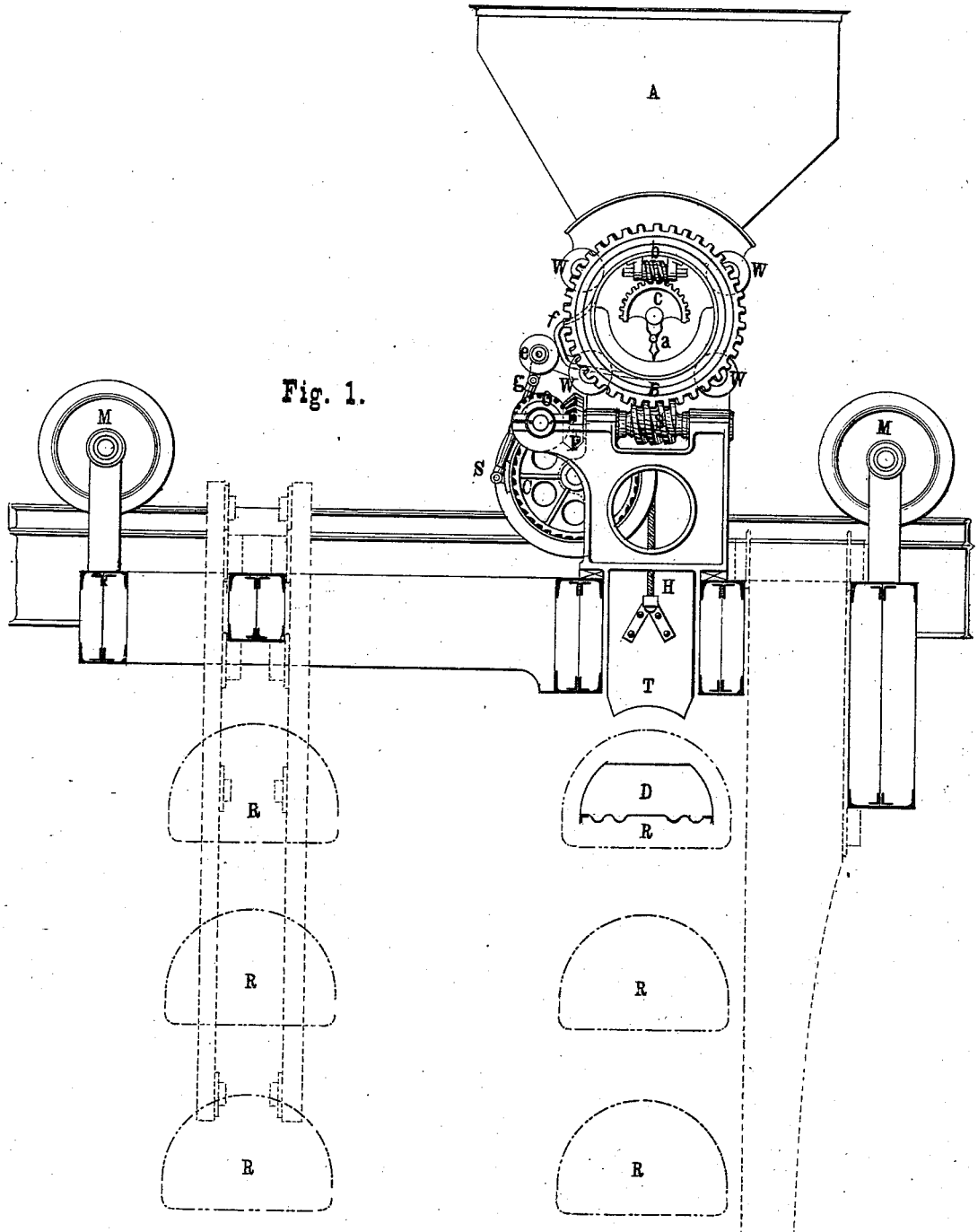
4 Sheets—Sheet 1.

T. F. ROWLAND.

REVOLVING COAL-METER.

No. 192,291. Patented June 19, 1877.

Fig. 1.



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4 Sheets—Sheet 2.

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Fig. 2.

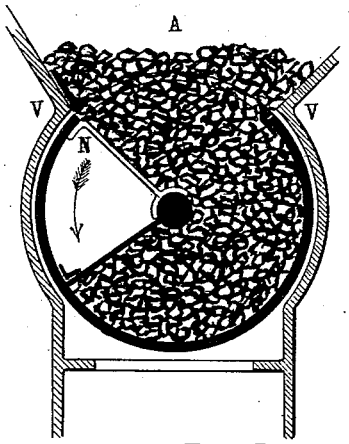


Fig. 3.

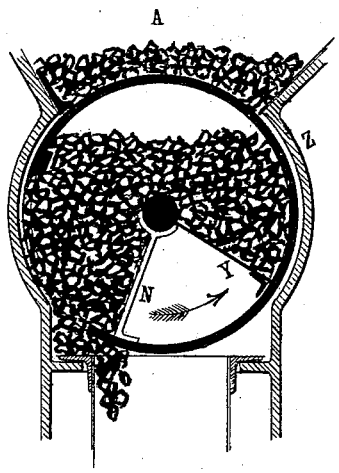


Fig. 4.

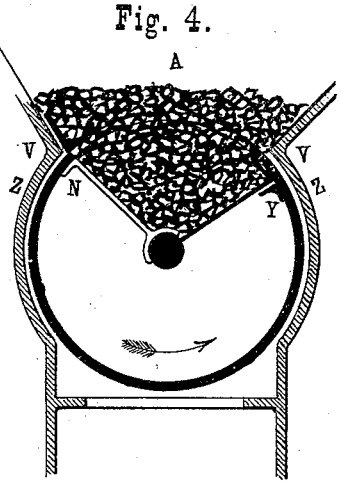


Fig. 5.

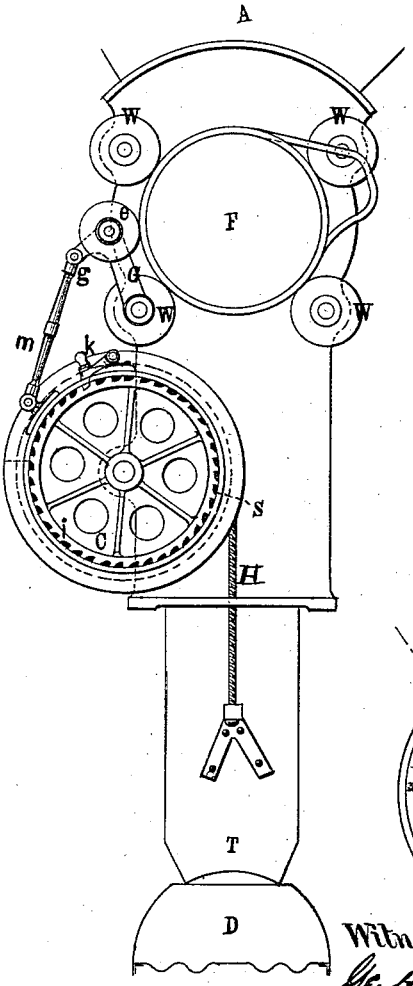


Fig. 6.

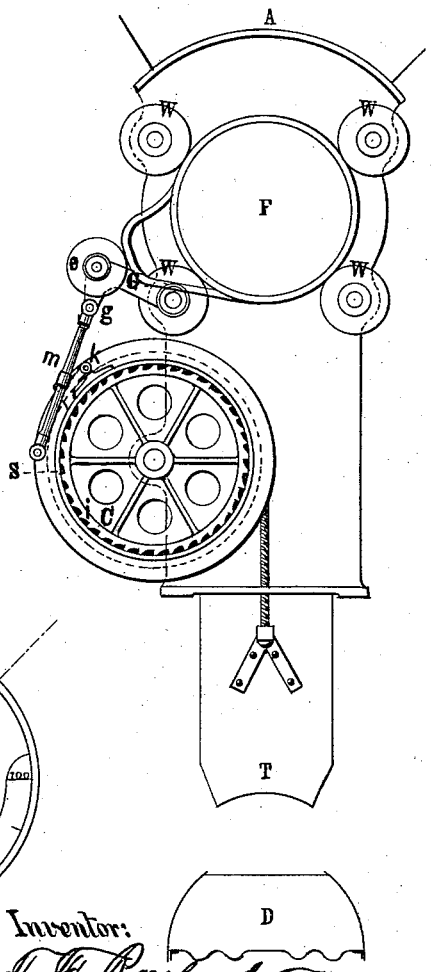
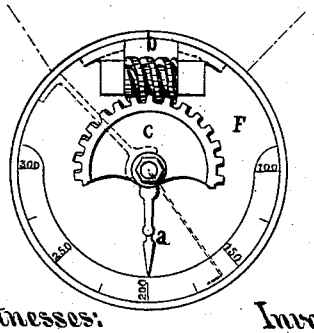


Fig. 7.



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4 Sheets—Sheet 3.

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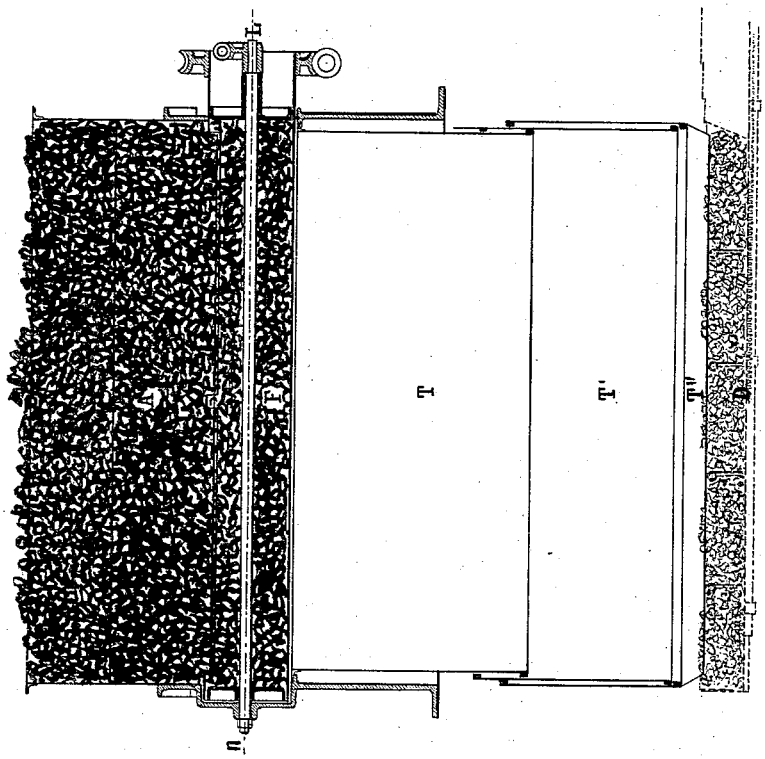
Fig. 8.



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4 Sheets—Sheet 4.

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REVOLVING COAL-METER.

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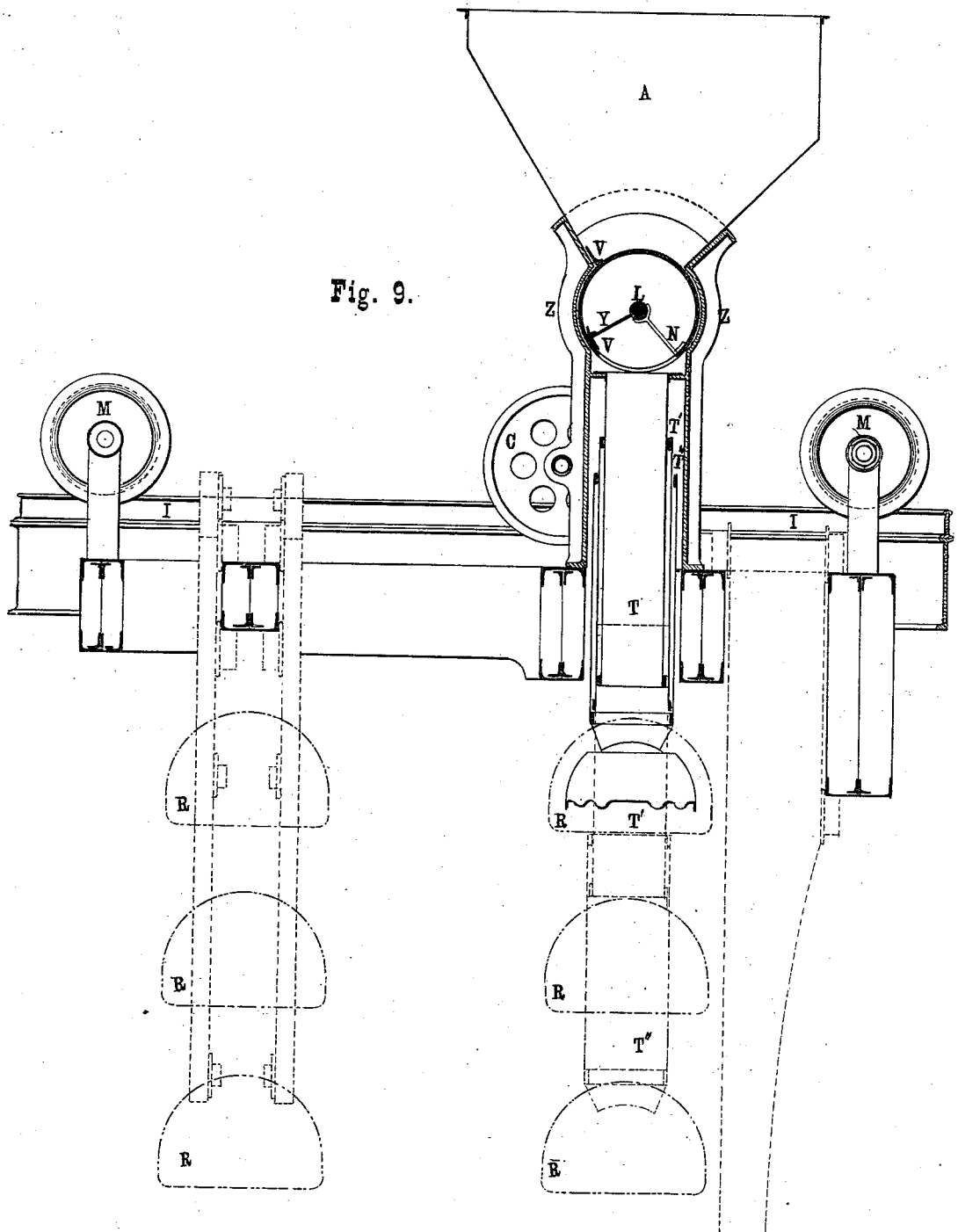
Fig. 9.



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UNITED STATES PATENT OFFICE.

THOMAS F. ROWLAND, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN REVOLVING COAL-METERS.

Specification forming part of Letters Patent No. **192,291**, dated June 19, 1877; application filed January 20, 1877.

To all whom it may concern:

Be it known that I, THOMAS F. ROWLAND, of Brooklyn, county of Kings, State of New York, have invented a new and useful Improvement in Revolving Coal-Meters, which improvement is fully set forth in the following specification.

My invention relates to an improvement in revolving coal-meters and to the telescopic coal-chute or guiding apparatus connected therewith. It is very important in charging gas-retorts and similar apparatus that the same quantity of coal be introduced in each charge, and therefore it has always been customary to employ some sort of a measure to determine the amount of coal to be placed in the retort. Usually the only meter used was the charger or scoop itself. I prefer, however, to use a separate meter, and have taken out two patents descriptive of a meter intended to accomplish this result, one in December, 1872, and the other in April, 1873.

My present apparatus relates to improvements on these machines. I have found it inadvisable to charge three scoops at once, and therefore content myself with charging one at a time, though some of the parts of my present apparatus might be applied to a charging apparatus intended to charge several scoops simultaneously.

In the first place, it is necessary that exactly the same amount of coal be measured or metered on each revolution or action of the machine. In the second place, it is necessary that this amount be variable, owing to the fact that different-sized retorts might be used, or that some of the retorts might become partially filled with deposited carbon. In the third place, it is necessary that the coal thus metered should be guided or carried into the scoop or charging apparatus, and that it should pass to and into this charging apparatus as much as possible through a confined space, for the reason that the fine coal used in gas manufacture very readily escapes into the air, and becomes very disagreeable, as well as injurious to men and machinery. These three results I have obtained by my present invention. I have also obtained another very desirable result, namely, the automatic lifting or elevation of the coal-chute or conductor from the scoop or coal-carrier after the discharge of the coal into the scoop.

In my drawings, Figure 1, Sheet 1, represents a general view of the rear of my apparatus, showing the revolving mechanism and the telescope-raising mechanism in detail. Figs. 2 and 3, Sheet 2, show my revolving meter in the position of receiving and discharging a measure of coal. Fig. 4 represents my meter receiving a charge of coal, the partitions being arranged to receive a less charge of coal than in Figs. 2 and 3. Fig. 5 represents a detailed view of the telescope-raising mechanism. Fig. 6 represents the same mechanism, showing the telescope in a raised position. Fig. 7 shows the quantity-varying mechanism of the coal-meter. Fig. 8, Sheet 3, represents a longitudinal section view of my apparatus, showing the scoop and the telescope in position of having just discharged a measure of coal into the scoop. Fig. 9, Sheet 4, represents a cross-section of my apparatus, showing the detail of the telescope and the detail of the moving partition of the meter.

Similar letters of reference indicate similar parts in the drawings.

The entire apparatus is carried parallel to the face of the retorts on wheels M M, running on rails I I, and the scoop or coal-carrier is arranged directly beneath it, so as to be met and entered by the descending telescope or guide T. The scoop and guide being carried on the same frame at whatever elevation D may be, the telescopic chute T, when lowered, would pass into it, as will be hereinafter shown.

A is a receiver or hopper, into which the coal is dropped from a traveling bucket or is placed there by any other suitable means. Directly beneath this hopper or receiver A is a revolving cylindrical meter, which I shall call generally F. This meter consists of a cylinder, revolving between two cylindrical surfaces which have openings at the top and bottom. The revolving cylinder is not entirely closed, but has a longitudinal cut or passage for the purpose receiving and discharging the coal. The construction of this part of the apparatus is clearly shown in Figs. 2, 3, and 4. The forward end of the cylindrical meter

F is carried and held firmly in position by the four anti-friction wheels W W W W. The cylinder is supported at the end nearest the retorts by a journal, *n*.

Through the center of this cylinder there passes the shaft L, carried in bearings at the ends of the cylinder, which shaft revolves in a half-bearing supported by a partition, N, within the cylinder. This shaft L has attached to it an adjustable partition, Y, which is swung around the cylinder on the revolution of the shaft L.

The amount of coal which the meter can receive and discharge is determined by the cubic space contained between N and Y. The greater the angle the greater the amount of coal. In Fig. 4 the adjustable partition is shown at a right angle to the fixed partition N. In Figs. 2 and 3 it is swung around three quarters of a revolution, so that the meter in Fig. 2 discharges about three times as much as it does in Fig. 4. The position of this variable partition is shown by the position of the pointer *a*, Fig. 7. The shaft L, which carries this alterable partition, passes through the end of the cylinder and frame-work and terminates in a segmental gear, *c*. This segmental gear *c* is moved by the revolution of the worm-screw *b*, which may be turned by a crank or other suitable means. Owing to the friction or resistance of this worm-screw, the shaft will remain in any position to which it may be set, and the vibration of the pointer to the right or to the left will indicate the amount of coal which the meter will hold. The revolution of the entire cylindrical meter is accomplished by the revolution of the gear-wheel B acted on by the worm-screw S. This worm-screw is revolved by means of two miter-gears, O and P, which are themselves moved by steam power, (not here shown,) or by other suitable means. This worm-screw gives a great leverage in revolving the meter, and renders it possible to break or cut any obstructing pieces of coal which might be caught between the edges of the hopper or receiver and the edge of the cylinder. These two edges are armed with cutting steel-knives V V′, as has been described in my previous patent.

It is now evident that each complete revolution of the cylindrical meter will necessarily receive and discharge an equal amount of coal, which amount is determined by the position of the adjustable partition Y.

The next object to accomplish is the guiding of the coal, which has been measured and discharged by the meter, into the coal-carrier or scoop beneath. This is done by what I call my telescopic chute, which I mark T. This telescope consists of a series of rectangular slides, a section of which is shown in Fig. 9, marked T T′ T″. These slides pass freely one over the other, and in their extended position are long enough to reach the scoop when at the elevation of the lowest retort. This scoop is raised or lowered by mechanism not shown in these drawings. The lower end or foot of the telescope is conical or narrower than the upper portion, and is arranged to enter the top of the scoop and to fill it closely, and is raised by the elevation of the scoop. This lower section T″ has attached to it a cord or chain, (shown clearly in Figs. 5 and 6,) which prevents the dropping of the lower section T″ upon the withdrawal or lowering of the scoop. This chain H passes over a wheel marked C, which is connected by a shaft to a wheel at the other end of the machine, so that the more distant end of the long telescope is also raised and lowered by a similar chain passing around a wheel at that end. The revolution of this wheel evidently would raise or lower the telescope. This wheel has connected to it a ratchet-wheel, *i*, and a pawl, marked *k*, carried by a concentric wheel, S, which pawl prevents the lowering of the telescope T. I sometimes employ a separate steam or air cylinder to revolve this wheel C; but I find it very convenient to raise the telescope by the upward movement of the scoop D. This slacks the rope H, when the wheel C is readily revolved beneath the pawl, which takes into the ratchet as soon as the revolution begins in the contrary direction; consequently the telescope is firmly held by means of this pawl at any elevation to which it may be raised by the scoop D. The telescope T, as has been described, enters the mouth of the scoop D, and I sometimes employ an apron passing outside of the line of junction to prevent the escape of any dust or particles of coal which might readily arise from the falling of the coal from the meter F.

Now, it is evident that the scoop D cannot be advanced into the retort until the telescope T has been raised so as to clear it, and I have devised an apparatus for automatically accomplishing this result. It is evident that, if the pawl *k* be moved outward from the position shown in Fig. 5 to the position shown in Fig. 6, it will revolve the ratchet-wheel *i* and the wheel C, and will wind up the chain H upon the wheel. This movement I accomplish by means of a cam, *f*, attached to the revolving-meter cylinder F, as will be now described. The pawl *k* is attached to a wheel, S, which is concentric with the ratchet-wheel *i*. This wheel has attached to it a link, *m*, which link is pivoted at *g* to a vibrating arm, G. The pawl *k* might be directly attached to the link *m* without the intervention of the wheel S. This vibrating lever G carries upon its upper extremity a roller, *e*, which rolls upon the surface of the cam *f*.

Now, it is evident that as the roller *e* is thrown to the left the pawl *k* will be depressed, the wheel C will be revolved, and the telescope will be raised, and that this will be true whenever the raised point of the cam *f* strikes the wheel *e*. The cam *f* is so arranged with reference to the revolving meter that in its position of rest, or when it is receiving the coal from the hopper, the raised point of the

cam bears against the roller *e* and holds the telescope in its raised position, as is clearly shown in Fig. 6. Now, when this cylindrical meter revolves, as has been previously described, the cam *f* passes from beneath the roller *e*, which allows it to fall back toward the center of the machine and allows the telescope T to drop into the mouth of the scoop D, as is shown in Fig. 5. While in this position, the revolving meter discharges into the telescope and the coal is conducted into the scoop through a closed channel or guide. Then the continued revolution of *f* again brings the raised point in contact with the roller *e*, throws down the pawl *k*, winds up the chain, and raises the telescope T clear of the mouth of the scoop. Then other parts of the machine (not here shown) are put into operation, and the scoop is forced into the retort. This part of the apparatus is in the position shown in Fig. 6 when the meter is in the position shown in Fig. 2, and is in the position shown in Fig. 5 when the meter is in the position shown in Fig. 3. This plan of automatically lowering the telescope into the scoop during or just previous to the passage of the coal, and automatically freeing it therefrom after the coal has been guided into the scoop, I consider one of the very important features of my invention.

The operation of the machine is as follows: The scoop D and meter are first brought opposite the retort to be charged and the hopper A is filled with coal. The quantity of coal to be discharged is then determined by the position of revolution of the shaft L, as indicated by the pointer *a*. The height of the telescope T is so adjusted that it is free of the scoop D when elevated, while when depressed its mouth will enter and exactly fill the entrance in D. The meter F is then revolved through a complete revolution by means of the worm-screw S. This measures and discharges the required quantity of coal into the scoop D and then raises the telescope T free of the scoop, so that the scoop can be advanced into the retort.

I claim—

1. The combination of a revolving coal-meter with an adjustable partition or diaphragm mounted on a central spindle or axis and turning with said axis, whereby the capacity of the meter may be varied, substantially as described.

2. The combination of a revolving coal-meter with a partition or diaphragm mounted on a central spindle and turning with said spindle and mechanism, substantially as described, whereby the partition is firmly set in different positions.

3. A revolving coal-meter combined with a cog-wheel whereby it is revolved, and a worm-wheel or gear whereby the cog-wheel is revolved, substantially as described.

4. The combination of a revolving coal-meter, having an adjustable partition with a cog-wheel attached to it and by which it is revolved, substantially as described.

5. The combination of a coal-meter with an adjustable chute or coal-guide, which chute serves to conduct the coal to the scoop and is variable in length to correspond with the varying position of the scoop, substantially as described.

6. The combination of a coal-meter with an adjustable chute, which consists of a series of boxes or guides sliding telescopically over each other, substantially as described.

7. The combination of a coal-meter and an adjustable chute with mechanism, substantially as described, whereby the chute is automatically lowered into the scoop beneath during the passage of the coal, and is automatically raised after its discharge, whereby the scoop is enabled to advance into the retort free of the chute, substantially as described.

8. The combination of a revolving coal-meter, having a cam attached to it, with mechanism, substantially as described, whereby a chute or coal-guide is elevated or lowered at different points in the revolution of the meter.

9. The combination of a revolving coal-meter supported on friction-rollers, with a coal guide or chute, substantially as described.

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