Jan. 7, 1930. F. W. LINAKER ET AL 1,742,361

MEANS FOR OPERATING BOILER SOOT CLEANERS

Filed March 31, 1926 2 Sheets-Sheet 1

Fig. 1.

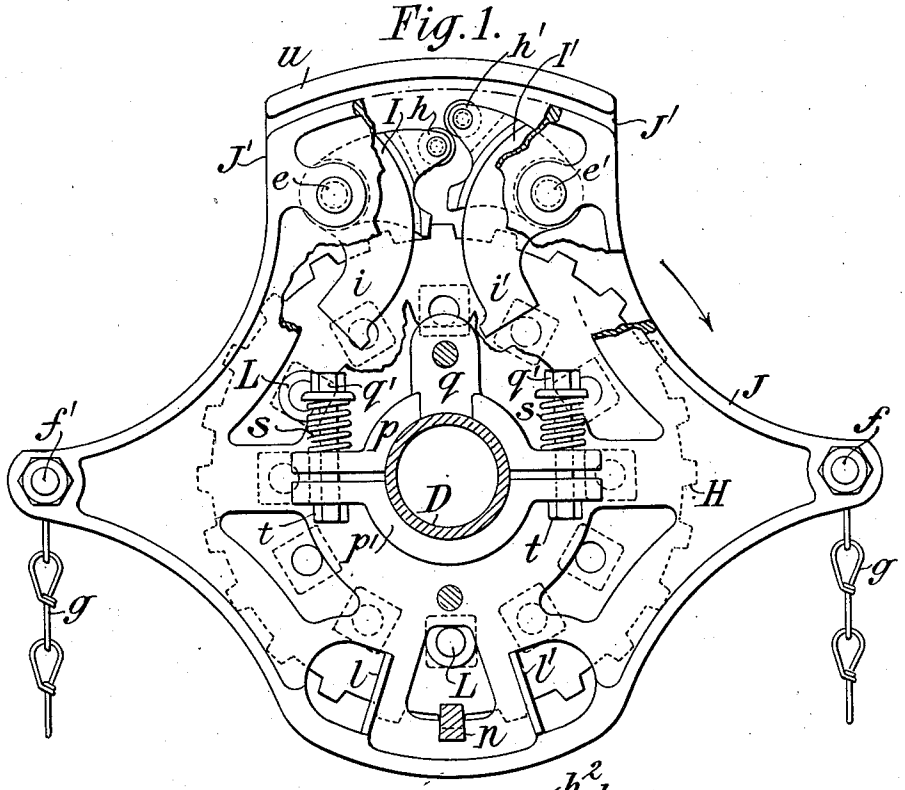
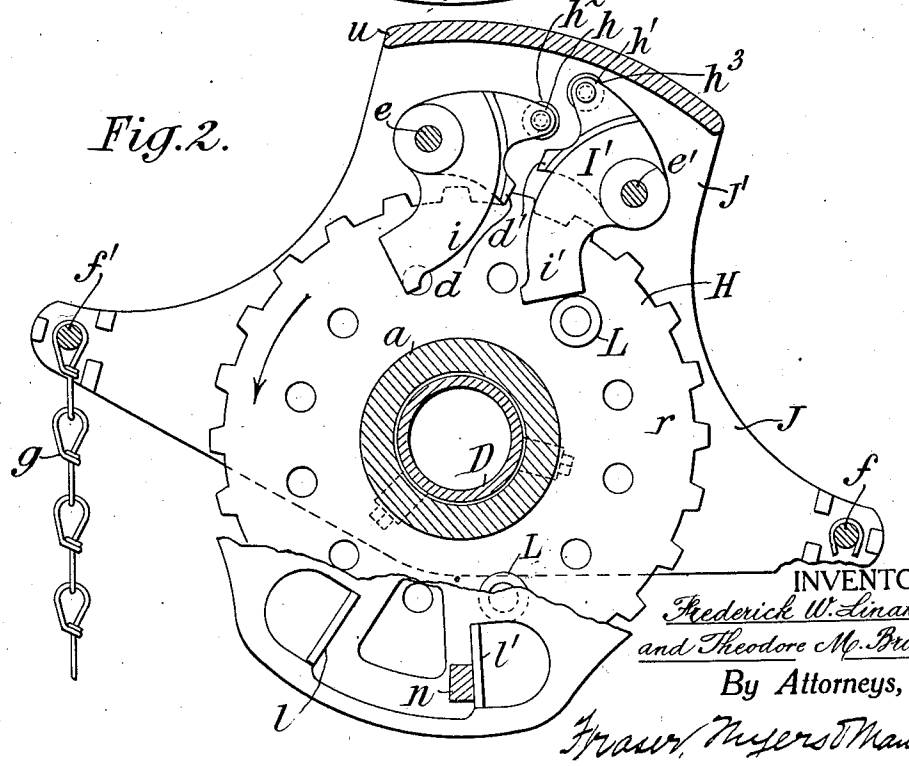


Fig. 2.



INVENTOR :
Frederick W. Linaker
and Theodore M. Bruback,
By Attorneys,
Fraser, Myers & Manley

Jan. 7, 1930. F. W. LINAKER ET AL 1,742,361

MEANS FOR OPERATING BOILER SOOT CLEANERS

Filed March 31, 1926 2 Sheets-Sheet 2

Fig. 3.

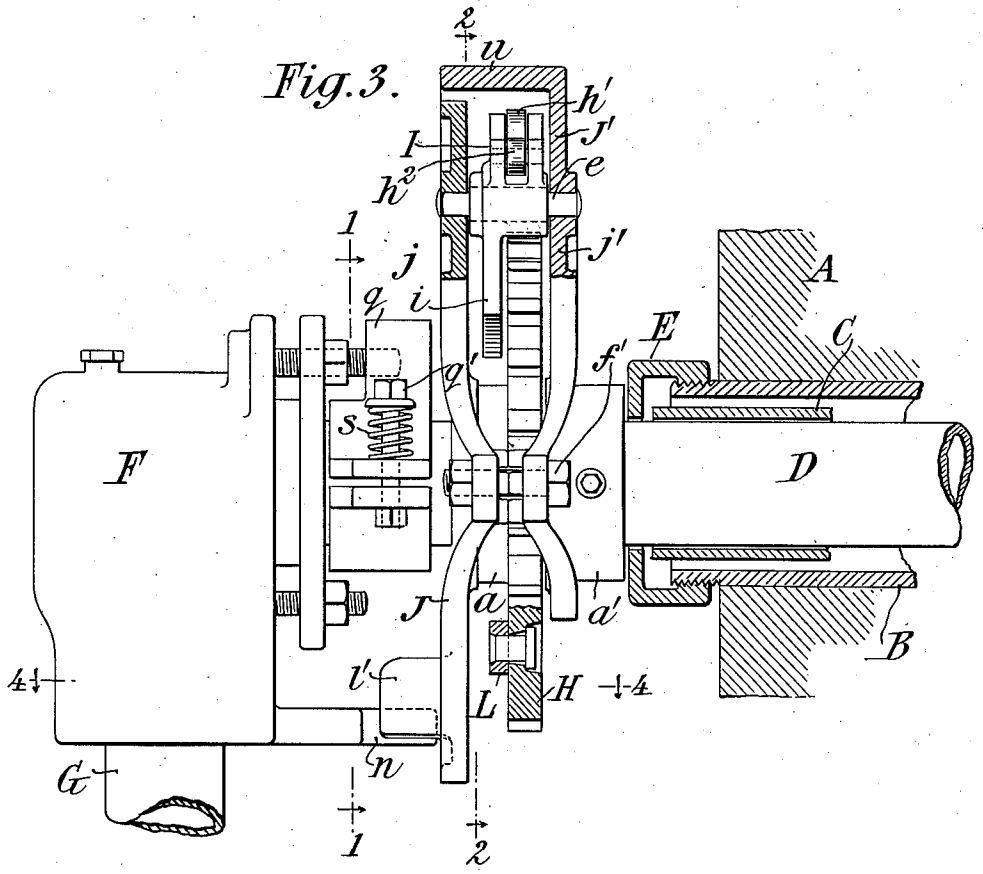
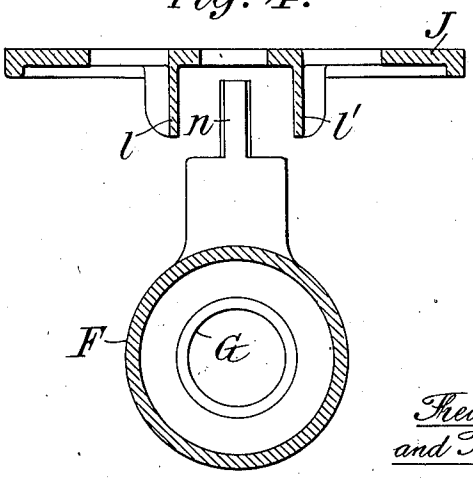


Fig. 4.



INVENTORS:
Frederick W. Linaker
and Theodore M. Bruback,
By Attorneys,
Fraser, Myers & Manley

Patented Jan. 7, 1930

1,742,361

UNITED STATES PATENT OFFICE

FREDERICK W. LINAKER AND THEODORE M. BRUBACK, OF DU BOIS, PENNSYLVANIA

MEANS FOR OPERATING BOILER SOOT CLEANERS

Application filed March 31, 1926. Serial No. 98,680.

This invention relates to means for cleaning soot from water tubes or flues of boilers by directing against the surface to be cleaned a jet or jets of steam or other suitable fluid. In such apparatus it is common practice to provide a tube entering through the boiler setting into the boiler furnace, and having perforations or jet nozzles for directing jets of steam laterally of such tube or more commonly against the exterior of boiler tubes. Such steam jet tubes or pipes are commonly called soot cleaner elements or soot blowers.

The present invention is directed to that type of soot cleaners in which the soot cleaner elements are oscillated through a given arc, the extent of which is determined with reference to the particular boiler to which the apparatus is applied. In this type of apparatus the steam is preferably continuously emitted from the cleaner element while the latter is slowly moved with preferably intermittent motion throughout the described arc, the cleaner element then being reversed in its direction and intermittently returned to its original position, the oscillation being maintained until the desired cleaning action has been effected. In a prior Patent No. 1,590,300, granted to us June 29, 1926, we have described a mechanism for accomplishing the oscillation of the cleaner element, such mechanism being manually operated, and being provided with means for automatically reversing the direction of oscillation when it has traversed the predetermined arc, thus requiring only that the user shall continuously actuate the device without reference to the position or extent of movement of the cleaner element. According to the present invention we provide an improved means for reversing the direction of movement of the cleaner element. Such improvements comprise briefly a simplification of the mechanism, a more compact and better protected arrangement for the working parts, and a more efficient and easily operated means for effecting the reversing action of the mechanism. The present invention also provides other features of improvement which will be hereinafter referred to.

Referring to the drawings, which illustrate one embodiment of the invention,—

Figure 1 is a view, partly in elevation and partly in section, taken generally on the line 1—1 in Fig. 3.

Fig. 2 is a sectional view, taken on the line 2—2 in Fig. 3.

Fig. 3 is a view, partly in elevation and partly in diametrical section.

Fig. 4 is a section of a detail on line 4—4 in Fig. 3.

Referring first to Fig. 3, A shows a fraction of the boiler wall or setting, usually of masonry, in which is set a sleeve or bushing B, and within this is a stop pipe or spacer sleeve C and a pipe D, which for the purpose of the present description may be treated as the cleaner element (although in practice the pipe D is a nipple coupled within the wall A to the cleaner element). The cleaner element is essentially a pipe for carrying steam or other fluid extending a suitable distance into the boiler furnace and commonly projecting among the boiler tubes and having a row or rows of perforations or jet nozzles for directing a series of jets of steam (or other fluid) against the soot-covered surfaces of the boiler tubes. The cleaner element is mounted to turn or rotate, either completely or within angular limits. The details of this construction, being well understood, are not shown. Where the bushing B emerges on the outer side of the wall A cap E is commonly applied to hold the pipes C D in place and in central rotative position. The pipe D projects outside of the wall and enters through a stuffing box or other means into the connection head F which receives steam through an inlet pipe G and directs it into the pipe D, the latter being rotated within its stuffing box on the head F. These parts, so far as described, are common with rotatable cleaner elements.

In our patent hereinbefore referred to we have illustrated a ratchet wheel H which is provided with hubs *a a'*, one or both of which is fastened by means of set screws to the pipe D. The purpose of this wheel is to rotate the cleaner element D by means of a pawl which is actuated by a rock lever J. In the prior construction this pawl is carried by the rock lever J and advances the ratchet wheel

H preferably a distance corresponding to one tooth on each complete oscillation of the rock lever, the idle stroke of the rock lever being utilized to advance the pawl to the next tooth. When the wheel H of this cleaner element has been rotated in one direction a sufficient distance the pawl is automatically reversed, so that by a continued rocking of the lever, motion in a reverse direction is imparted to the ratchet wheel. The limits of the oscillating movement of the ratchet wheel and cleaner element are in the construction of said application determined by the position on the ratchet wheel of two stops which operate to trip the pawl. These stops are adjustable on the wheel so that the extent of oscillation may correspond to the required surfaces designed to be cleaned. When the reversing mechanism is to be used at a distance above the boiler room floor which permits it the rock lever J may be operated directly by the hand of the user; otherwise it is provided with operating chains or the like *g g*.

One of the objects of the present invention is to provide a pawl mechanism which is more simple in construction than that set forth in our prior application and one in which there is little or no tendency to turn the ratchet wheel in a reverse direction during the operation of reversing the pawl mechanism.

In carrying this object of our invention into effect we prefer to form an extension J′ on the upper side of the rock lever and to utilize this extension as a supporting member for the pawl mechanism. Preferably the rock lever is formed in two halves, one of which *j* is pivoted on the hub *a* and the other of which *j′* is similarly mounted on the hub *a′*. The bolts *f f′* maintain the two halves in alinement and form convenient means for attaching the chains *g*. When this construction is adopted, the extension J′ is formed on both plates of the rock lever and serves to support the pivot or pivots of the pawl mechanism.

The preferred form of pawl mechanism which we have shown particularly in Figs. 1 and 2, comprises two distinct pawls, one of which is adapted to turn the ratchet wheel H in one direction and the other of which serves to turn it in the reverse direction. Means are provided by which when one pawl is in operative position, the other will be held in inoperative position, this relation being maintained until the required reversing action is to take place. Preferably we so construct the pawls that each when in its operative position holds the other in its inoperative position. The particular form of pawl which we prefer comprises a pivoted member I or I′ adapted to oscillate freely on a stud *e* or *e′*, each of the pawls having an operative nose *d* or *d′*, which engages the teeth of the ratchet wheel as the rock arm is oscillated. At each effective movement of the rock arm the ratchet wheel is avdanced a distance corresponding to one tooth, the arm being restricted in its movement by a stop *n* mounted upon the header F which enters between abutments *l l′* carried by the rock arm. On the reverse or idle stroke of the rock arm the nose of the active pawl slips idly over the next succeeding tooth and takes its position behind it, the extent of the idle movement being determined by one of the abutments *l l′* coming in contact with the stop *n*.

By the construction thus described a repeated operation of the rock arm would result in a continuous motion of the ratchet wheel in one direction or the other, depending upon which of the pawls I or I′ was in operation. To limit the rotative movement of the wheel to a predetermined arc the wheel is provided with reversing stops L L which may be fitted in any of the holes or recesses *r* with which the wheel is provided. Each of these reversing stops is brought by the rotation of the wheel in position where it will engage one of the pawls I I′ during the return or idle stroke of the rock arm J. For this purpose each of the pawls is provided with a projection *i* (or *i′*) lying below its pivotal axis which projection engages the reverse stop L L, thereby lifting the nose of the pawl out of contact with the tooth with which it is engaged. Simultaneously the opposite pawl which has been held out of contact with the wheel is dropped so that its nose engages one of the teeth of the wheel on the opposite side, so that continued rocking movement of the arm J forces the wheel to intermittently move in a reverse direction until the second pawl is itself moved out of operative position and the first pawl restored to such position. The invention hence includes means for normally holding one pawl inoperative while the other is operative, and vice versa. Preferably such means comprise the pawls themselves which according to the preferred form of the present invention are so constructed as to mutually act as detents, one for the other. For this purpose each pawl is provided with a projection *h* or *h′* located above the pivotal axes of the pawls, the construction being such that when the projection *h′*, for instance, lies beneath the projection *h*, the nose *d* of the pawl I will be held out of engagement with the ratchet wheel and when the projection *i′* of the pawl I′ engages the reverse stop L and is lifted thereby, the projection *h′* is moved upward until it releases the projection *h*, thus permitting the pawl I to drop until its nose *d* engages the ratchet wheel. In Fig. 2 of the drawing the pawl I′ is shown in position where it has been engaged by the reverse stop L, and has been moved upward to release the pawl I, the latter being shown as having dropped to operative position ready to turn the ratchet wheel upon the next up-

ward movement of the left-hand end of the rock arm J. In order to minimize any friction between the respective projections h and h', these are preferably provided with rollers h^2 h^3.

By this construction it will be seen that the force required to lift each pawl out of its operative position is trifling, it being remembered that the tripping of the pawls occurs on the idle stroke of the rock arm J. It will be understood that the direction in which the rock arm J moves during such idle stroke depends upon the direction in which the ratchet wheel is being rotated, or in other words, upon which of the pawls is in operation. Thus in the construction shown the idle stroke will occur on the downward movement of that end of the rock arm J which is nearest the pawl which is in operation.

It will be observed that the operation of the reversing pawls being effected by a stop on the ratchet wheel would cause a reaction on the latter which should be equal to the force required to trip the pawl. If this force were substantial, it would tend to move the ratchet wheel and cleaner element backwardly. By making the force necessary to trip the pawl very slight, even a light cleaner element which has but little inertia has no material tendency to move during the tripping action.

We have found it desirable, however, to control the forward movement of the ratchet wheel under the action of the pawl, so that the cleaner element does not tend to move by its own inertia beyond the point to which it is moved by the pawl. We prefer to accomplish this by means of a friction device which normally bears against the pipe D, although it may engage any other of the parts which oscillate in connection therewith, if desired. The preferred form, as shown, comprises two yokes or brake bands p p', one of which p has an extension q bolted to some fixed part, as for instance, the header F. Adjusting screws q' are provided for forcing the brake bands into engagement with the pipe D, and in order to avoid binding and permit some flexibility in the device springs s s are arranged between the heads of the adjusting screws and one of the brake bands as p. In this construction the upper band p (and the lower band also if desired) is provided with bolt holes which are of larger diameter than the screws, so that the bands may adjust themselves to the surface of the pipe. Nuts t t are provided at the lower end of the adjusting screws. The brake bands are adjusted to introduce sufficient friction to prevent the cleaner element from moving by inertia beyond the point to which it is carried by the pawls, thus limiting the arc through which the cleaner elements oscillate to that to which they are mechanically moved by the operation of the rock arm. The friction device also holds the cleaner element against any possible movement in the opposite direction due to the reaction against it during the change of pawls, although as before stated this reaction is so minimized by the present invention as to seldom require any control.

We prefer to provide a cover or shield u which extends over the pawl mechanism and protects it to a considerable extent from dust and injury, etc. This may be conveniently done by making the shield u as a part of one of the plates j of the rock arm J.

By the present invention a reversing mechanism for the purpose described is obtained which is simple to manufacture, in which the mechanism is entirely enclosed or protected, and in which each resetting of the reverse mechanism takes place with the exertion of little power. Various changes may be made in the mechanism shown and described without departing from the invention.

What we claim is:

1. In a soot cleaner, a turning means for a cleaner element comprising a ratchet wheel connected thereto, a lever, and a pawl carried by said lever for intermittently rotating said ratchet wheel, said pawl having an inoperative and an operative position, and means carried by said wheel for moving said pawl to its inoperative position, means for holding the pawl in such position, and means for releasing the pawl from said inoperative position, said pawl being adapted to thereupon be restored by gravity to its operative position.

2. In a soot cleaner, a reversible driving means for a cleaner element, comprising a ratchet wheel connected with the cleaner element, a rock lever, and a pair of separate pawls carried by said rock lever for moving said ratchet wheel in opposite directions, and means for controlling the operation of said pawls, whereby when one is brought into operative position the other is brought into inoperative position.

3. The mechanism of claim 2, further characterized in that the operative pawl maintains the inoperative pawl in inactive position.

4. The mechanism of claim 2, further characterized in that the means for controlling the operation of the pawls is carried by the ratchet wheel.

5. The mechanism of claim 2, further characterized in that the pawls face each other and have inter-engaging projections, the projection on the pawl which is operative holding the other pawl inactive by maintaining its projection in a raised position.

6. The mechanism of claim 2, further characterized in that the pawls face each

other and have inter-engaging projections, the projection on the pawl which is operative holding the other pawl inactive by maintaining its projection in a raised position, said projections have anti-friction rollers adapted to cause said projections to easily pass each other.

7. The mechanism of claim 2, further characterized in that the pawls are so related to each other that the weight of the inoperative pawl assists in holding the operative pawl in active position.

8. The mechanism of claim 2, further characterized in that the pawls face each other and each of the pawls is provided with two projections, the outer projections co-operating so that the operative pawl holds the inoperative pawl in inactive position and the inner projections lie adjacent to the ratchet wheel and the ratchet wheel having abutments to engage the said inner projections to move the pawls to inactive positions.

9. In a soot cleaner, a turning means for a cleaner element adapted to move the latter intermittently, and a constantly acting friction device for preventing undue movements of said cleaner element.

10. The construction of claim 9, further characterized in that the friction device is connected to a fixed part and engages frictionally a part turning with the cleaner element and has spring adjustment means for controlling the degree of friction exerted against said cleaner element.

11. In a soot cleaner, a cleaner element and an intermittent means for turning it, comprising a ratchet wheel connected to the element, a rock lever having arms extending on each side of the ratchet wheel and adapted to be oscillated to move the ratchet wheel in either direction, said rock lever being formed with an upper extension lying beyond the ratchet wheel, pawl mechanism carried by such extension, and a cover horizontally arranged as a part of the rock lever which overhangs said pawls.

In witness whereof, we have hereunto signed our names.

FREDERICK W. LINAKER.
THEODORE M. BRUBACK.