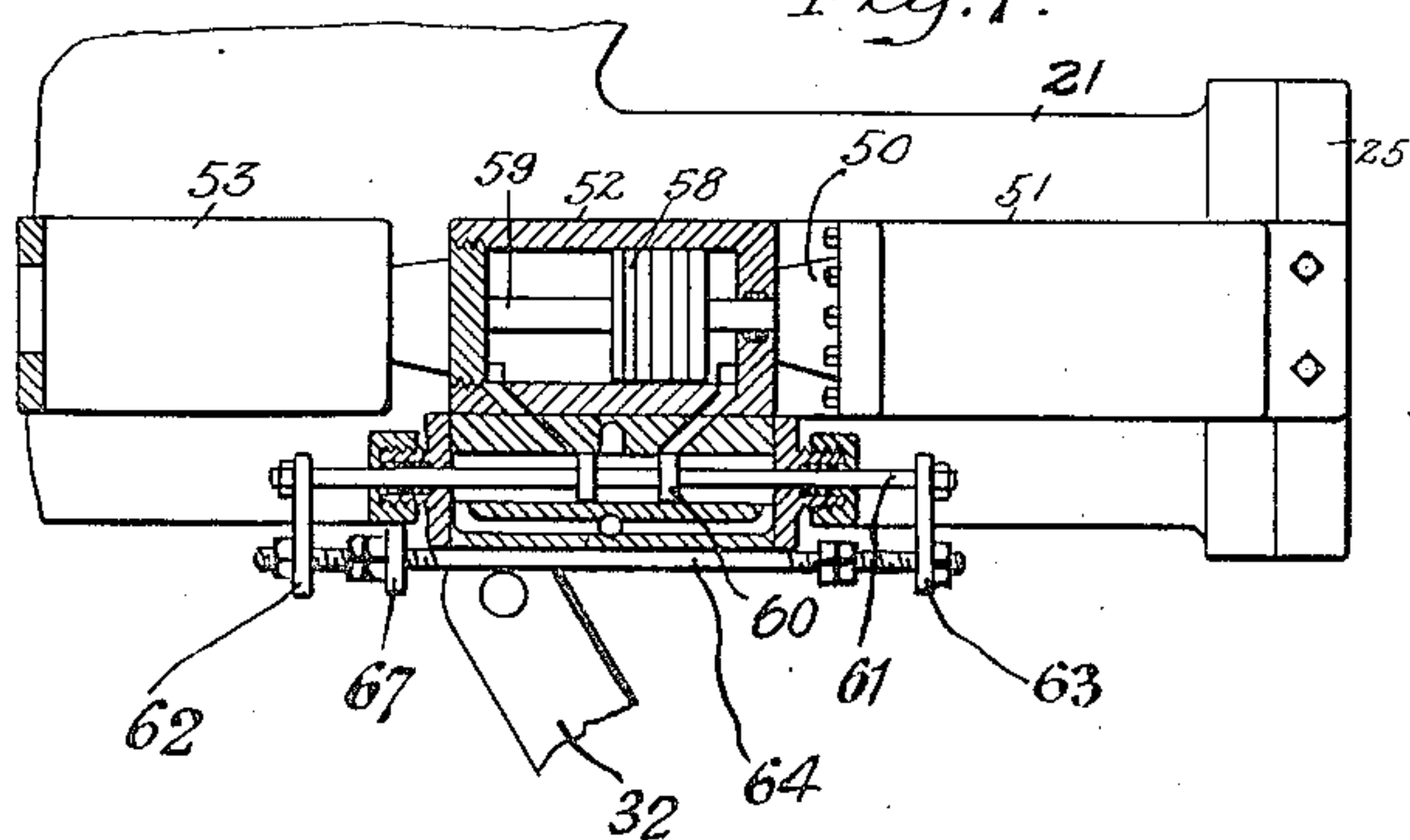
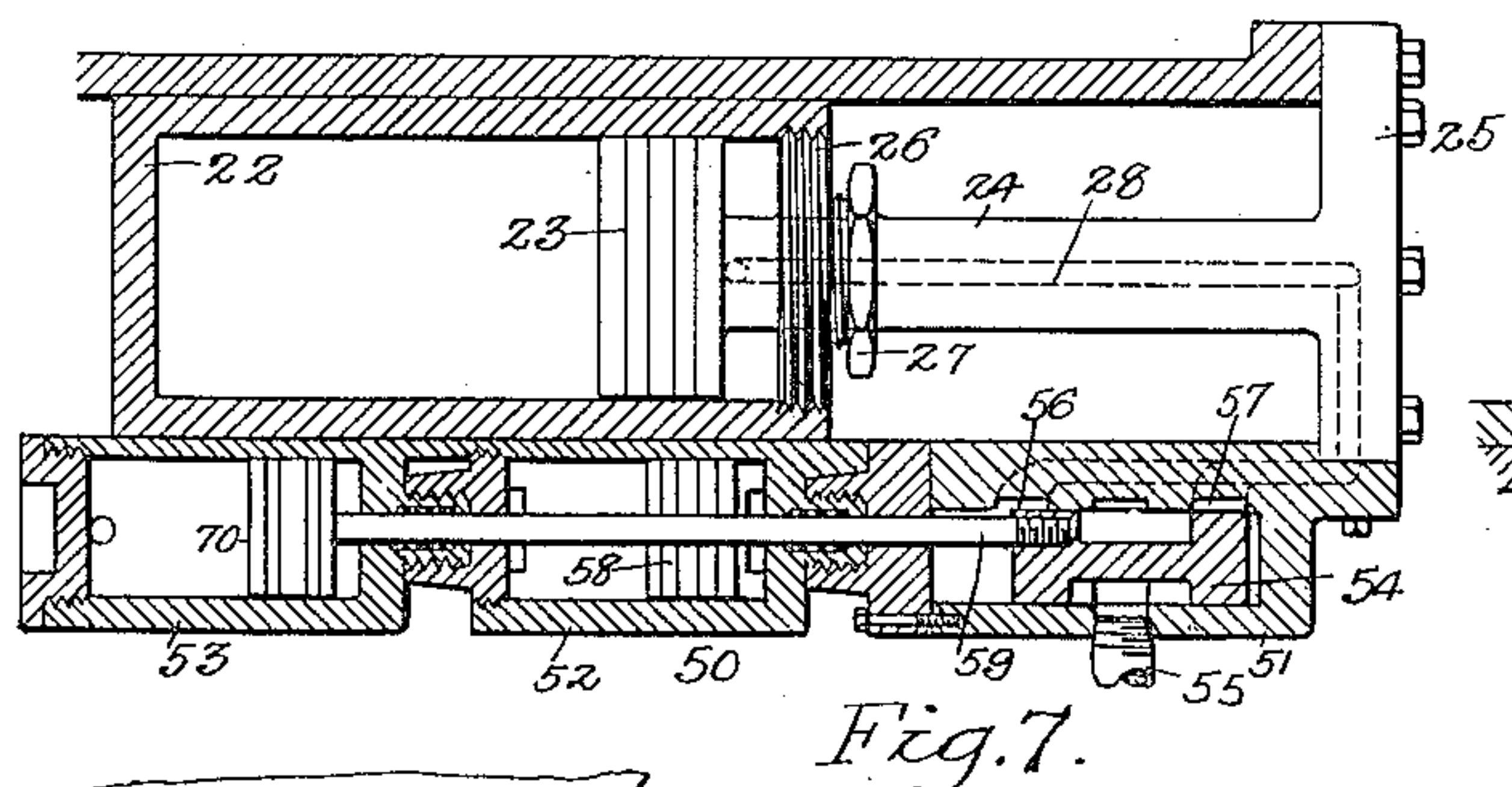
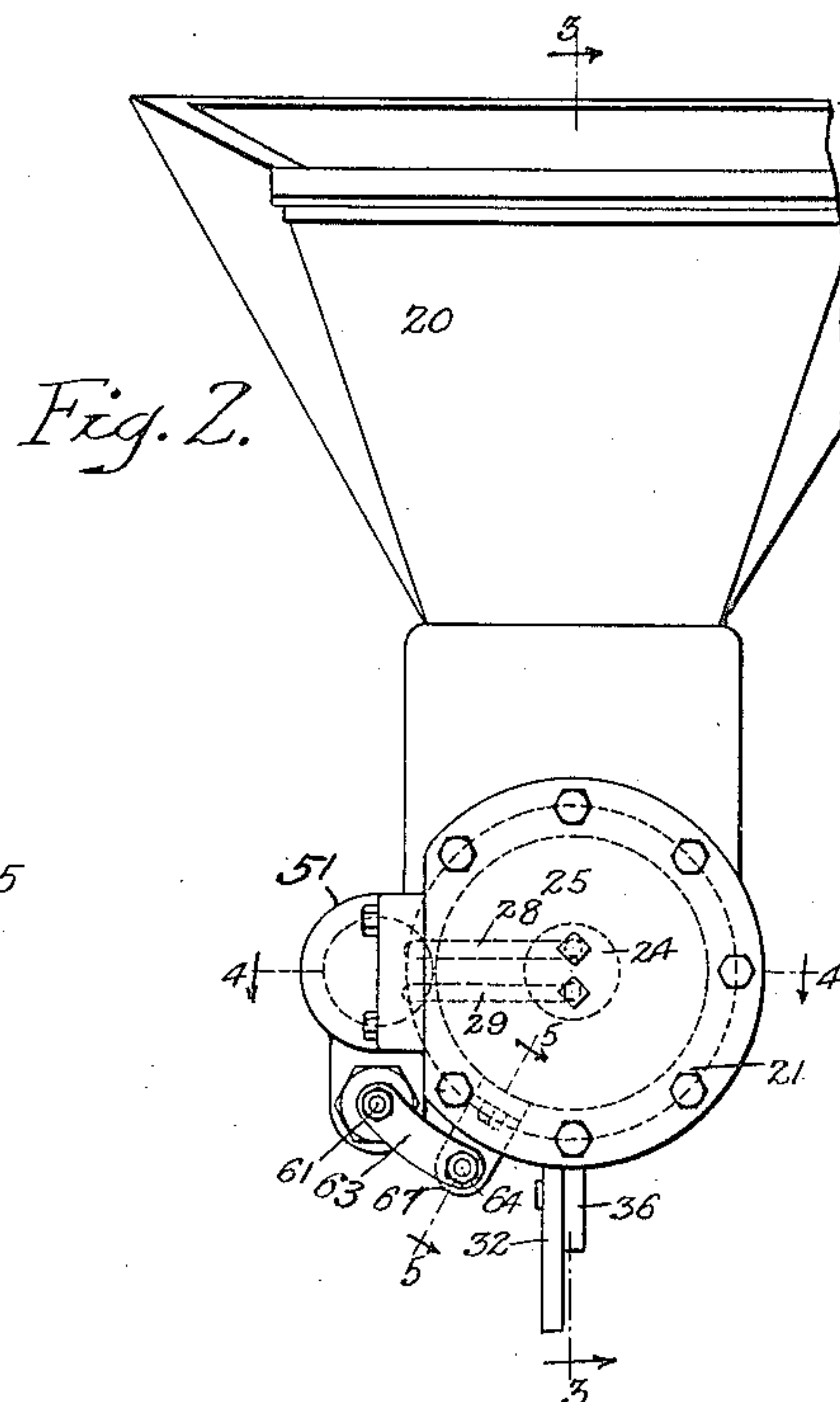
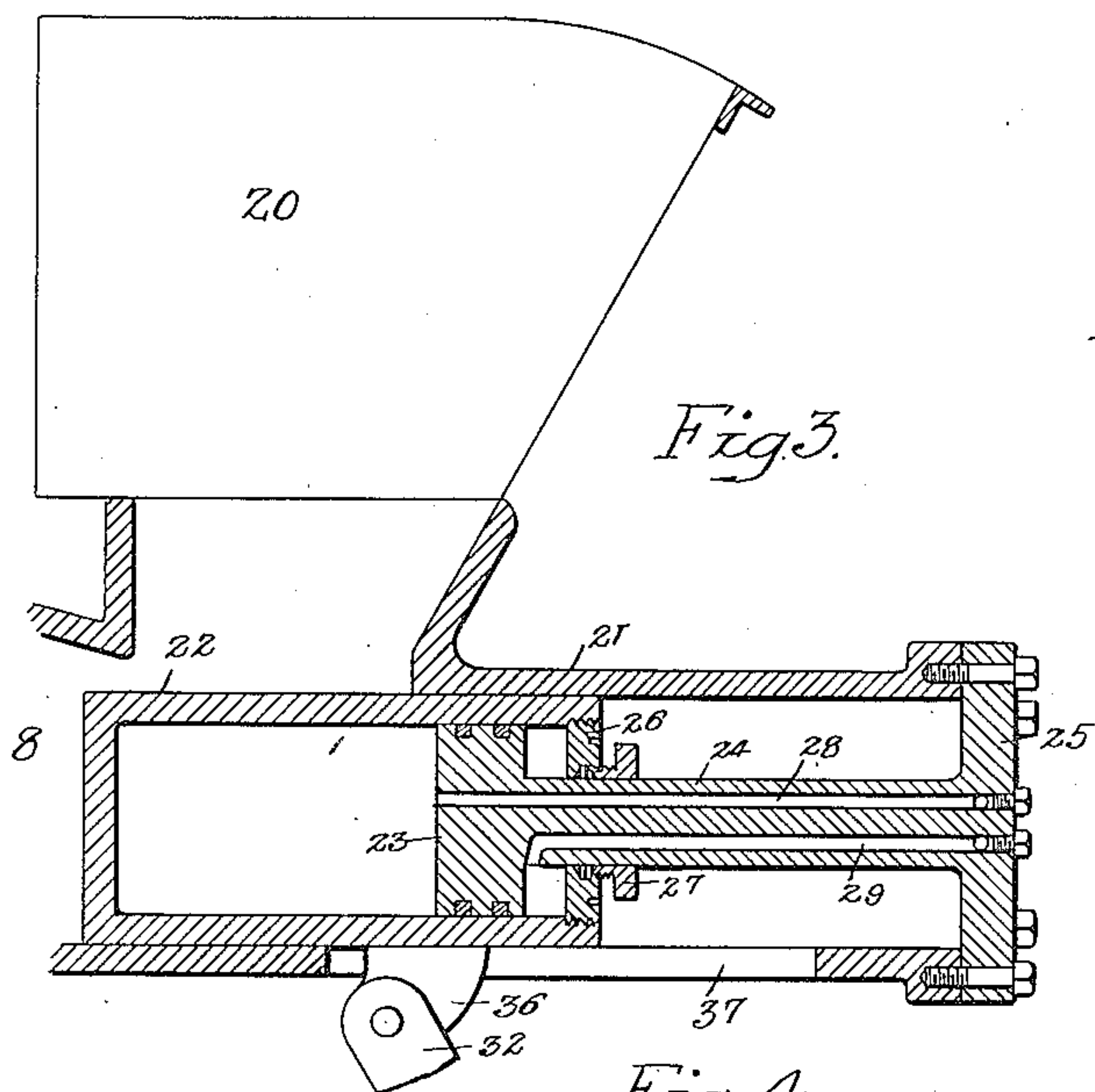


Jan. 2, 1923.

M. P. LAUGHLIN.  
STOKER MECHANISM.  
FILED JULY 2, 1919.

1,441,097

2 SHEETS-SHEET 2



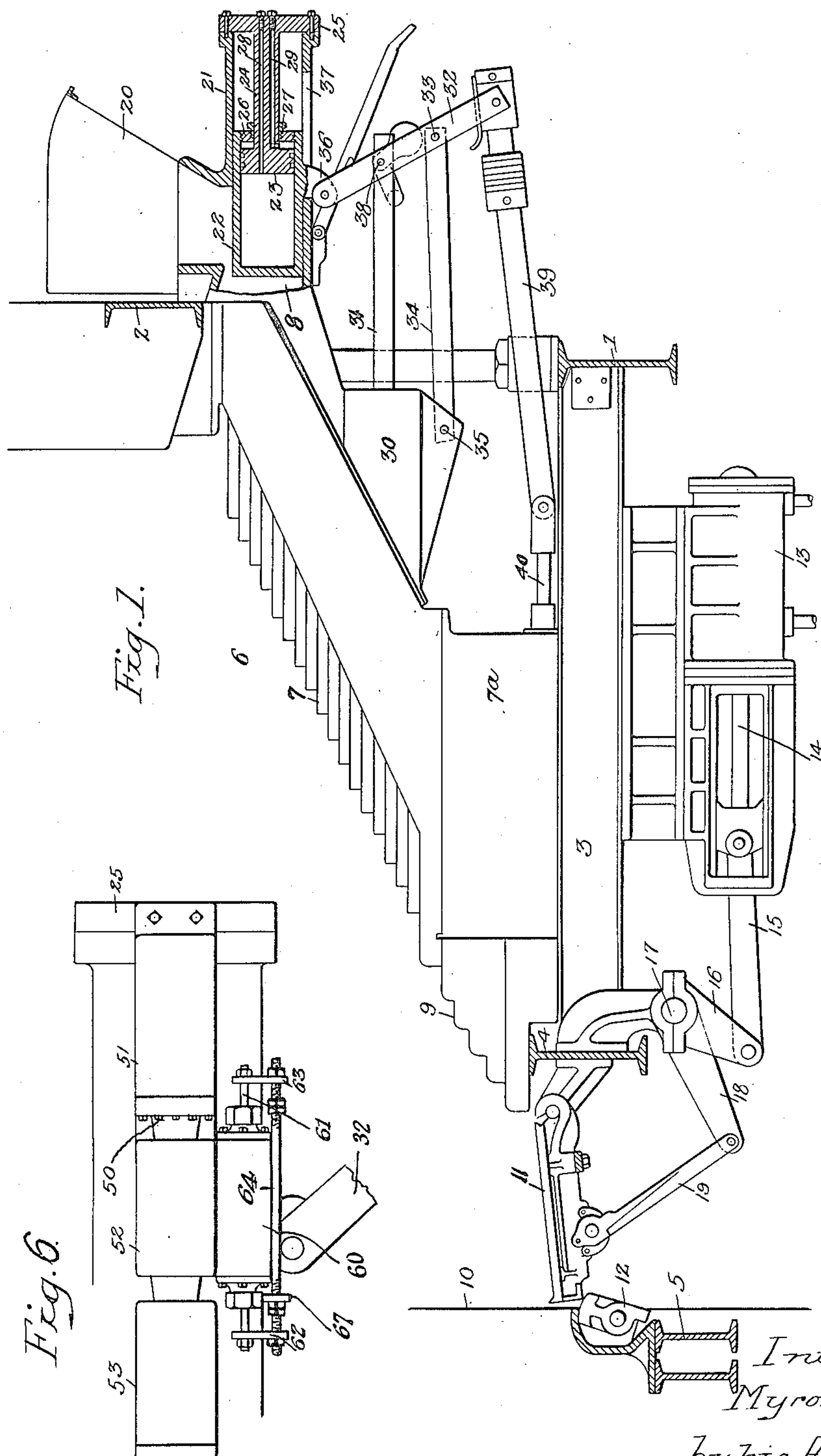
Inventor -  
Myron P. Laughlin,  
by his Attorneys,  
Hewson & Hewson

Jan. 2, 1923.

1,441,097

M. P. LAUGHLIN.  
STOKER MECHANISM.  
FILED JULY 2, 1919.

2 SHEETS-SHEET 1



Inventor.-  
Myron P. Laughlin  
by his Attorneys  
Howson & Howson



Patented Jan. 2, 1923.

1,441,097

# UNITED STATES PATENT OFFICE.

MYRON P. LAUGHLIN, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO AMERICAN ENGINEERING COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

## STOKER MECHANISM.

Application filed July 2, 1919. Serial No. 308,142.

*To all whom it may concern:*

Be it known that I, MYRON P. LAUGHLIN, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented the Stoker Mechanism, of which the following is a specification.

One object of my invention is to provide a novel form of fuel feeding device for an automatic stoker which shall include a fuel pushing element cooperating not only with the hopper and ram chamber to forcibly deliver fuel to the retort of such a stoker but shall also cooperate with a piston as a fluid motor developing the power necessary for its operation on the fuel.

Another object of my invention is to provide a feeding mechanism for mechanical stokers, especially of the inclined underfeed type, which shall be simple, compact and have such an arrangement and construction of parts as will permit of its being manufactured and operated at a greatly reduced cost as compared with similar devices of the same class;—the invention contemplating a novel motive power device, one of whose elements shall also serve as the ram or pusher whereby fuel is intermittently fed from the source thereof to the stoker furnace.

Another object of my invention is to provide a novel form of combined ram and motor cylinder designed to cooperate both with a fuel supplying and guiding structure and also with a stationary piston to utilize the power developed by fluid under pressure for delivering fuel to the furnace of a stoker.

A further object of the invention is to provide a novel form of combined ram and motor cylinder, together with a simple and substantial valve mechanism for controlling the flow of motive fluid for said cylinder.

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

Fig. 1 is a vertical section of an inclined underfeed stoker, illustrating my invention as applied thereto;

Fig. 2 is an end elevation on a larger scale than Fig. 1, illustrating the construction of the ram chamber and part of its associated mechanism;

Figs. 3 and 4 are respectively vertical and

horizontal sections on the lines 3—3 and 4—4, Fig. 2;

Fig. 5 is a section on the line 5—5, Fig. 2, illustrating certain details of the valve mechanism;

Fig. 6 is a side elevation of the ram chamber showing the valve actuating cylinder and its associated parts; and

Fig. 7 is a longitudinal vertical section of the cylinder and piston for actuating the controlling valve, together with the pilot valve for said cylinder.

In the above drawings 1—5 represent portions of the frame work of a stoker, illustrated as of the inclined underfeed type, having in its furnace 6 any suitable number of sets of tuyeres 7 between each of which sets are retorts 8;—the tuyeres being supplied with air under pressure from a wind box 7<sup>a</sup> in the manner well known in this art and more particularly as found in the Taylor stoker.

Below and to the rear of the series of tuyeres 7 is a stepped grate 9 slidable toward and from the bridge wall 10 as well as parallel therewith and between said wall and the grate is a dumping plate 11 normally supported at a level below said stepped grate by a pawl structure 12 which may be withdrawn or projected at will. This dumping plate may be agitated, and restored to its normal elevated position after being permitted to drop upon the withdrawal of the pawl, by a suitable power device such as the motor 13 which is illustrated as a cylinder whose piston is connected through a rod 14 and a link 15 to an arm 16. This latter, through a shaft 17, an arm 18 and a link 19 is operatively connected to said dumping plate 11.

For delivering fuel to each of the retorts and for feeding it out and down into the furnace, I provide a fuel hopper 20 mounted across the front of the stoker and having its lower portion connected to deliver fuel by gravity to a horizontally elongated cylinder or ram chamber 21 whose rear end opens into the retort 8.

For forcibly moving the fuel delivered from the hopper out of the ram chamber 21 into the retort, I provide a ram or pusher 22 in the form of a cylindrical structure reciprocable within said chamber and in ac-



cordance with my invention, this ram itself constitutes the cylinder of a fluid motor, for it is designed to cooperate with a piston 23 fixed relatively to the fuel receiving chamber 21 within which it is mounted. This piston is connected through a rod or stem 24 with a plate 25 constituting the head of the fuel chamber 21 and has the necessary packing rings to prevent leakage of fluid around its edges. The front end of the ram 22 has fixed in or to it a head 26 provided with a stuffing box 27 to prevent leakage along the rod 24 and this latter has formed in it two longitudinally extending passages 28 and 29, of which the first opens on the rear face of the piston 23 so as to be capable of delivering fluid to and exhausting it from the rear end of the ram cylinder 22, while the second passage 29 opens on the front end of the piston 23 so as to deliver fluid to and exhaust it from the space between said piston and the head 26.

In the particular case illustrated I have shown my invention as applied to a stoker having an auxiliary fuel receiving chamber or cylinder 30 in which a ram of the usual construction is reciprocable by means of a rod 31, and this latter is actuated from the main ram 22 through a bar 32 constituting a lever fulcrumed at 33 on a bar 34 pivoted to a fixed portion of the stoker structure at 35. The upper arm of said lever is pivoted to a lug 36 projecting downwardly from the ram 22 through a slot 37 in the under part of the ram chamber 21 and said lever is pivoted at 38 to the outer end of the rod 31 which drives the auxiliary ram. The lower end of the lever 32 is connected through a bar 39 and a rod 40 with the reciprocable grate 9, so that under operating conditions the reciprocation of the main ram 22 in the chamber 21 not only causes fuel to be delivered from the hopper 20 to the retort 8, but likewise causes the ram in the cylinder 30 to be reciprocated so as to assist in feeding the fuel downwardly and outwardly in said retort. At the same time the reciprocation of the grate 9 further feeds the ashes with the partly consumed fuel therewith downwardly onto the dumping plate 11 and also serves to cooperate with the bridge wall 10 in crushing any clinkers which may have formed.

While my invention contemplates the use of any suitable form of valve gear for periodically supplying motive fluid to and exhausting it from the two ends of the ram cylinder 22, so as to cause this to reciprocate in the chamber 21 at the desired rate of speed, I preferably employ the apparatus shown, in which the passages 28 and 29 in the fixed piston rod 24 are extended laterally through the head 25 of said ram chamber 21 so that their outer ends terminate adjacent each other on the edge of said head.

For controlling the delivery of fluid to these passages I mount an elongated structure 50 preferably on the side of the ram chamber 21 and form in or mount upon it three casings 51, 52 and 53, of which the first contains a main controlling valve 54 designed to govern the flow of the motive fluid such as steam, water or air, from a supply pipe 55 to two channels 56 and 57 opening on the face of the structure 50 in such positions that they respectively communicate with the ends of the passages 28 and 29 where these terminate on the edge of the head 25.

For operating this main valve 54 I provide the second casing 52 with a piston 58 connected through a rod 59 with said main valve, and I control the flow of motive fluid to this cylinder by a pilot valve 60 mounted at one side of the structure 50. This valve has its movable element connected to and movable with a rod 61, whose two opposite ends are connected through parallel arms 62 and 63 to the ends of a second rod 64 threaded to receive two adjustable abutments 65 and 66, so positioned as to be engaged by an arm 67 rigidly fixed to and movable with the ram cylinder 22. The arrangement of parts is such that the reciprocation of said cylinder through the arm 67 causes the rod 64 and with it the valve rod 61 to be moved longitudinally as the ram cylinder 22 approaches either end of its stroke. As a result the pilot valve is so moved as to allow motive fluid to enter one or the other end of the second or relay cylinder 52 and thereby, through the piston 58 and rod 59, shift the main valve 54 at the proper time to cause motive fluid to be delivered to one or the other end of said ram cylinder, which is thereby moved in the ram chamber to feed successive charges of fuel from the hopper to the retort.

For regulating the operation of the piston 58 and main valve 54, I connect to the rod 59 a second piston 70 operative in the dash pot casing 53. Oil or other suitable fluid is confined in this cylinder and suitable means, whose detail construction forms no part of the present invention, is provided for regulating the speed at which this fluid may flow from one end to the other of said casing and hence, the speed at which the pistons 70 and 58 with the valve 54 may move in their respective casings or cylinders.

From the above description it will be noted that I have materially simplified and rendered more compact the fuel feeding mechanism for a stoker, since by utilizing the fuel feeding ram as a motor cylinder, I am enabled to develop the power for propelling the fuel at the point where it is to be utilized without requiring it to be transmitted through gearing or other forms of mechanism. Moreover the stationary pis-



ton may be situated practically under the hopper and the fuel receiving cylinder or ram chamber merely extended forwardly far enough and in such form as to provide a  
5 suitable guide for the ram cylinder.

I claim:

10 1. A fuel feeding device for a stoker consisting of a fuel source; a retort; a cylinder connecting said fuel source and retort; a hollow fuel pusher operative in the cylinder to act directly on fuel from the source and formed to cut off the source from said cylinder while said pusher is delivering fuel therefrom to the retort; a relatively stationary piston in the pusher; and means for  
15 supplying and controlling the admission and exhaust of motive fluid for the pusher to cause the same to be reciprocated in the cylinder.

20 2. The combination in an inclined under-

feed stoker of a retort therefor; a source of fuel; a cylinder positioned to receive fuel from said source; a second cylinder closely fitting the first cylinder and reciprocable therein in position to force the fuel there- 25 from into the retort; a piston operative in the second cylinder; and valve mechanism for supplying and controlling motive fluid to and its exhaust from the second cylinder.

3. The combination in a stoker feeding 30 mechanism of a hopper; a cylinder connected to receive fuel from the hopper under the action of gravity; with a double acting fluid motor having its movable member closely fitting into and reciprocable in said cylinder and formed to directly engage and discharge therefrom the material entering it from the hopper. 35

In witness whereof I affix my signature.  
MYRON P. LAUGHLIN.