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MECHANISM FOR FEEDING FURNACES.
APPLICATION FILED NOV. 1, 1907.

900,390.

Patented Oct. 6, 1908.

Fig. 1.

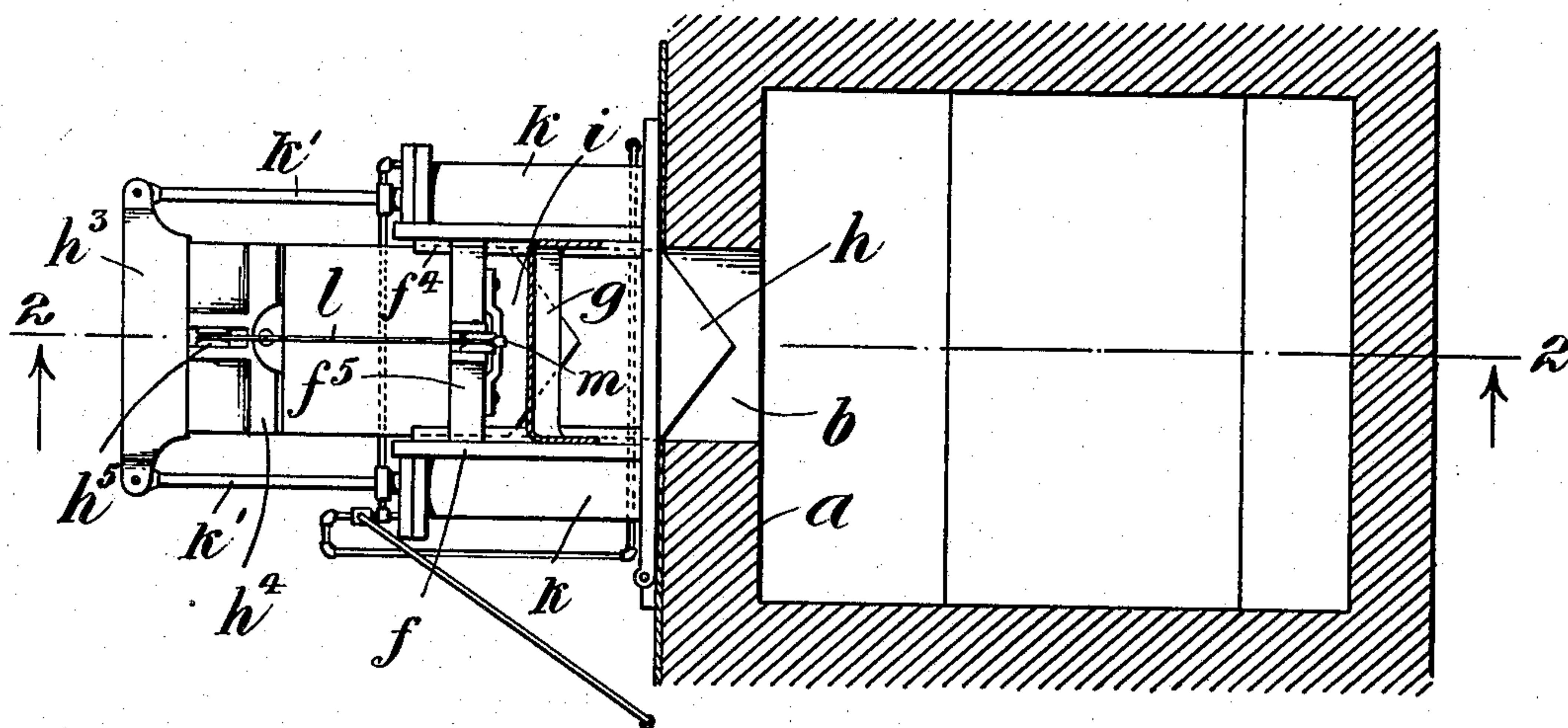


Fig. 2.

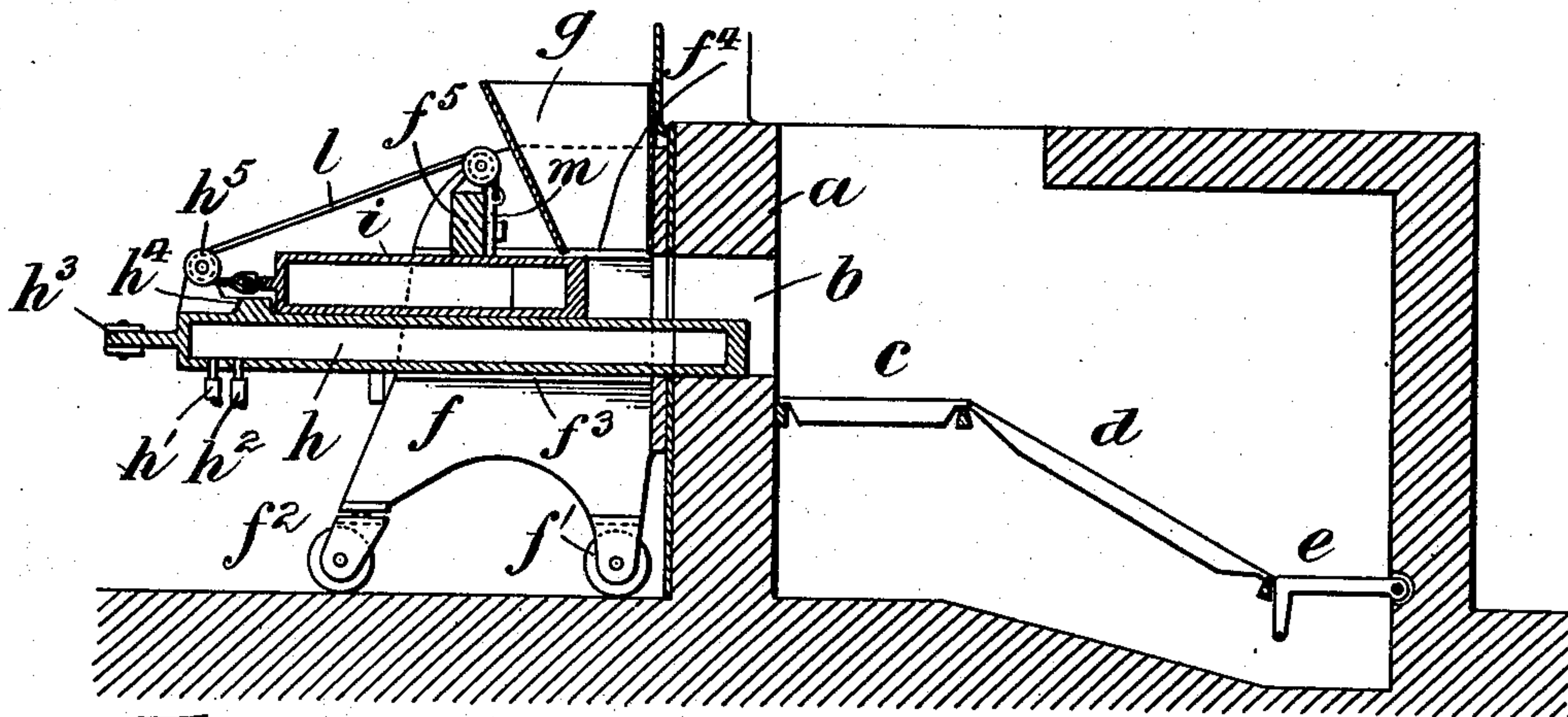


Fig. 3.

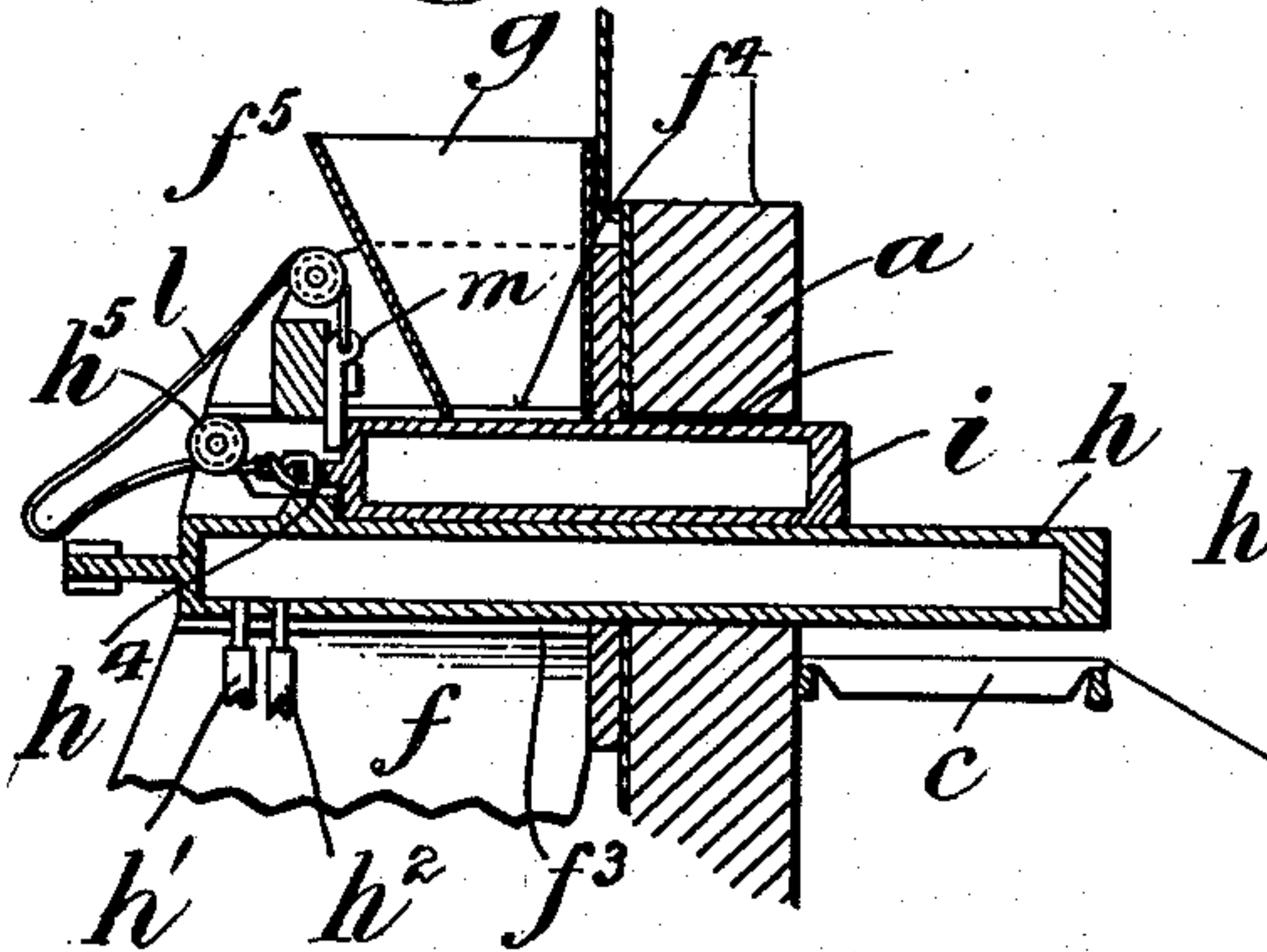
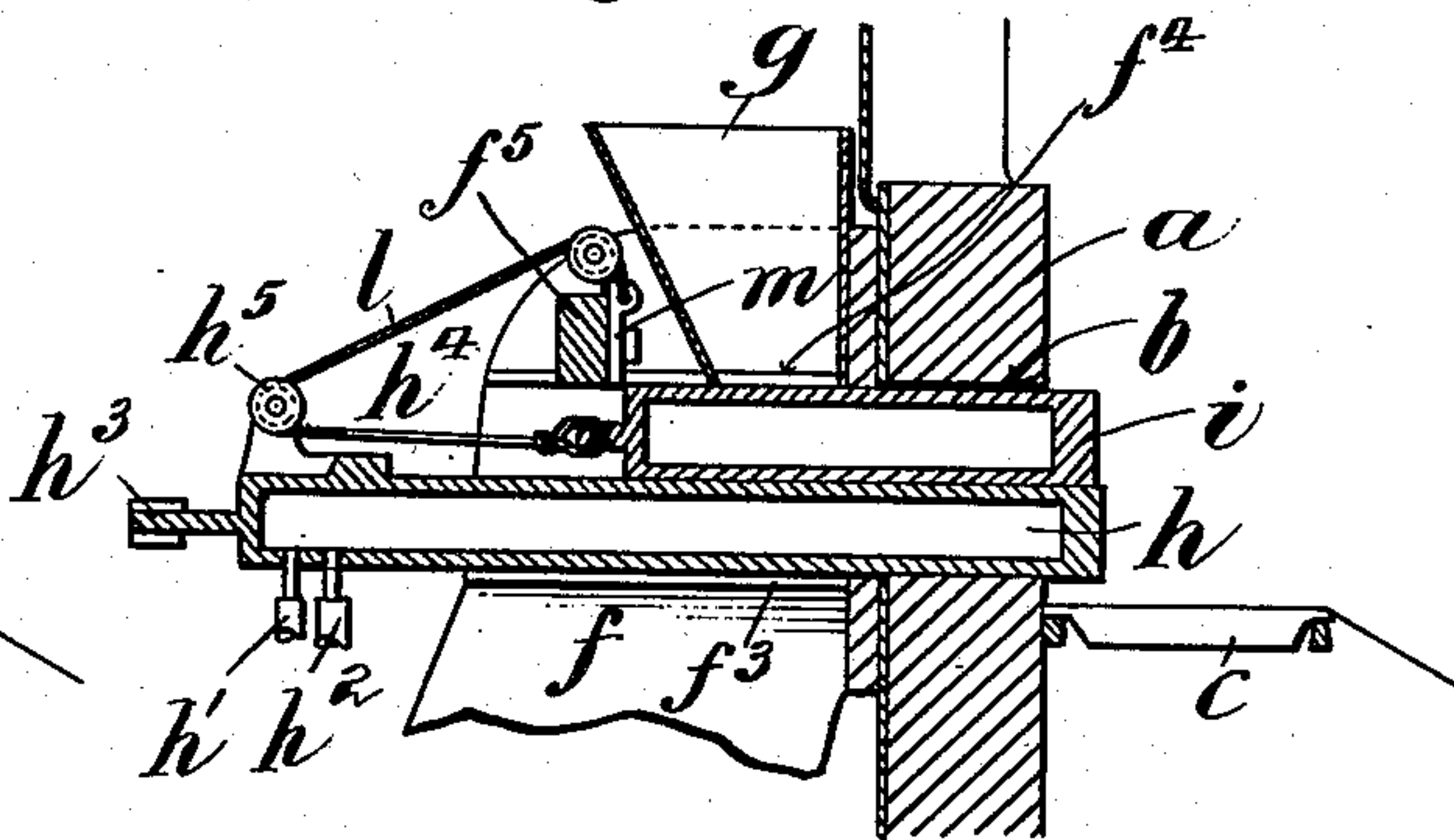


Fig. 4.



Attest:

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UNITED STATES PATENT OFFICE.

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MECHANISM FOR FEEDING FURNACES.

No. 900,390.

Specification of Letters Patent.

Patented Oct. 6, 1908.

Application filed November 1, 1907. Serial No. 400,302.

To all whom it may concern:

Be it known that I, FRANK KINGSLEY, a British subject, residing in the borough of Manhattan, of the city of New York, in the State of New York, have invented certain new and useful Improvements in Mechanism for Feeding Furnaces, of which the following is a specification, reference being had to the accompanying drawings, forming a part hereof.

This invention relates to so called mechanical stokers or mechanism for feeding fuel to furnaces for steam boilers and other purposes, and it is the object of the invention to provide simple and efficient mechanism which shall have certain advantages over other mechanism heretofore used for the purpose and shall overcome certain of the difficulties incident to the use of such mechanism.

One object of the invention is to enable the pusher, by which the fuel may be forced into the fire box, to act also as a coke breaker, to break up the coke already formed on the surface of the fuel in the fire box.

Another object is to enable the pusher to spread the fuel after it has been introduced into the fire box and after the volatile gases have been distilled from it.

Still another object is to enable the mechanism first to displace a portion of the fuel already introduced into the fire box near the fire door and then to deposit a fresh charge in the place thereof, thereby causing the smoky gases from the fresh fuel in the front of the fire to pass over an area of hot coke in the back of the fire before leaving the furnace, and still other objects are to effectively prevent the admission of cold air through the fire door during the operation of the fuel feeding mechanism, and generally to improve the construction and operation of mechanism of the character referred to.

The invention will be more fully described hereinafter with reference to the accompanying drawings, in which for purposes of illustration and explanation of the nature of the invention, it is shown as embodied in a convenient and practical form, and in which—

Figure 1 is a plan view of the improved mechanism applied to a furnace of ordinary construction, the walls of the latter and the fuel hopper being shown in horizontal section. Fig. 2 is a view in vertical section on the plane indicated by the line 2—2 of Fig. 1. Figs. 3 and 4 are partial views, similar to

Fig. 2, showing the parts in different positions.

The improved mechanism may be applied to any ordinary furnace. As shown in the drawings, the furnace is represented as of usual construction, provided in its front wall *a* with an opening such as a fire door opening *b* and provided interiorly with a grate which is preferably arranged as indicated in Fig. 2, comprising a horizontal section *c* immediately within the fire door, an inclined section *d*, and, if desired, a dumping section *e*.

For convenience the fuel feeding mechanism may be supported by a movable frame *f* which may be mounted upon wheels *f'* and *f''*, the latter being swiveled. If the fuel feeding mechanism is thus supported it can be readily moved away from the furnace door to give access to the furnace for any purpose, and as readily returned.

In the upper portion of the frame is mounted a suitable hopper *g* to which the fuel may be supplied in any suitable manner, and below the hopper are two pushers *h* and *i*, the pusher *h* being conveniently supported upon the flanges *f'* of the frame *f*, while the pusher *i* may, if desired, be supported directly upon the pusher *h* and may be held down, if necessary, by flanges *f''* of the frame *f*. The pusher *h* is supported at such a height that it may enter the fire box and may be of any suitable construction. As indicated in the drawings, for example, it may be a simple casting, cored for the sake of lightness, and preferably having its forward end somewhat tapered or plow shaped to facilitate the spreading of the fuel. It is of such length and is given such range of reciprocating motion that it not only pushes the fuel in front of it through the fire door into the furnace, but enters the furnace itself, over the horizontal grate *c* and operates both to break up the coke, which forms on the surface of the fuel over the horizontal grate, and to spread the fuel both sidewise and forward upon the inclined portion *d* of the grate, down which the fuel will gradually move as it is consumed and as it is urged forward by the addition, from time to time, of fresh fuel behind it. If desired, the pusher *h* might be provided for connection, as at *h'*, *h''*, with water circulating pipes, so that the pusher may be kept cool and prevented from burning out.

The pusher *h* may be reciprocated by hand or by any other suitable means. As shown

in the drawings, two steam cylinders k , k , mounted on the frame f and provided with suitable steam controlling valves, have their piston rods k' , k' connected to a yoke h^3 secured to the pusher h .

The pusher i , which is shown as supported directly on the pusher h and is also represented as a cored casting, which might be provided with water circulating connections, is somewhat shorter than the pusher h , having as its functions to permit the discharge from the hopper upon the upper surface of the pusher h of a measured quantity of fuel, then to assist in carrying forward such measured quantity of fuel into the fire box, and finally effecting the removal of the fuel from the upper surface of the pusher h and the deposit thereof in the place of the fuel which has been displaced by the pusher h . The two pushers, as will be observed, preferably fill the fire door opening b when they are in their forward position.

The proper relative movements of the pusher i , with respect to the pusher h , are conveniently and preferably effected by the movements of the pusher h . For this purpose the pusher h is provided with a stop or projection h^4 by which the pusher i is thrust forward with the pusher h , and is also provided with a guide pulley h^5 over which passes a chain or flexible cable l which is connected at one end to the rear end of the pusher i and at the other end to the frame f , preferably through the intermediary of a latch m . The latter may be carried by a cross bar f^5 of the frame f and is arranged to move into the path of some portion of the pusher i , when it has been carried to its extreme forward position by the pusher h , so as to retain the pusher i in such extreme forward position during the first portion of the rearward movement of the pusher h , for the purpose of effecting the discharge of the fuel from the top of the pusher h . The latch is conveniently operated by the chain or cable l , when the slack is taken out of such chain or cable by the rearward movement of the pusher h , and therefore acts as an anchor for the end of such chain or cable, so that as the rearward movement of the pusher h is continued, the guide wheel or pulley h^5 moving with the pusher h causes the pusher i to move rearwardly upon the pusher h at twice the speed thereof until both reach their rearmost positions, as shown in Fig. 2.

The operation of the improved fuel feeding mechanism will now be readily understood. When the parts are in the positions shown in Figs. 1 and 2 the fuel falls from the hopper g upon the forward portion of the pusher h , which is then uncovered by the pusher i . As the forward movement of the pusher h begins, it carries with it the pusher i and the fuel which has been deposited upon the forward portion of the pusher h is carried through the fire door opening b . In the forward move-

ment of the pusher i , over the horizontal portion c of the grate, since the pusher is below the normal level of the fire surface, it breaks up the coke which has formed on the portion of the fire supported by the horizontal grate and pushes the fuel both forward and to each side upon the inclined portion d of the grate, which movement of the fuel on the horizontal portion of the grate induces a gradual forward movement of the fuel on the inclined portion of the grate. As the two pushers reach the limit of their forward movement the latch m drops behind the pusher i and holds the same in its forward position while the pusher h makes the first portion of its rearward movement, so that the fuel which was supported by the pusher h when the two pushers were in their forward positions, as shown in Fig. 3, is pushed or scraped off from the pusher h by the movement thereof relative to the then stationary pusher i and the fresh fuel carried in by the pusher h is deposited over the horizontal portion c of the grate in the place of the fuel which was displaced by the extreme forward movement of the pusher h . As soon as the pusher h reaches approximately the position indicated in Fig. 4, the slack of the chain or cable l is taken up by the pulley h^5 . The first effect is to withdraw the latch m so as to release the pusher i and, as the latch, after withdrawal, acts as an anchor for the end of the chain or cable, the continued rearward movement of the pulley h^5 with the pusher h causes the pusher i to be drawn rearwardly upon the pusher h , at twice the speed of the pusher h , until both pushers reach their extreme rearward positions, as shown in Fig. 2, and a fresh charge of fuel is deposited from the hopper upon the exposed forward portion of the pusher h as before.

It will be understood that any usual or suitable means, whether manual or otherwise, for reciprocating the pusher h , may be employed, and that various changes in details of construction and arrangement of the improved mechanism may be made to suit different conditions and different requirements without departing from the spirit of the invention.

I claim as my invention:

1. The combination with a furnace having a fire door of a hopper a reciprocating pusher below the hopper and adapted to receive a charge of fresh fuel upon its upper surface, means to project the pusher through the fire door opening into the furnace to carry with it the charge of fresh fuel, and a second reciprocating pusher overlying the first pusher to discharge the fresh fuel from the first pusher into the furnace.

2. The combination with a furnace having a fire door of a reciprocating pusher arranged to receive a charge of fresh fuel, means to project the pusher through the fire door opening

into the furnace with its charge of fuel, a second pusher overlying the first, means to reciprocate the same, and means to hold the second pusher stationary during the first 5 part of the rearward movement of the first named pusher whereby the fuel carried by the first named pusher is discharged within the furnace.

3. A fuel feeding mechanism comprising a 10 supporting frame, a hopper, a pusher mounted on the frame below the hopper and arranged to receive a charge of fresh fuel on its upper surface and carry the same into the furnace, and a second reciprocating pusher overlying 15 the first and adapted to discharge the fresh fuel from the first pusher into the furnace.

4. A fuel feeding mechanism comprising a supporting frame, a reciprocating pusher mounted thereon and adapted to carry a 20 fresh charge of fuel into the furnace, a second reciprocating pusher overlying the first, and means to hold the second pusher stationary during the withdrawal of the first pusher to effect the discharge of the fuel therefrom 25 within the furnace.

5. A fuel feeding mechanism comprising a supporting frame, a reciprocating pusher mounted thereon, a second reciprocating pusher mounted thereon and overlying the 30 first pusher, a flexible connection secured at one end of the frame and at the other end to the second pusher, and a guide pulley therefor carried by the first pusher, whereby the second pusher is withdrawn by the rearward 35 movement of the first pusher and at a greater speed.

6. A fuel feeding mechanism comprising

a supporting frame, a reciprocating pusher mounted thereon, a second reciprocating pusher also mounted thereon and overlying 40 the first pusher, a projection on the first pusher to carry forward the second pusher, and a flexible connection secured at one end to the frame and at the other end to the second pusher and passing over a guide pulley 45 on the first pusher to effect the withdrawal of the second pusher during the withdrawal of the first pusher.

7. A fuel feeding mechanism comprising a supporting frame, a reciprocating pusher 50 mounted thereon, a second pusher also mounted thereon and overlying the first, a projection on the first pusher to carry the second pusher forward, a latch carried by the frame to retain the second pusher in its 55 forward position during the first part of the rearward movement of the first pusher, and a flexible connection secured to the latch at one end and at the other end to the second pusher and passing over a guide pulley car- 60 ried by the first pusher whereby the second pusher is carried forward into the furnace with the first pusher, is held temporarily during the first of the rearward movement of the first pusher, and is then withdrawn 65 during the continued rearward movement of the first pusher.

This specification signed and witnessed this 31st day of October, A. D., 1907.

FRANK KINGSLEY.

Signed in the presence of:

W. B. GREELEY,
ELLIS J. KRUGER.