Branton's, and Gurney's, were all proposed for a similar purpose as the two last named, but were all soon laid aside, their inventors, after having spent great sums in patents, and in their construction, only obtained ridicule as a reward for their pains.

No. (17), Page 159.

It was at length found, by experiment on a railway belonging to Wylam Colliery, that the Locomotive could move large trains without any slipping of the wheels, where the inclination of the plane of the railway did not greatly exceed one foot rise in a hundred feet in

length. This successful experiment, made in 1814, set all the friction-schemes aside.

No. (18), Page 160.

In 1814, Mr. George Stephenson, in conjunction with his partners, introduced two cylinders in his Locomotive, the pistons of which acting on cranks placed at an angle of 45° to one another, produced an easy motion, and which was also efficient in making the carriage adapt itself to the curves of the railway

ADDITIONAL NOTES

TO

CANTO IX.

No. (1), Page 166.

The great locomotives, Achilles and the Iron Duke, on the Great Western Railway, may be considered as near an approach to perfection, in point of speed and strength, as can be desired. The Iron Duke is further noticed in Canto X.

No. (2), Page 169.

The Directors of the Liverpool and Manchester Railway, in 1829, offered premiums of £500 for Locomotives, the weight of which did not exceed six tons, and to move thrice its weight (18 tons) at the rate of 10 miles an hour. This offer gave an important impulse to Locomotives, which ended in establishing their superiority over all other existing modes of travelling.

No. (3), Page 170.

The great premiums offered to be contended for by the Locomotives, had the effect of attracting great crowds of all grades to witness the contest, in the same manner as the noted horse-races at Epsom, Newmarket, &c., are so well known for their numerous spectators.

No. (4), Page 172.

The Rocket, by Mr. George Stephenson, embraced the fire-box,

fire-tubes, and blast-pipe of the modern locomotives, for the first time. The blast-pipe, which is the invention of Mr. G. Stephenson, and which leads from the exhaust-passages of the cylinders into the funnel, is of great use in producing the strong draught through the fire-tubes, as each jet of steam emitted creates a partial vacuum in the funnel, which is immediately filled by a current of air, rushing through the fire-grate. In fact the Rocket embraced every essential, which, in an improved form, has since been found to give energy to the modern locomotive; and as no patents were taken out for these improvements, all other manufacturers of locomotives immediately adopted them.

No. (5), Page 172.

Mr. Booth, secretary to the Liverpool and Manchester Railway, suggested the introduction of the tubes in the boiler of the Rocket, which were 25 in number. These tubes in some of the modern locomotives have been increased to 303, and they contribute in a very great degree to the efficiency of this power.

No. (6), Page 173.

The Sanspareil embraced the blast-pipe of the modern locomotive, with the single return-tube of Trevithick's old engine; the whole construction possessed considerable energy, without any material novelty of principle.

No. (7), Page 173.

The necessary draught of air in this Locomotive was produced by a forge-bellows, which was found to be efficient for the purpose; but, at the same time, greatly inferior to the methods adopted for the same purpose, in the Rocket; for which reason the peculiar construction of the Novelty was never afterwards adopted in practice; but perhaps the strongest reason for rejecting the forge-bellows was the failure in competing for the prize, which arose solely from the weakness of the frame-work of the locomotive and not from its principle of construction

Nos. (8) and (9), Pages 174 and 175.

As the failures of the Novelty and Sanspareil arose more from the weakness of their parts than from their principles of construction, and as they had, by their performance, given hopes of full success, their breaking down was the cause of great disappointment to the spectators.

The Rocket having fulfilled all the conditions of the competition against time, &c., required by the directors, *Mr. George Stephenson* was entitled to the double premium, which he received with the high approbation, so justly due to his talents, of all parties. His pre-eminence, from that memorable day, became fully established as the *Foster-sire of the Modern Locomotive.*

The failures of the Novelty and Sanspareil, and the complete success of the Rocket, have become a memorable portion in the history of the Locomotive, and are detailed, I trust, with sufficient accuracy in the Poem; it may, however, be further stated, that the exultation of the spectators was greater than was ever witnessed at the success of a popular candidate at an election, or a favourite horse at a race; but on this occasion a more important result than either called forth the acclamations of the people.

ADDITIONAL NOTES

TO

CANTO X.

No. (1), Page 186.

The improvements, introduced into the Rocket, were carried out with still greater efficiency in the Arrow, which could now nearly equal twice the power of the former; and all the other Locomotives, destined to take part in the opening procession of the Liverpool and Manchester Railway, were on a similarly improved principle.

No. (2) and (3), Page 187.

Opening of the Liverpool and Manchester Railway.

The Liverpool and Manchester Railway was the first line of vast magnitude, which was opened for the conveyance of passengers. The first prospectus of the company, formed for carrying out this great project, was dated October 29th, 1824; and the work was fully completed, and opened on Wednesday, September 15th, 1830. On this great occasion, as early as six o'clock in the morning, the people of Liverpool and its neighbourhood were seen approaching in crowds to the station, at the commencement of the railway, to secure the best places for viewing the procession, about to take place. The Duke of Wellington, Lord Brougham, Sir Robert Peel, and several other noblemen and gentlemen of note were present. The procession left Liverpool, at about half-past ten o'clock, drawn by eight locomotives, in the following order:—the Northumbrian, with the Duke of Wellington, numerous distinguished visitors, and the directors of the railway; the Phœnix, with green flags; the North Star,

yellow; the Rocket, light blue; the Dart, purple; the Comet, red; the Arrow, pink; and the Meteor, with light green flags. The Northumbrian drew three carriages; in the first was the band, in the second the Duke of Wellington and his distinguished party, and in third the directors of the railway. The Phœnix and North Star also contained several distinguished personages, and each drew five carriages: the Rocket drew three; and the Dart, Comet, Arrow, and Meteor, each four. The number of persons, conveyed on this memorable occasion, was nearly one thousand. The average speed of the procession was not more than sixteen miles per hour; which was the rate intended, that the company might have an opportunity to inspect the works, as they passed along. The first part of the procession went off with the most complete success and satisfaction; and every thing was likely to pass well throughout, had it not been for the melancholy accident which happened to the distinguished financier and statesman, Mr. Huskisson.

It appears that the accident originated from the irresolution of the unfortunate gentleman. At the time of the accident, he was standing close to the carriage which conveyed the Duke of Wellington; the train having then stopped, and several of the passengers got out of the carriages, contrary to the advice of the directors, and among them was Mr. Huskisson. If he had kept close to the carriage from which he had got out, another train might have passed without injuring him; but the moment before the Rocket passed, he unfortunately laid hold of the open door of the Duke's car, which was struck by the passing train; and which threw him on the line of rails, upon which the Rocket was passing: his right leg fell under the wheel of the engine, and was severely crushed. So serious were the injuries he received, that death terminated his sufferings a few hours after the accident.

The new method of transit, thus established, at once exhibited the advantages to be derived from railways; for in eighteen months after the completion of the work, 700,000 persons had been conveyed on the line, being an average of nearly 1100 per day. Previous to the opening of the railway, there were nearly thirty regular and occasional coaches, which could only convey, when full, about 700 persons per day. The time required by the coaches was four hours, and by the railway one hour and a half. Besides the lower rate at which goods and passengers could be conveyed, was a still greater advan-

tage over the conveyance by coach and canal; for the manufacturers of Manchester alone saved more than £20,000 per annum, in the mere carriage of cotton. Before the establishment of railways, heavy goods were conveyed from the manufacturing districts to London by canals, the passage by which to London occupied nearly a fortnight; and slow as the stage waggons were, they were much more expeditious than canals.

No. (4), Page 191.

Immediately after the opening of the Liverpool and Manchester Railway, the great trunk-lines from London were projected in all directions, among the first were the North Western, the Great Western, the South Eastern, the South Western, and the North Eastern, with several others in the manufacturing and mineral districts.

No. (5), Page 191.

The great profits, held forth as certain to arise from the projected railways, attracted numerous speculators; and the traffic in shares began to go on to a great extent; and many transactions of a very discreditable character were the results of the eagerness to purchase shares.

Nos. (6) and (7), Page 192.

The nefarious proceedings of the parties, referred to in the Poem, are sufficiently well remembered, at the present time (1857), and, therefore, further details of their manœuvres, which were intended to be given in this note, shall be omitted.

No. (8), Page 194.

A great number of accidents, attended with serious injuries and loss of life, occurred shortly after the opening of several of the great lines. These disasters chiefly arose from want of experience, both on the part of the servants of the different railway companies, and of the passengers, who had not been in the habit of travelling by railway. By a parliamentary return, it appears that the number of accidents in 1842, on all the railways, then opened in England and Scotland, amounted to

73 killed and 71 injured. After all, it is said, that the number of accidents, in proportion to the number of passengers carried, and the number of miles travelled, was ten times greater in the case of coaches than in that of railways. In 1846, the number of accidents, reported in England, Scotland, and Ireland, were, 84 killed and 102 injured; but it must be considered, at the same time, that many new lines had been opened during the two previous years; thus making the number of casualties proportionably less than in 1842.

No. (9), Page 195.

The idea of the employment of electricity for the transmission of intelligence originated at an early period of the history of electrical science. Many plans to effect this had been brought before the public; but they all were neglected, till Messrs. Wheatstone and Cooke, in 1837, obtained their first patent for an electric telegraph of a real practicable kind. This patent was followed, at short intervals, by many others, by which the invention has been gradually improved and brought to its present form; the principles, originally adopted, have been progressively varied and simplified in their application. By these improvements the number of wires, necessary for the conveyance of intelligence, has been diminished, and the general construction has been made cheaper and more perfect. The electric telegraph involves two essential principles. First, that a magnetic needle, free to rotate about its centre, being brought near a wire, through which an electric current is passing, has an immediate tendency to place itself at right angles to that wire; the direction of its motion following a certain invariable law. This property was first discovered by Professor Œrsted, of Copenhagen, in 1819. Secondly, that a piece of soft iron, not perfectly magnetic, is made temporarily so, during the transmission of the electric current along a wire coiled spirally around it. By the joint indications of these two agents, messages may be transmitted with rapidity and accuracy, whenever the electric current is made to act upon them.

The electric telegraph is now the chief medium of all the news of the Government, and the important messages of merchants and of the public generally; thus reducing distances of several thousands of miles to almost perfect contiguity; thus more than realizing the fabled feats of the Magi of old.

No. (10), Page 196.

For a detailed account of the magnitude of the projects undertaken on this occasion, and the wild speculations connected therewith; see a work entitled *The Railway Mania of* 1845.

No. (11), Page 197.

The Britannia Tubular Bridge, combining unparalleled novelty, strength, and magnitude, forms one of the viaducts of the Chester and Holyhead Railway. It crosses the Menai Straits, where it is divided into two arms by the Britannia rock, whence the name of the viaduct; and it unites the mainland of Wales and the Isle of Anglesea. It consists of two rectangular tubes, each 1513 feet in length, 26 feet in average depth, and 14⅔ feet in width. Each tube has four spans, and consequently three piers or towers, besides the abutments. The two middle spans are each 460 feet, and the two end spans each 230 feet, exclusive of the widths of the towers, which support the tubes, at a height of 102 feet above high-water mark; the whole height of the middle tower, which rests on the Britannia rock, is 200 feet above high-water mark, or 230 feet from the foundation. The parts of the tubes forming the middle spans were 472 feet in length, previous to their being united, and weighed upwards of 1600 tons; thus making the whole weight of the tubes, including the junctions within the towers, upwards of 10,000 tons.

The design of this far-famed structure is due to *Mr. R. Stephenson*, which would alone be sufficient to hand down his name to posterity, had he never produced equally important and well known inventions connected with the great works of his age.

The Conway Tubular Bridge, in the same line of railway, preceded the Britannia, having been first designed and carried out, and finally raised, by *Mr. R. Stephenson*, in 1848. Its stability at once proved the complete efficiency of viaducts of this kind for sustaining the great weight of locomotives and their trains; and gave full confidence of success to the still greater project, the Britannia. The Conway viaduct consists of only one span of 400 feet: the height of the tubes above the level of high water is only 18 feet, each of which weighs 1300 tons.

The High-level Bridge, at Newcastle-upon-Tyne, is another novel and gigantic work by *Mr. R. Stephenson*, which it will be proper to

describe in this place. This bridge is of cast iron, and forms the viaduct of the Great North of England Railway over the deep valley of the Tyne. In addition to the great height and elegance of this work, it has a way for common carriages suspended beneath the railway, which gives it a decided claim to novelty of construction.

The number of its arches are six, each consisting of four cast iron ribs, having a span of 125 feet, and rise of 17½ feet in the centre. The ribs are arranged in pairs; one pair on each side of the carriage-way, which is 20 feet wide, with foot-roads, between each pair of ribs, six feet wide. The total width of the railway is 33 feet; the weight of iron in each arch is 576 tons; in the whole structure about 5000 tons. The height of the railway from the level of high water is 108½ feet; the height of the suspended carriage-way is 85 feet, and the total height from the bottom of the river is nearly 130 feet. The length of the bridge, from the Castle Garth to Gateshead, including the cast iron approaches, is nearly 1350 feet.

The cellular work at the top and bottom of the Britannia and Conway tubular bridges, which gives them their stability, is due to *Mr. W. Fairbairn*, of Manchester, who had previously introduced similar work into other viaducts of a different construction. *Mr. Fairbairn* was also the inventor of the *Rivetting Machine* for Steam Engine boilers; one of the earliest constructors of *Iron-ships*; of *Ventilated Water-wheels;* and of an improved application of iron to *Fire-proof Buildings*. His improvements in the Steam Engine consist in the introduction of the *Revolving Disc-valves*, by which the steam can be cut off at any point of the stroke of the piston; and the system of taking the motion from the run of the fly-wheel, now in general use.

Messrs. Easton and Amos designed and executed the most stupendous work, to which the hydraulic press has ever been applied, for lifting the massive tubes of the Britannia and Conway bridges to their positions. Two steam-engines, each of 40 horse-power, were employed for forcing the water into the cylinders of the presses used for this purpose. The forcing pumps were one and one-tenth of an inch diameter, and 16 inches stroke. The pipe, for conveying the water into the cylinder, was half-an-inch bore, its external diameter one inch, and was made of wrought iron; the diameter of the cylinder of the largest press was 20 inches. The power, applied to the

pump, is thus increased in the ratio of the areas of the pipe and the cylinder, or as 1 to 355. When the full power of the engine, equal to that of 40 horses, was exerted, the available power, thus produced in the press, would be equal to the product of 40 and 355, or that of 14,200 horses. The actual work done by the one large press at one end of the tube, or by the two smaller ones at the other end, would be equal to raising half the tube, or about 900 tons. The ends of the tubes, which were to be raised, were strengthened by massive frame-work of cast-iron, fitted to their interior, and bolted to the plates of the tubes.

Messrs. Easton and Amos are, also, the inventors, improvers, and manufacturers of all kinds of hydraulic machinery, among which *Mr. Appold's Centrifugal Pump* ought to be noticed in this place. This very ingenious and powerful machine had its capabilities tested at the Great Exhibition of 1851. It consists of a hollow disc, or cylinder, 12 inches in diameter, and 3 inches in width at the rim, with a circular opening in the centre 6 inches in diameter, through which the water passes to the curved vanes between the centre and the rim. The disc is enclosed on both sides, excepting the central opening, and is quite open all round the rim. The disc is placed vertically on an axle passing through its centre; and on the end of this axle a pulley is fixed for driving the disc with a belt from the gearing of a Steam Engine, the cylinder of which is 9 inches in diameter, and its piston of 27 inches stroke. For the purpose of raising water, the disc is fixed at the bottom of a vertical trunk, 22 feet in height, 7½ feet broad, and one foot wide; a valve being fixed in the trunk, at the height to which the water may be required to be raised, and from which valve the water flows. When in action at the Great Exhibition, the water issued at a valve placed 10 feet above the disc, at the rate of about 2000 gallons per minute, and the disc was making from 800 to 1000 revolutions per minute: the capacity of the disc was about 1¼ gallons.

This machine, in a greatly enlarged form, has been found more efficacious than any other hydraulic apparatus of like power, in the drainage of Whittlesea Mere, in Cambridgeshire.

The chief scientific writers on the Steam Engine are *Tredgold*, (who is the author of the most original and extensive work on this important subject,) *Mr. W. S. B. Woolhouse* and *Mr. James Hann*, (who successively made extensive and valuable additions to Tredgold's

work,) *Rev. Canon Moseley*, *Professor Barlow*, *Mr. William Fairbairn*, and *Professor Hodgkinson*, who have produced works embracing various mechanical subjects, either on, or connected with, the Steam Engine, on the strength of materials, and on the other great works of this age. *Mr. Appold* is the inventor of several other important machines, besides the one already described. *The Compte de Pambour* is also author of valuable works on the Steam Engine, and the inventor of several original formulæ for the determination of its power, &c. *Mr. Lewis Gompertz* is the author of an ingenious work on machinery which he invented. There are several other authors on parts of the subjects, already named, as *Pole*, *Edwin Clarke*, and several French and American authors, whose works elucidate, in a greater or less degree, the same important subjects.

No. (12), Page 199.

The Iron Duke, embracing all the improvements of Messrs. G. and R. Stephenson, was the first Locomotive which moved with ease heavy passenger-trains at the rate of 60 miles an hour; and other Locomotives on the same line (the Great Western Railway) drew merchandise trains of 600 tons at the rate of 25 miles an hour!—"the mere idea of which, not many years ago, would have been considered as purely fabulous. Such is the modern Locomotive,—an illustrative example of the genius of man; but, like many other important inventions, it is the joint production of many minds, and many more are still directed to its further improvement. The records of the Patent Office show, that from January, 1840, to September, 1849, no less than 226 patents were enrolled; all of them more or less applicable to the Steam Engine and its appendages." Among the most conspicuous improvements of the modern Locomotive, *Messrs. Stephenson and Gray's* slide-valve motion has been widely adopted, and *Mr. Crampton* has engines of his peculiar plan successfully employed both in England and on the Continent.