J. W. SEAVER.

OPERATING MECHANISM FOR FURNACE VALVES.

APPLICATION FILED OCT. 17, 1907.

928,403. Patented July 20, 1909.

3 SHEETS—SHEET 1.

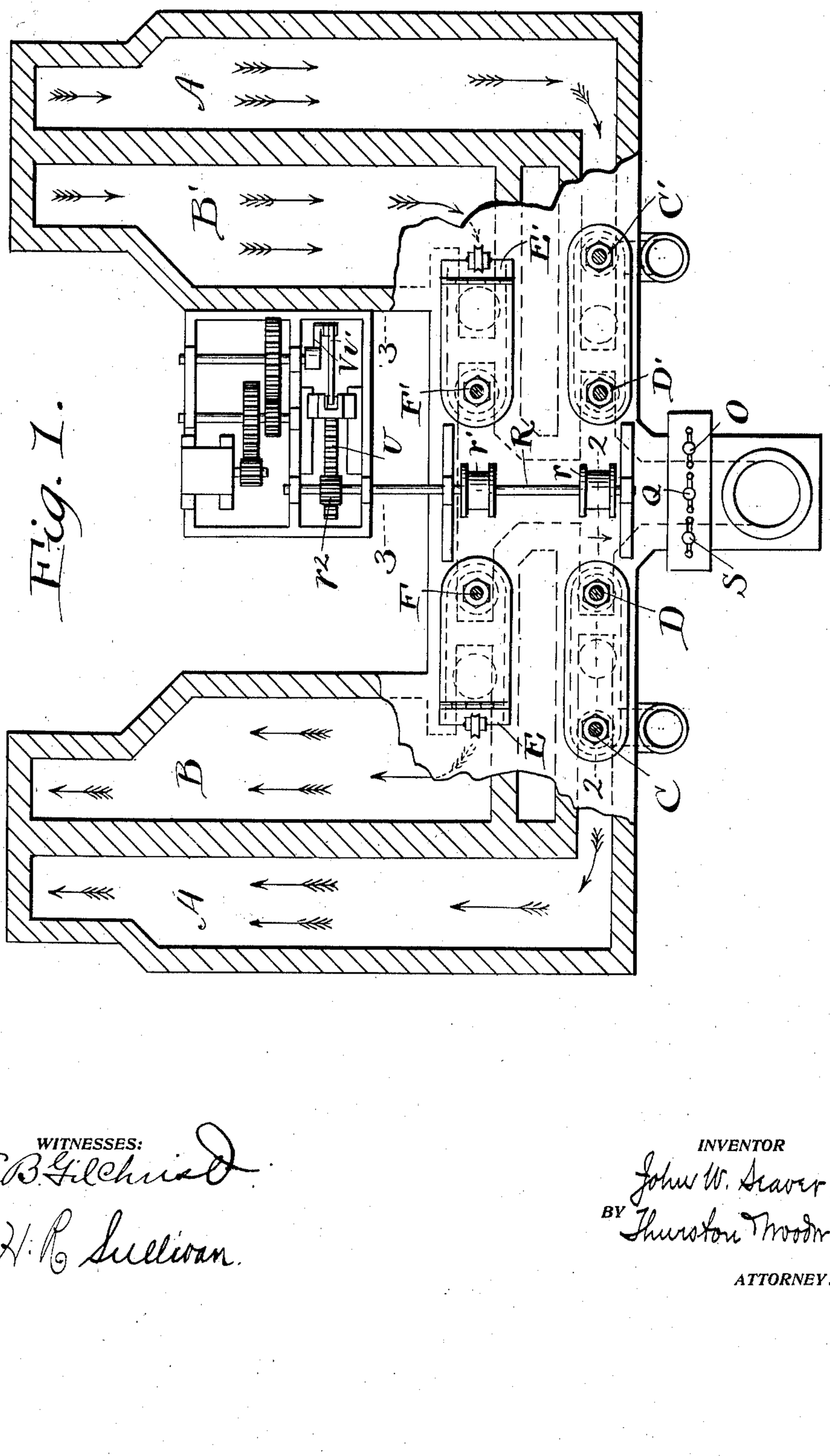

Fig. 1.

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3 SHEETS—SHEET 2.

Fig. 2.

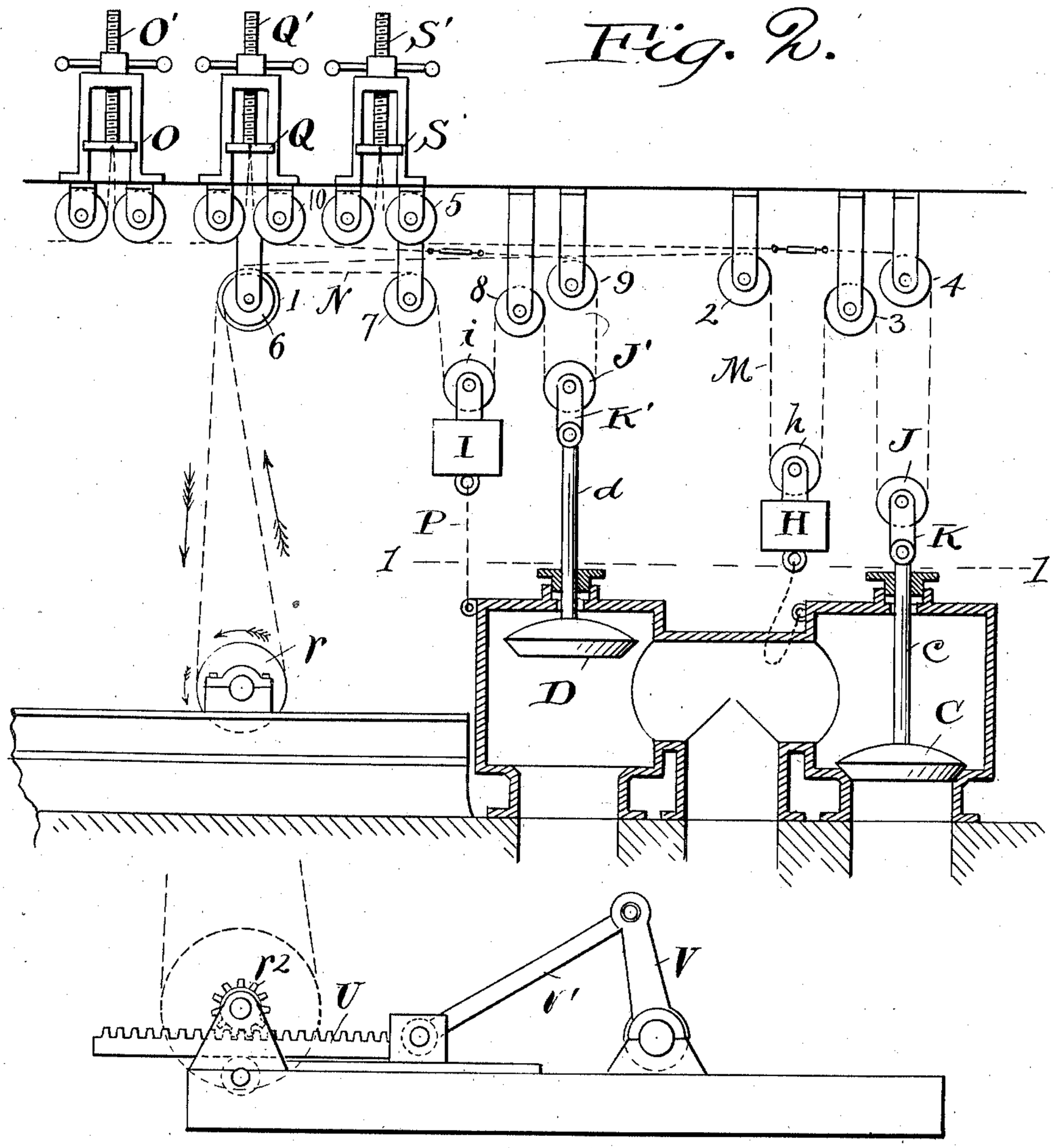

Fig. 3.

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3 SHEETS—SHEET 3.

Fig. 4.

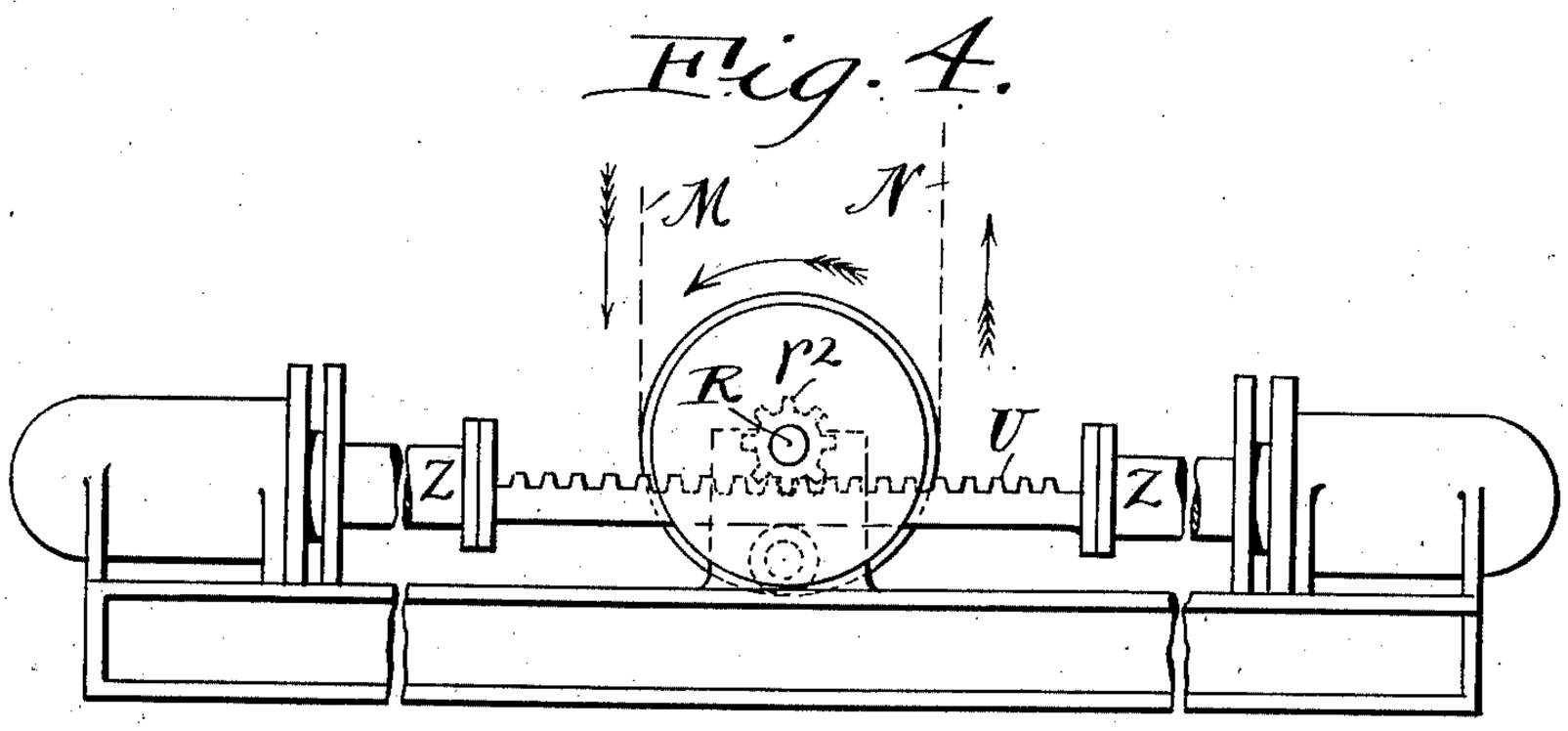
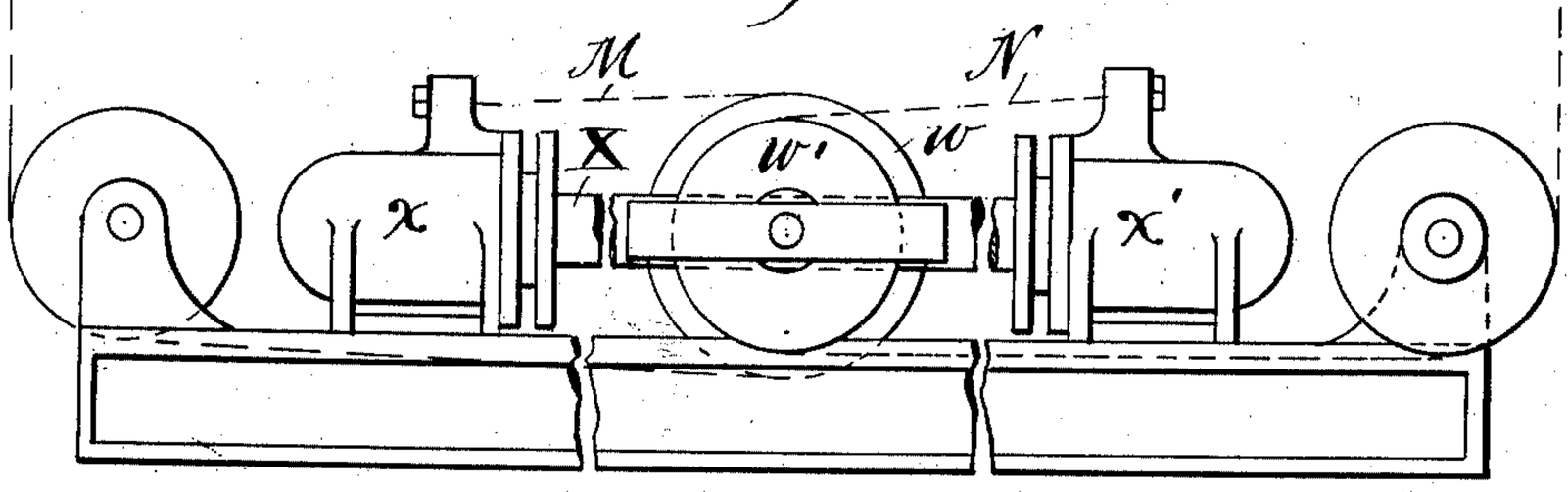


Fig. 5.



WITNESSES:

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UNITED STATES PATENT OFFICE.

JOHN W. SEAVER, OF CLEVELAND HEIGHTS, OHIO, ASSIGNOR OF ONE-HALF TO THE GARRETT-CROMWELL ENGINEERING COMPANY, A CORPORATION OF OHIO.

OPERATING MECHANISM FOR FURNACE-VALVES.

No. 928,403. Specification of Letters Patent. Patented July 20, 1909.

Application filed October 17, 1907. Serial No. 397,824.

To all whom it may concern:

Be it known that I, JOHN W. SEAVER, a citizen of the United States, residing at Cleveland Heights, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Operating Mechanism for Furnace-Valves, of which the following is a full, clear, and exact description.

This invention is especially adapted for use in operating the reversing valves of regenerative gas furnaces, and is shown in the drawings arranged for this purpose.

The object of the invention, as an entirety, is to permit one motor running continuously in one direction to properly operate all of the valves in proper sequence, and in such manner that, without any attention from an operator, the valves, after they have moved a definite and safe distance in either direction, will reverse their direction of movement.

Another object of the invention is to provide efficient means for operating each pair of reversing valves so that the closed valve will not be moved from its seat until the open valve has been seated.

The invention also provides cheap and efficient mechanism for properly controlling valves of the sort specified.

In the drawing, Figure 1 is a sectional plan view of a regenerator gas furnace equipped with the present invention in a satisfactory form,—said view being taken in a plane indicated by line 1—1 on Fig. 2. Fig. 2 is a vertical sectional view in the plane indicated by line 2—2 of Fig. 1. Fig. 3 is a sectional view in the plane indicated by line 3—3 on Fig. 1, showing particularly the mechanism for reversing the direction of rotation of the drum carrying shaft. Fig. 4 is a view of another form of mechanism which may be substituted for that shown in Fig. 3. Fig. 5 is a view of another form of mechanism which may be substituted for the mechanism shown in the other figures for taking in and paying out the valve operating cables.

Referring to the parts by letters A A′ represent the two gas regenerators, and B, B′ represent the two air regenerators of an ordinary regenerative gas furnace. The two gas valves are indicated by C, C′; and the chimney valves for the gas regenerators are indicated by D, D′. The air valves for the two air regenerators are indicated by E, E′, and the two chimney valves for the air regenerators are indicated by F, F′. These valves which may be of any suitable form are exemplified in Fig. 2, which shows the gas valve C and the associated chimney valve D of the gas regenerator A. Each valve, as shown, is a heavy conical valve of conventional puppet form, and each, when of this form, has an upwardly extended stem, exemplified by the stems *c* and *d* in Fig. 2. Sheaves J, J′ are respectively mounted in the yokes K, K′, which are pivotally connected with the upper ends of these valve stems.

A weight is associated with each valve, which weight is not as heavy as the valve. As shown in Fig. 2, the weight H is associated with valve C, and the weight I is associated with valve D; and these weights are respectively suspended from sheaves *h* and *i*. Means are provided for limiting the upward movement of each weight, the means shown being a cable P of the required length, which is secured to the under side of each weight at one end and to a fixed point at its other end.

A drum *r* is attached to a rotatable shaft R. Two cables M and N are wound in opposite directions upon this drum. The cable M goes from the drum over suitable guide sheaves, illustrated by sheaves 1, 2, 3 and 4, being looped down between sheaves 2 and 3 and between sheaves 3 and 4. In one loop the sheave *h* of the weight H is hung and in the other loop the sheave J of the valve C is hung. One end of the cable M is anchored. Preferably it goes under a sheave 5, and is connected with a block S, which is vertically adjustable by means of a screw S′. This anchor connection permits the effective length of the cable to be readily adjusted so that it will operate in the required manner.

Cable N goes over the guide sheaves, illustrated by sheaves 6, 7, 8 and 9,—being looped down between sheaves 7 and 8 and between sheaves 8 and 9. In one of these loops the sheaves *i* of the weight I is hung, and in the other loop the sheave J′ of the valve D is hung. The cable N preferably goes under a sheave 10, and is anchored to a block Q which is vertically adjustable by a screw Q′.

There is another adjustable anchor block O and its adjusting screw O′ shown, besides

those which have been mentioned. In practice, one anchor block as Q will serve for the cables of all of the gas valves. Another anchor block, as S, will serve for all of the cables of the chimney valves; and the third anchor block, as O, will serve for the cables of all of the air valves. With the several cables connected as described with these three anchor blocks, it will be easy to adjust the valves to the various conditions of use, viz., variation in atmospheric conditions, and richness of gas, etc. It will be understood that these adjusting devices may be located at any convenient point,—because the cables may be made of any required length and may be guided by suitable sheaves.

To operate the valves the drum r is turned so as to take in the cable associated with the closed valve, and to equally pay out the other cable. As one cable (M, for example) is taken in, the first effect is to lift the weight H, because the weight is lighter than the associated valve C. At the same time, the cable N is being paid out and this permits valve D to close, which it does because it is heavier than the associated weight I. The weight H goes up until its further movement is checked by the cable P, at which time valve D has reached its seat. As the drum r continues to rotate after this has taken place, the valve C will be lifted, and the weight I will go down. By reversing the direction in which the drum r turns, the valve D will be caused to seat itself and after this has taken place, the valve C will be lifted.

It will be understood that the pairs of valves, C′ D′, E F, E′ F′, will be associated with similar controlling mechanism, and that the cables which form part of said mechanism will be wound in the manner described on drums r and r' on shaft R. The cable associated with the valves C′ and D′ may be wound upon drum r. The cables associated with valves E, F, and E′ F′ may be wound upon drum r'.

It is obvious from the foregoing description that one drum shaft R, if turned first in one direction a suitable amount, and then in the opposite direction, will operate all of the valves of the furnace in proper sequence.

The shaft may be driven by a suitable motor, as, for example, by an electromotor T, which may be connected with the said shaft by a suitable train of mechanism. In order, however, to control the movement of the valves so that they cannot be moved too far in either direction and therefore injure the apparatus, mechanism is provided by which the rotation of shaft R will be automatically reversed, while the motor continues to run in one direction. A variety of mechanism can be employed for this purpose. As shown in Fig. 3, this mechanism consists of a pinion r^2 secured to shaft R, and a reciprocating rack bar U which may be reciprocated by any suitable mechanism, as, for example, the crank V and pitmen v'.

In Fig. 4 the rack bar U is connected with two opposed hydraulic rams Z, Z, of ordinary construction.

Fig. 5 shows mechanism by which the shaft R and its drums may be dispensed with, and the cables M and N taken in and paid out in the required manner. This mechanism includes a hydraulic ram X common to two opposed cylinders x, x', and suitable sheaves w, w' carried by this ram. The cables M and N will be anchored at their ends and will pass in opposite directions around these two sheaves, and will then be guided by suitable sheaves toward the valves.

It will be understood from the foregoing description that the invention herein shown may be embodied in various specific forms, and that numerous changes may be made in the specific embodiment shown. Such changes are not to be regarded as a departure from the invention as defined by the claims.

Having described my invention, I claim:

1. The combination of a set of valves and mechanism including cables for opening and closing them, winding drums for said cables, a motor, and automatic mechanism intermediate of said motor and drums for turning the drums first in one direction and then in the other indefinitely.

2. The combination of a lifting valve, a weight, and means for limiting the upward movement of said weight, with suitable cable guiding sheaves, a cable going over said sheaves and having two depending loops, a sheave connected with the weight and hung in one of said loops, a sheave connected with the valve and hung in the other loop, and mechanism for taking in and paying out said cable.

3. The combination of a pair of lifting valves, a pair of associated weights, means limiting the upward movement of said weights, and sheaves carried by said weights and valves, with cable guiding sheaves, two cables going over said sheaves and each having two depending loops,—one valve and its associated weight being suspended by their sheaves in the loops of one cable, and the other valve and its associated weight being suspended by their sheave in the loops of the other cable, and means for taking in one cable and simultaneously paying out the other.

4. The combination of a pair of lifting valves, a pair of associated weights, means limiting the upward movement of said weights, and sheaves carried by said weights and valves, with cable guiding sheaves, two cables going over said sheaves and each having two depending loops,—one valve and its associated weight being suspended by their sheaves in the loops of one cable, and the other valve

and its associated weight being suspended by their sheaves in the loops of the other cable, each cable being anchored at one end, a drum on which the other ends of said cables are wound in opposite directions, and mechanism for turning said drum in opposite directions.

5. The combination of a pair of lifting valves, a pair of associated weights, means limiting the upward movement of said weights, and sheaves carried by said weights and valves, cable guiding sheaves, two cables going over said sheaves and each having two depending loops,—one valve and its associated weight being suspended by their sheaves in the loops of one cable, and the other valve and its associated weight being suspended by their sheave in the loops of the other cable, each cable being anchored at one end, a drum on which the other ends of said cables are wound in opposite directions, and mechanism for turning said drum a definite amount in one direction and then a like amount in the opposite direction indefinitely.

6. The combination of a pair of lifting valves, a pair of associated weights, means limiting the upward movement of said weights, and sheaves carried by said weights and valves, cable guiding sheaves, two cables going over said sheaves and each having two depending loops,—one valve and its associated weight being suspended by their sheaves in the loops of one cable, and the other valve and its associated weight being suspended by their sheave in the loops of the other cable, adjustable anchor block to which the ends of the cables are respectively connected, a drum on which the other ends of said cables are wound in opposite directions, a pinion connected with said drum, and a reciprocating rack bar engaging with said pinion, and mechanism for reciprocating said rack bar.

In testimony whereof, I hereunto affix my signature in the presence of two witnesses.

JOHN W. SEAVER.

Witnesses:
E. B. GILCHRIST,
E. L. THURSTON.