M. ALPERN.

GOVERNING MECHANISM.

APPLICATION FILED NOV. 9, 1914.

1,298,432.

Patented Mar. 25, 1919.

2 SHEETS—SHEET 1.

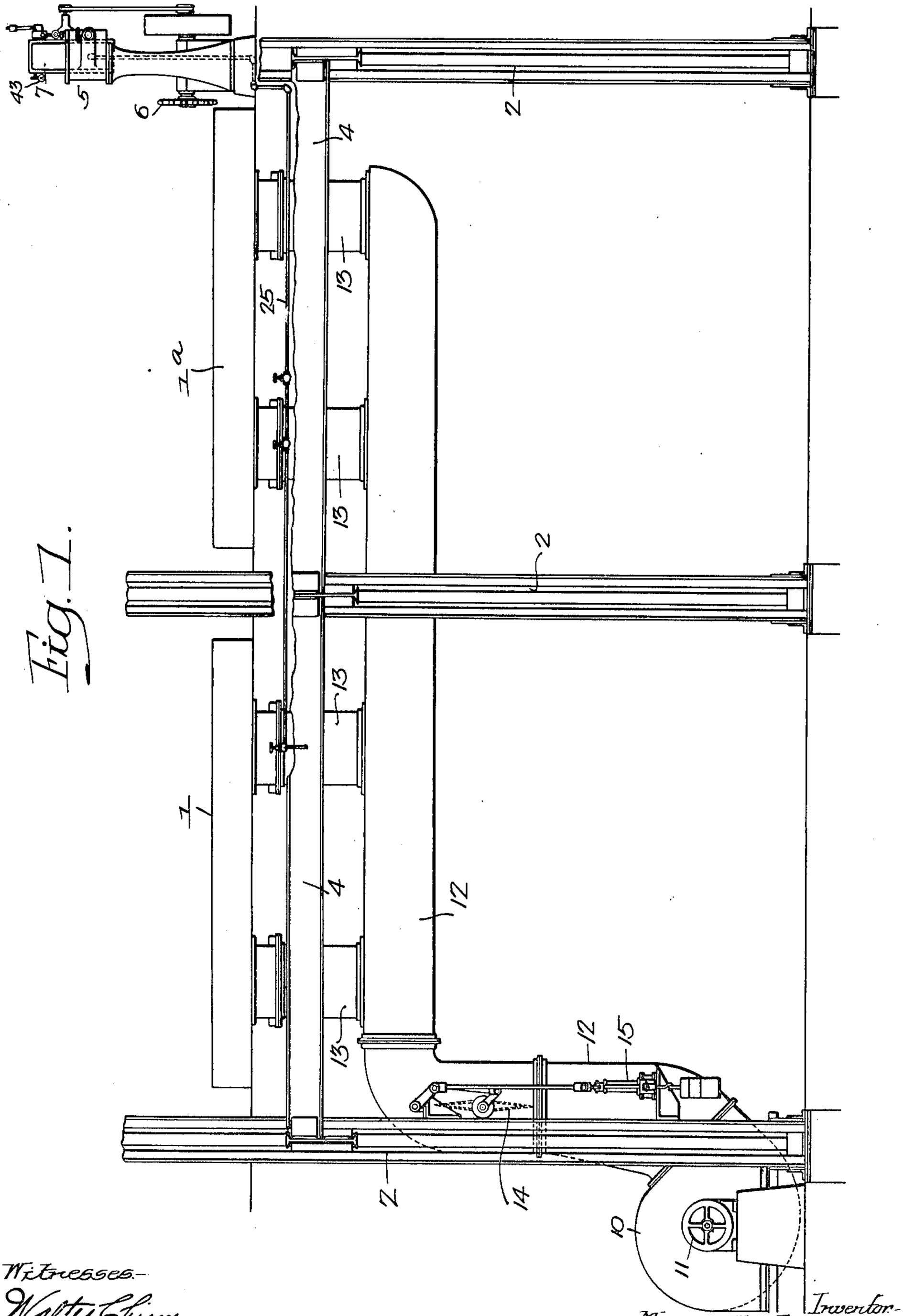

Fig. 1.

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2 SHEETS—SHEET 2.

Fig. 4.

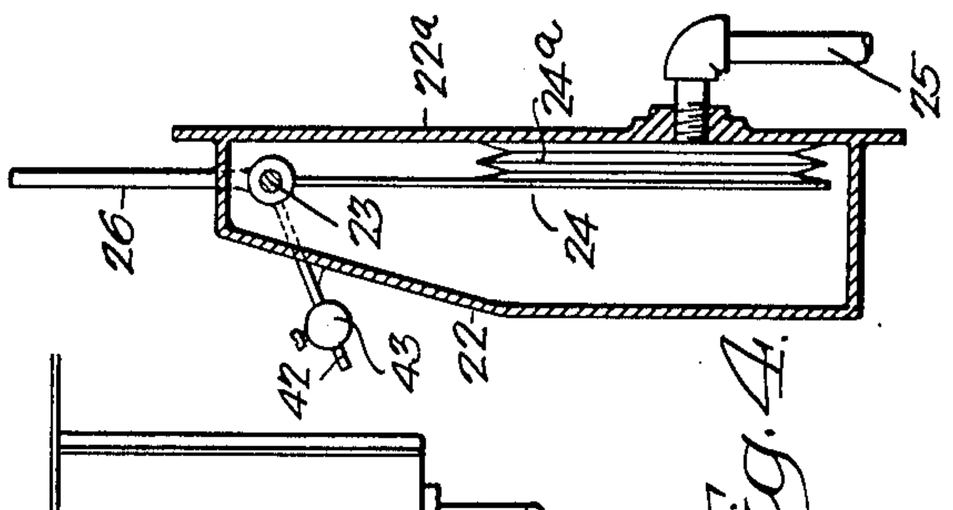


Fig. 2

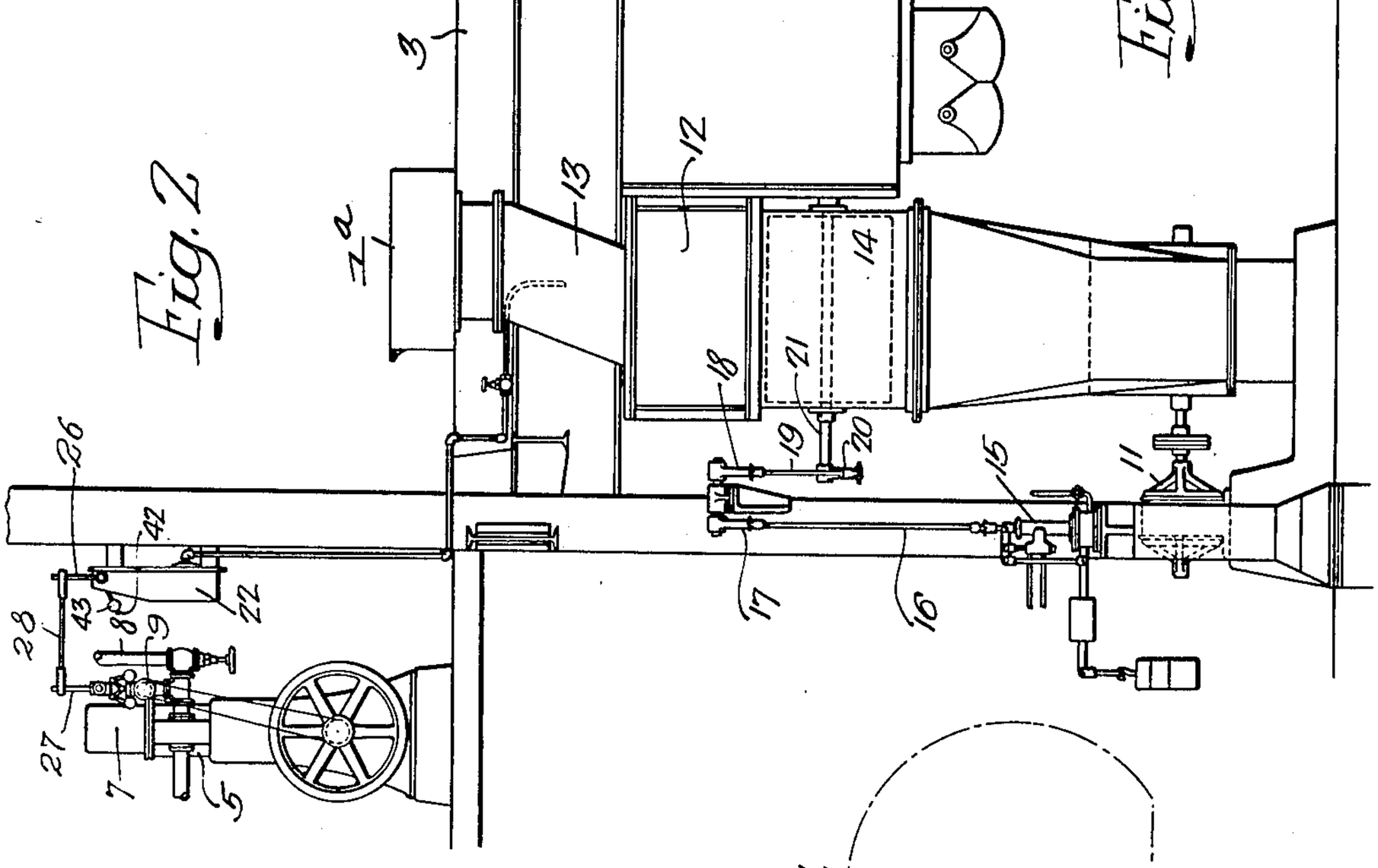
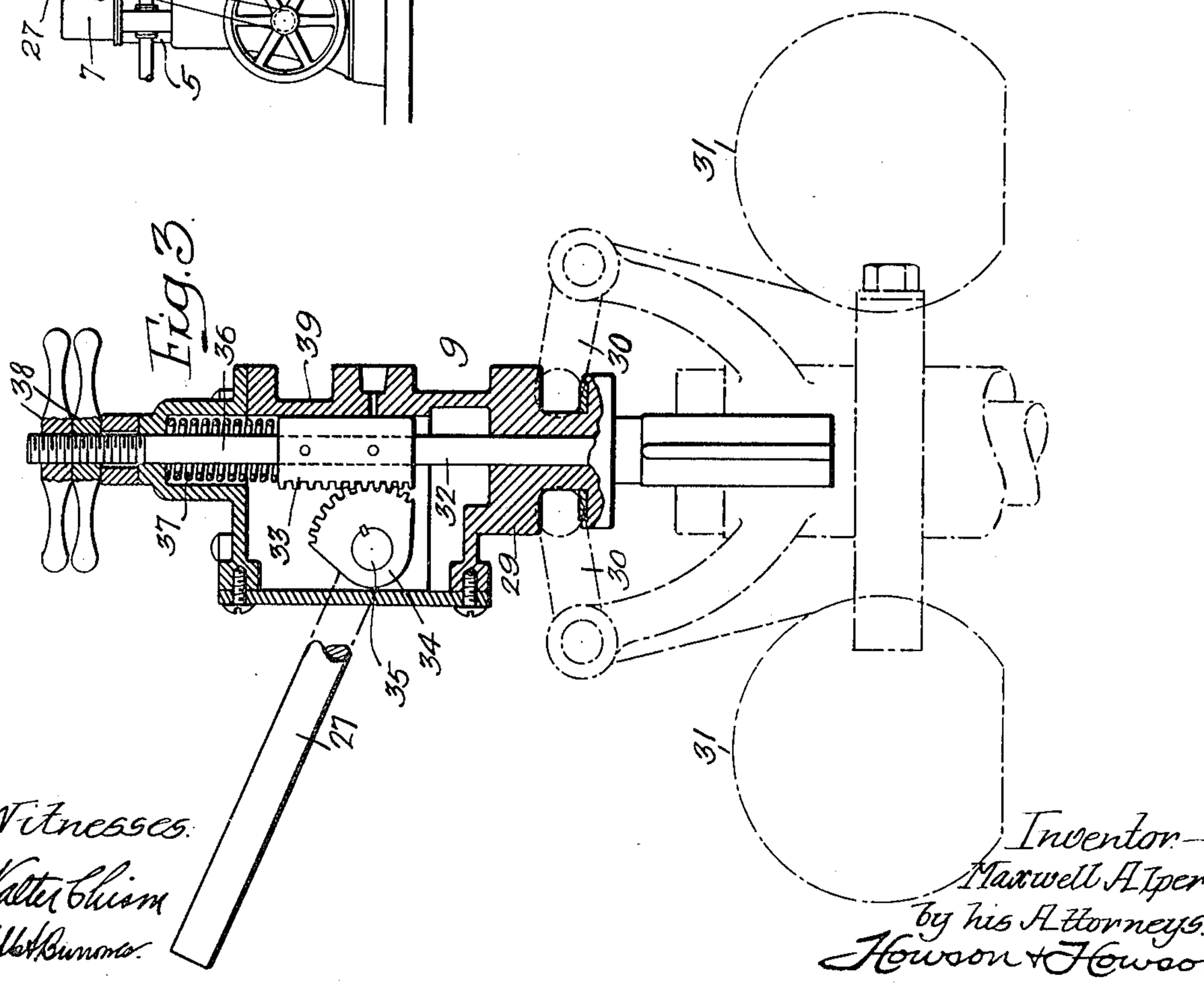


Fig. 3.



Witnesses.
Walter Chism
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UNITED STATES PATENT OFFICE.

MAXWELL ALPERN, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO AMERICAN ENGINEERING COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

GOVERNING MECHANISM.

1,298,432. Specification of Letters Patent. Patented Mar. 25, 1919.

Application filed November 9, 1914. Serial No. 871,097.

To all whom it may concern:

Be it known that I, MAXWELL ALPERN, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Governing Mechanism, of which the following is a specification.

This invention relates to apparatus for governing the fuel and air supplies for mechanical stokers, and one object is to provide a combination of devices whereby the pressure of the air delivered to the stoker is made to be dependent upon the pressure of the steam generated by the boiler which said stoker feeds, while the rate at which fuel is supplied to said boiler is caused to be dependent on and vary with the pressure of said air.

It is also desired to provide apparatus operatively connecting the fuel feeding engine and the air supply system of a stoker whereby a predetermined ratio shall be at all times maintained between the speed of said engine and the flow of air to the stoker, the arrangement of parts being such that these two quantities or factors increase or decrease in accordance with said constant ratio.

Another object of the invention is to provide novel means for regulating the supply of fuel to a stoker in accordance with variations in the air supply thereto, the invention contemplating such an arrangement of parts as will cause the speed of the stoker feeding mechanism to vary in accordance with and maintain a constant ratio to the variations in the pressure, and hence in the quantity, of the air supplied.

A further object of my invention is to provide a novel combination of parts whereby the amounts of fuel and air under pressure are made to vary in acordance with variations in the pressure of the steam in the boiler.

These objects and other advantageous ends I secure as hereinafter set forth, reference being had to the accompanaying drawings in which;

Figure 1 is a side elevation illustrating one arrangement of the apparatus constituting my invention;

Fig. 2 is an end elevation of the apparatus shown in Fig. 1;

Fig. 3 is a vertical section partly in side elevation illustrating the controlling mechanism of the stoker engine governor, and

Fig. 4 is a vertical section of the air-actuated damper for controlling the engine governor.

In the above drawings 1 and 1^a represent the wind boxes of two mechanical stokers, a portion of whose supporting frame work is illustrated by the parts 2, 3 and 4. The greater part of the stoker structure and mechanism has been omitted since it constitutes no part of the present invention and may be of any desired or suitable form, so that the fuel feeding mechanism may be driven by an engine such as that indicated at 5 or by a suitable electric or other motor. This engine is illustrated as of the vertical reciprocating type having on its main shaft a sprocket wheel 6 connected to the fuel feeding mechanism of the stokers and provided with a cylinder 7, supplied with steam through a pipe 8 in which is mounted the valve of a throttle governor 9, shown as of the ball type.

Air is supplied to any desired number of wind boxes 1 and 1^a from a blower 10 driven by a motor 11 and delivering to a supply conduit 12 connected to each of said stoker wind boxes through a pair of branch conduits 13. In this conduit 12 adjacent the blower 10 is a damper 14 whose position is controlled by any suitable form of regulator 15 whose operation is dependent upon the steam pressure in the boiler whose fuel is supplied by the stokers. In the present instance I have illustrated the well known form of Mason regulator whose movable member is connected through a link 16, lever arms 17 and 18 and a link 19 with an arm 20 on the shaft or spindle 21 upon which the damper 14 is mounted. The arrangement and adjustment of the above parts is such that as the steam pressure in the boiler or in the main connected thereto, rises above a predetermined point, the damper 14 is swung so as to cut off a greater or less amount of air flow to the stoker wind boxes.

For causing the operation of the fuel feeding engine 5 to be dependent upon the air pressure in the air supply system, I mount adjacent said engine a box or casing 22 in the upper part of which is journaled a spindle 23 having outside said casing an arm 42 carrying an adjustable weight 43. Also fixed to the spindle within the casing is a dependent damper or diaphragm 24, forming one side of a bellows whose other walls

are formed by flexible structures 24ª and the rear wall 22ª. This diaphragm occupies a definite position under the action of the weight 42 whose adjustment determines the distance moved by said diaphragm when acted on by a given force. The bellows are connected through a pipe 25 with some point in the air supply system such as one of the branch conduits 13 from which the pressure of the air delivered to said bellows will be dependent both on the static as well as on the velocity head of the air from the blower 10.

The movable element 24 of the bellows is connected to the engine governor as illustrated in Figs. 2 and 3, there being a second arm 26 fixed to a portion of the diaphragm shaft 23 projecting outside of the casing 22 and connected through another arm 27 and a link 28 to the governing mechanism. For the purposes of my invention, the engine governor 9 has a casing or frame 39 fixed to the collar 29 operated on by the levers 30 which carry the balls or weights 31. The valve spindle 32 of the governor extends into this casing and has fixed to it a suitably formed toothed piece or rack 33 engaged by a toothed segment 34 fixed to a short spindle journaled in the casing 39 and having fixed to it the arm 27. Above the rack 33 the valve stem has an extension 36 on which is mounted a spring 37 tending to force downwardly the spindle or rack 33, whose position and hence that of the valve under normal conditions, is determined by a pair of adjusting wheels or handled nuts 38 threaded on the extension 36 outside the frame or casing 39. These are so arranged that by their adjustment the amount of opening of the steam valve for a definite speed of the engine, may be varied at will.

With the above described arrangement of parts, if it be assumed that the blower 10 is operated at a constant speed and that the fuel feeding engine is regulated to cause the stoker feeding mechanism to deliver fuel at the rate required for normal operation, then if for any reason the steam pressure in the boiler or boilers rises above the predetermined desired point, the pressure regulator 15 operates to swing the damper 14 into such position as to cut down the pressure of the air flowing in the conduit 12, and hence the amount delivered to the stokers. Under normal conditions the pressure of the air from the branch conduit 13 is exerted through the pipe 25 upon the movable element 24 of the bellows in the casing 22, causing it to take up a definite position and thus change the relative positions of the arms 26 and 27. The toothed segment 34 is consequently turned and acts through the rack 33 on the valve spindle 32 to move the valve thereof toward its closed position independently of the position of the governor balls 31, although these latter with their associated parts will act to govern the speed of the engine in the well known manner.

As a consequence of this operation, a rise in the steam pressure above a predetermined point results in a diminution not only in the air pressure of the blast but also in a reduction of the rate at which fuel is fed to the furnace. On the other hand a fall of the boiler pressure results in an opening of the damper 14 and a consequent increase in the volume of air delivered to the stokers, while at the same time the increase of air pressure so moves the diaphragm 24 as to cause opening of the governer valve and an increase in the rate of fuel feed. Thus there is maintained a constant ratio between the speed of the stoker feeding engine and the flow of air to the stoker and the supply of both air and fuel is regulated to maintain the boiler pressure substantially constant with the result that there is a material increase in the efficiency of the boilers.

In case of injury to the apparatus, the spring 37 will automatically act to seat the governor valve and shut down the engine, while if the diaphragm 24 or its attached parts should get out of adjustment or any of said parts should require inspection or repair, it or they may be disconnected from the engine by the removal of the link 28, and the governor adjusted by means of the hand nuts 38 so that the engine will operate at any desired speed. Under normal conditions of operation, the casing 39 with the valve spindle and its attached parts, will be moved up or down in accordance with the position of the governor balls. At the same time however, said spindle may be independently operated by means of the toothed segment 34, so that the position of the valve in the steam pipe 8 is dependent both on the speed of the engine and on the pressure of the air in the air supply conduit.

I claim:—

1. The combination of a source of air under pressure; a conduit connecting said source with a furnace; a boiler; an automatic stoker; a motor for driving said stoker; and automatically acting means for varying the speed of the motor by means of and in accordance with variations in the pressure of the air from said source.

2. The combination of a source of air under pressure; a conduit for delivering such air to the furnace of a boiler; an automatic stoker; an engine for driving said stoker; a governor for the engine; and mechanism for automatically adjusting the governor to vary the rate at which the engine drives the stoker, in accordance with variations in the pressure of air in said conduit.

3. The combination of a conduit for supplying air under pressure to the furnace of a boiler; an automatic stoker; an engine for

driving said stoker; and a governor for controlling the operation of said engine; with means actuated by air from said conduit for also controlling the operation of the engine.

4. The combination of an automatic stoker; an engine for driving said stoker; a governor for controlling the operation of said engine; and an automatically acting device for adjusting said governor independently of the speed of the engine to vary the rate at which fuel is delivered to the furnace.

5. The combination of means for supplying air under pressure to the furnace of a boiler; an automatic stoker; an engine for driving said stoker; an automatic governor for the engine; and mechanism actuated by air from said air supply means for adjusting the amount of steam flow to the engine independently of the governor.

6. The combination of an automatic stoker; an engine for driving said stoker; means for supplying air to said furnace; a governor for the engine including a valve spindle; weights operative to adjust said spindle in accordance with variations in the speed of the engine; an automatic mechanism also operative on the spindle to adjust the same independently of the weights in accordance with variations in the pressure of the air delivered to the furnace.

7. The combination of a source of air under pressure including a conduit discharging into the furnace of a steam boiler; an automatic stoker; a source of power for driving said stoker; a diaphragm movable in accordance with variations in the air pressure in said conduit; and means for controlling the operation of said source of power from the diaphragm.

8. The combination of a conduit for delivering air to the furnace of a boiler; a diaphragm; means for causing said diaphragm to be moved in accordance with variations in the pressure of air in the conduit; an automatic stoker; an engine for driving said stoker; and means for operatively controlling the engine from said diaphragm.

9. The combination of a conduit for delivering air to the furnace of a boiler; a diaphragm; means for causing said diaphragm to be moved in accordance with variations in the pressure of air in the conduit; an automatic stoker; an engine for driving said stoker; means for operatively controlling the engine from said diaphragm; and a governor for the engine operative in conjunction with said diaphragm controlled means.

10. The combination of a source of supply of air for a furnace; an automatic stoker; a motor for driving said stoker; and an automatically acting apparatus for maintaining a predetermined ratio between the speed of said motor and the flow of air from the source thereof.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

MAXWELL ALPERN.

Witnesses:
M. E. BURGESS,
C. L. SMITH.