

No. 679,275.

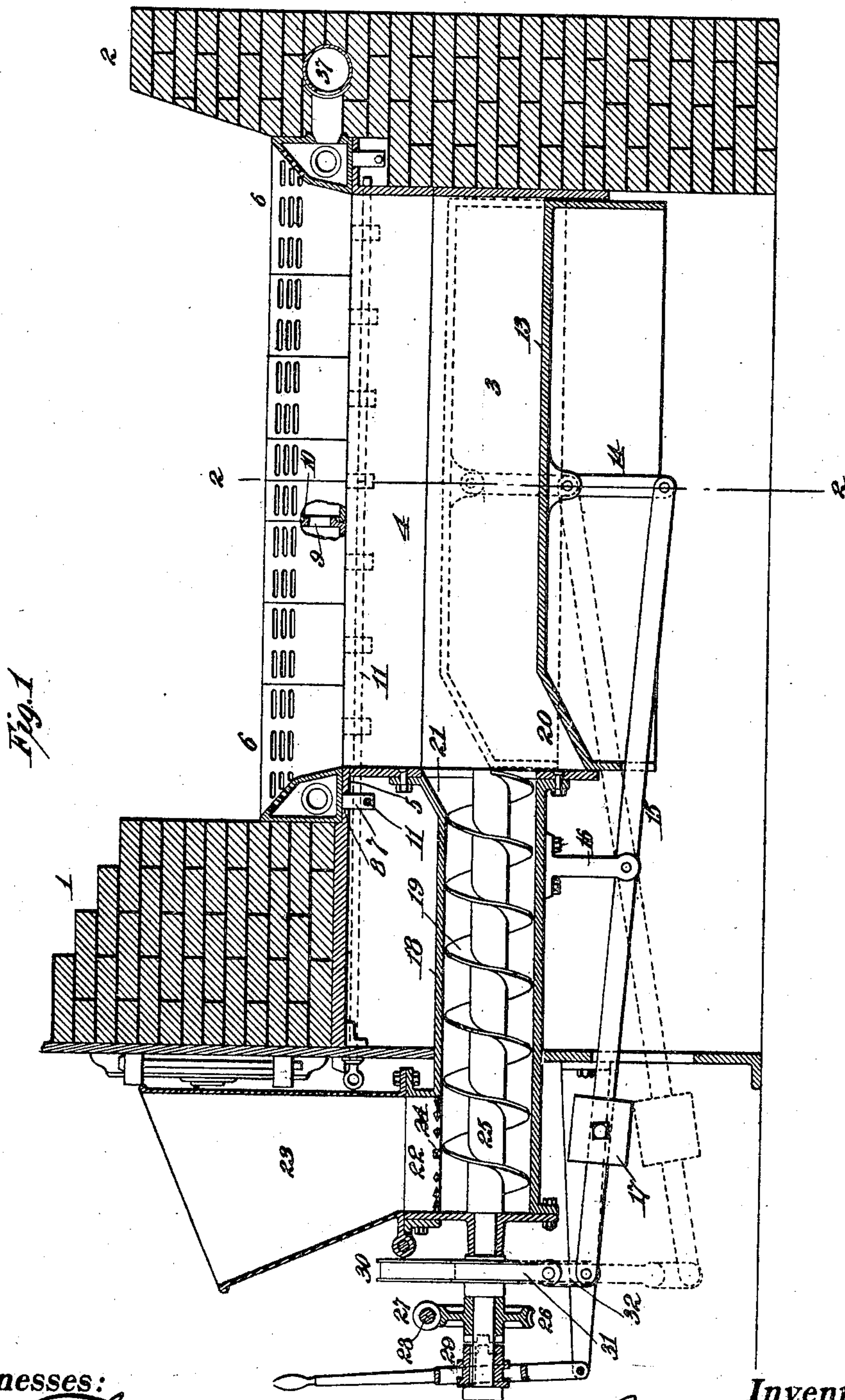
Patented July 23, 1901.

J. MACCORMACK.  
AUTOMATIC STOKER.

(Application filed Aug. 16, 1900.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses:

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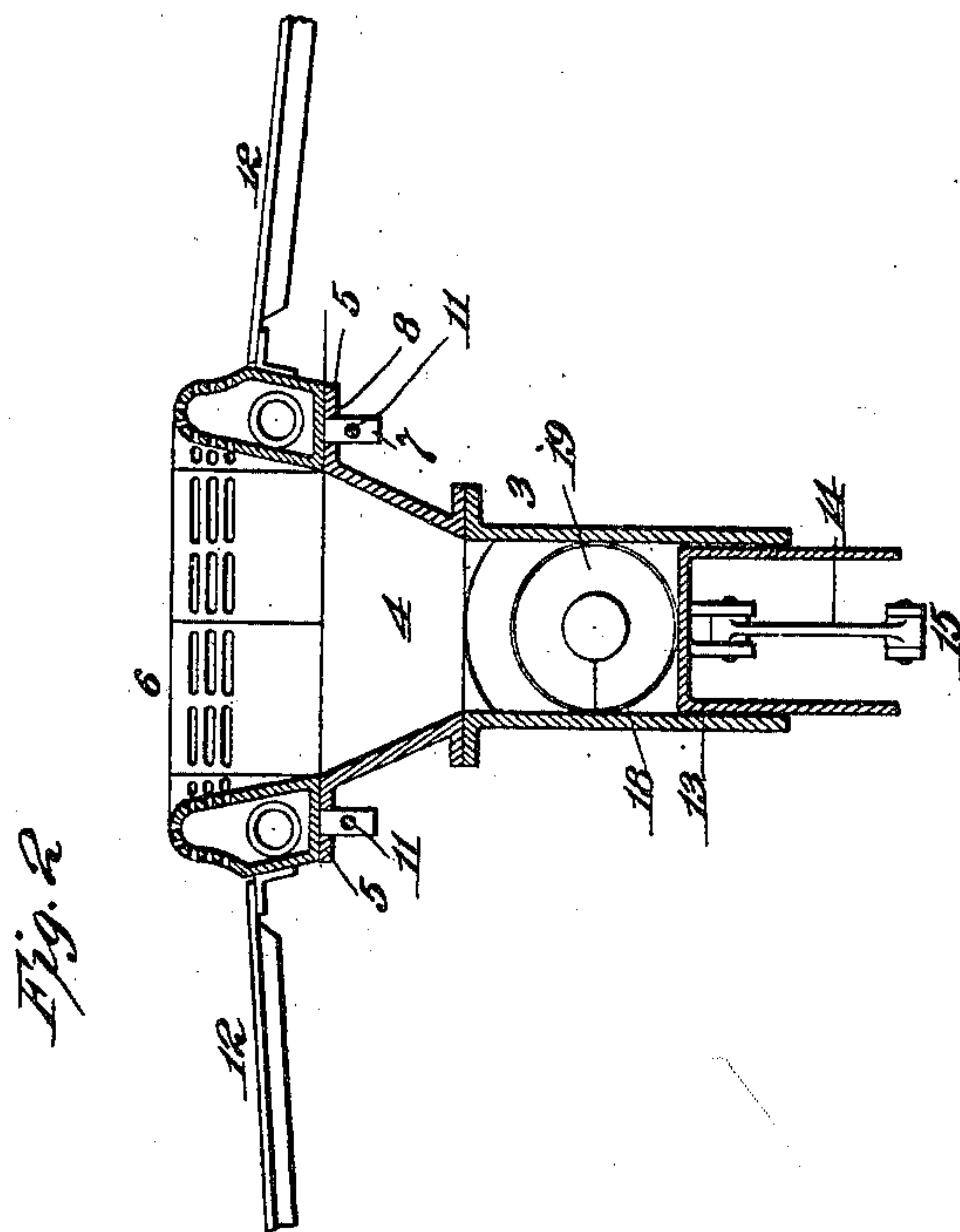
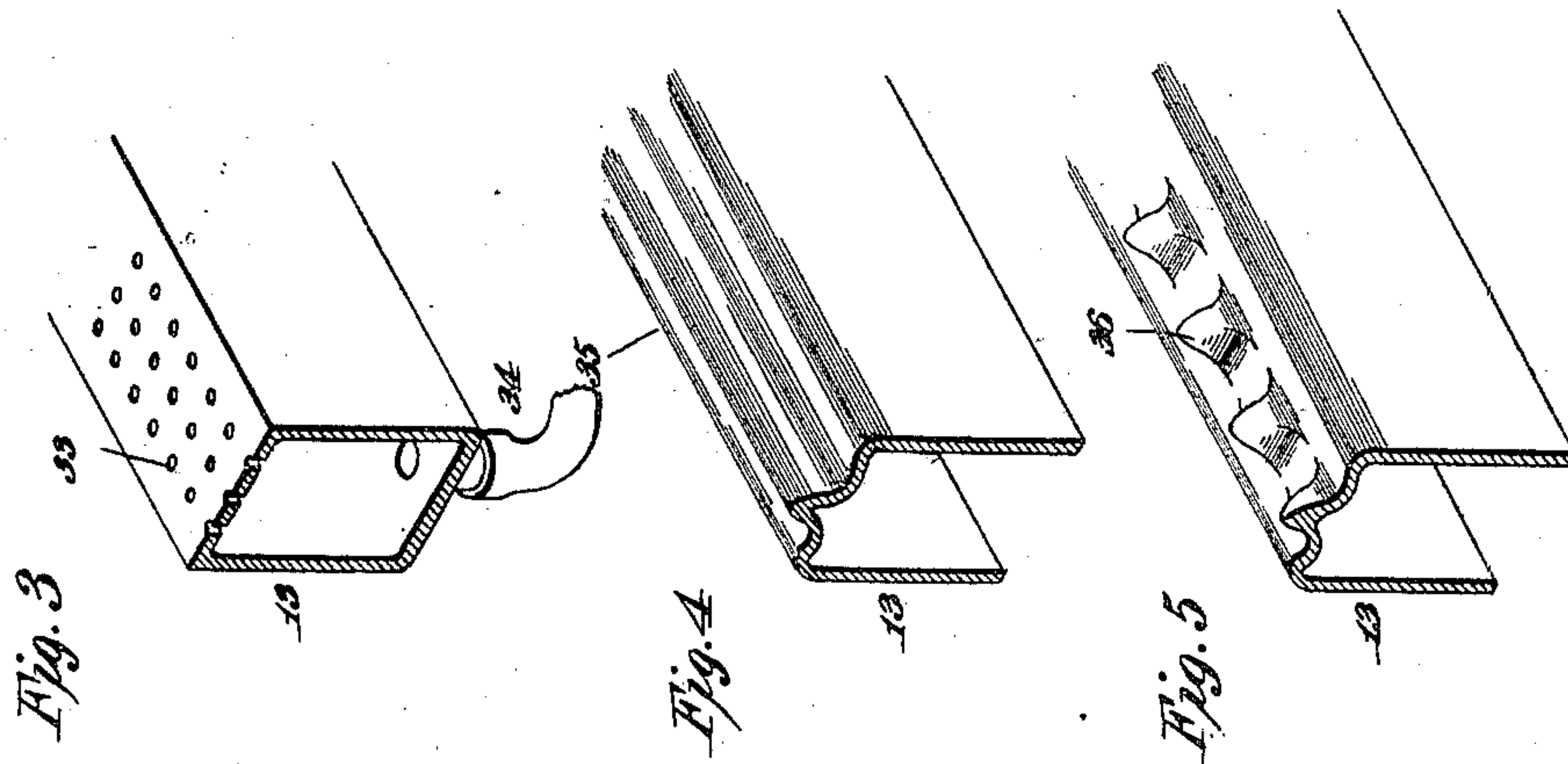
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2 Sheets—Sheet 2.



Witnesses:

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# UNITED STATES PATENT OFFICE.

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## AUTOMATIC STOKER.

SPECIFICATION forming part of Letters Patent No. 679,275, dated July 23, 1901.

Application filed August 16, 1900. Serial No. 27,011. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN MACCORMACK, a citizen of the United States, residing at Bayonne, county of Hudson, and State of New Jersey, have invented certain new and useful Improvements in Automatic Stokers, of which the following is a specification.

My invention relates to improvements in automatic stokers of the type employing two sets of grate-bars arranged on either side of and inclining from a magazine to which the fuel is supplied and from which it is caused to pass over twyer-blocks before being deposited upon the grates. In stokers of this type as heretofore employed a feed-screw projects within the magazine to force the fuel into the same and to cause the fuel to pile up and overflow the upper sides of the magazine. The objection to the employment of a feed-screw extending substantially the entire length of the magazine is that the feed of fuel to the grate-bars is not uniform, a disproportionately large amount of fuel being supplied to the farther end of the magazine and to the set of grate-bars toward which the worm rotates.

My object, essentially, is to provide an apparatus of the type referred to wherein the objection indicated will be overcome and wherein an approximately uniform fuel-supply will be furnished to both sets of grate-bars or the equivalent thereof and to all portions of either set.

In carrying my invention into effect I construct a magazine with tapered or hopper-like upper side walls surmounted by twyer-blocks of any desired form and from which at either side extend the shaking, dumping, stationary, or revolving grate-bars or the equivalent thereof, and I provide the magazine with a bottom movable vertically therein. I make use also of a feed-screw which is supplied with material from a suitable feed-hopper and by which the material will be fed into the magazine upon the movable bottom thereof, and I simultaneously rotate the feed-screw and actuate the movable bottom of the magazine up and down. In this way material will be supplied to the magazine by the feed-screw, while as the bottom of the magazine ascends the fuel will be carried thereby

into the upper or hopper-like part of the magazine, where it will accumulate, so as to entirely fill the upper part of the magazine and also the space inclosed by the twyer-blocks. The subsequent vertical movements of the bottom of the magazine supplying additional quantities of fuel thereto will cause the material to flow evenly and uniformly over both sides of the twyer-blocks, so as to be supplied with approximate uniformity to both sets of grate-bars or the equivalent thereof. The movable bottom for the magazine may have any desired conformation, according to the particular material operated upon. Thus, with the case of very fine or dust-like fuel, the bottom may be perforated and be supplied with a light blast beneath it to supply the necessary air for effecting the combustion. With other material the bottom may be provided with a longitudinal continuous rib, which will tend to more uniformly divide the material and cause it to be distributed equally to the two sets of grate-bars, while with the case of bituminous coal having large lumps the bottom may be provided with breaking-teeth for the purpose of breaking and reducing the particles of fuel.

In order that my invention may be better understood, attention is directed to the accompanying drawings, forming part of this specification, and in which—

Figure 1 is a longitudinal sectional view through the furnace of the type referred to equipped with my present improvements; Fig. 2, a section on the line 2 2 of Fig. 1, and Figs. 3, 4, and 5 detail views showing different forms for the movable bottom of the hopper.

In all of the above views corresponding parts are represented by the same numerals of reference.

1 represents the front wall of any desired furnace, and 2 the bridge-wall thereof. Located between these walls are the stoker and grate-bars.

3 represents the magazine, which is provided with an upper hopper-shaped portion 4, preferably separate from the body of the magazine and bolted to the same, the hopper portion 4 being provided with flanges 5, by which it will be supported upon the furnace



walls, as shown. Carried upon the flanges 5 are the twyer-blocks 6, arranged in the generally rectangular form shown. The twyer-blocks are made, preferably, of cast-iron, and each is provided with a lug 7, extending through an opening or slot 8 in the flange 5. Each twyer-block is formed with a boss 9, engaging an opening 10 in the adjacent block, forming a substantially tight joint between all the blocks.

11 represents fastening-rods which are passed through openings in all the twyer-blocks to hold the latter in place. Sufficient play is allowed between the blocks to enable any one of them to be removed by first withdrawing the proper locking-rod when it is desired to place a new block in position. The grate-bars 12 are inclined, as shown in Fig. 2, away from the sides of the twyer-blocks and are arranged in two sets. Any convenient arrangement of grate-bars or the equivalent thereof can be employed, and the grate-bars may be either stationary, shaking, dumping, revolving, or of any other type. The main portion of the magazine 3 is essentially rectangular in cross-section and is provided with a bottom 13, which is arranged to be reciprocated vertically in said magazine. The bottom 13 is connected by a link 14 to a lever 15, pivoted to a standard 16 and having an adjustable counterweight 17, the forward end of the lever extending, preferably, through the ash-pit door of the furnace. Leading into the magazine is a feed-tunnel 18, circular in cross-section and having a flange which is bolted to the front of the magazine. Within the tunnel 18 is a feed-screw 19 of the desired pitch. Preferably the outer end of the bottom 13 of the magazine is inclined at 20, as shown, while the inner end of the feed-tunnel is enlarged at 21, so that when the bottom 13 is in its uppermost position, as indicated in dotted lines, the discharge-orifice from the feed-tunnel will not be substantially contracted in area, so as to obstruct the free feed of fuel. The feed-tunnel 18 is provided with an inlet-opening 22, supplied with fuel from a feed-hopper 23, the opening 22 being usually provided with teeth 24 or the equivalent thereof to serve to break large lumps of material between said teeth and the blades of the feed-screw 19, as will be obvious. The shaft 25 of the feed-screw is driven in any suitable way, but preferably by a gear 26 and a worm 27. The worm 27 is mounted on a shaft 28, which in the case of a battery of boilers extends across the front of all of said boilers, so that said shaft may be operated by a single engine or motor. Preferably a clutch 29 is interposed between each of the gears 26 and the shaft 25, so that the feed-screw 19 of any stoker can be stopped without arresting rotation of the shaft 28, and consequently the operation of any other stokers in same bank. The bottom 13 is operated from the shaft 25 in any suitable way, but preferably by means

of an eccentric 30, keyed to the shaft 25, and having an eccentric-strap 31, which is connected to the outer end of the lever 15 by means of a link 32.

In Figs. 1 and 2 I illustrate the upper surface of the bottom 13 as being substantially plane, and for ordinary work such conformation is satisfactory. The movable bottom may, however, be of other forms to suit special conditions of fuel or of practice. For instance, in Fig. 3 the bottom 13 is illustrated as being provided with a series of perforations 33 and as being supplied with an air-blast through a flexible pipe 34. With a bottom of this form and equipped with an additional air-blast, as illustrated, the stoker will be adapted particularly for use in connection with very fine fuel, the additional air-supply furnishing the necessary oxygen to effect complete combustion. In Fig. 4 the bottom 13 is provided with a central continuous rib 35, which tends to more perfectly subdivide the material than is the case with a perfectly plane bottom, and as will be explained. In Fig. 5 the bottom 13 is provided with a series of teeth 36, which tend to break up any large lumps or particles of bituminous coal in the operation of stoking.

The operation of my improved automatic stoker is as follows: Air is supplied to the twyer-blocks in any suitable way—as, for example, through an air-pipe 37, arranged in the bridge-wall of the furnace—and the desired fuel is supplied to the feed-hopper 23 by hand or by automatic conveying devices. From the feed-hopper 23 the fuel drops into the feed-channel and is fed therefrom by means of the feed-screw into the magazine above the movable bottom 13 thereof. In this operation the bottom will be elevated and will descend at each complete rotation of the shaft 25, thereby elevating the material deposited on the bottom and carrying the fuel up into the hopper portion 4 of the magazine. By reason of the tapered walls of this part of the magazine the material elevated therein by means of the movable bottom 13 will remain bridged in place and will not descend with the bottom, so that there will be a free space offered between the bottom and the material in the hopper part 4 of the magazine for the introduction of a fresh supply of fuel from the feed-channel 18. After the space between the twyer-blocks 6 has been entirely filled with fuel the further addition of material at each upward movement of the bottom will cause the fuel to flow uniformly over the side walls of the twyer-blocks to the two sets of grate-bars on which the fire has previously been started. It will thus be seen that by giving to the fuel in the magazine an elevation by direct vertical movement, and particularly if the bottom of the magazine is provided with a continuous rib 35, as shown in Fig. 4, there will be effected a perfect subdivision of the fuel in the space above the magazine, and the fuel will therefore be sup-



plied uniformly to both sets of grate-bars, while by causing the fuel elevated out of the lower part of the magazine by the bottom thereof to remain in the hopper-like upper part of the magazine a perfectly open space is offered above the bottom for the introduction of a fresh supply of the material from the feed-channel, so that such material will be supplied to the bottom of the magazine with entire uniformity. In this way an approximately uniform feed of material to the two sets of grate-bars will be effected by means of simple mechanism, requiring but relatively little power to operate it.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is as follows:

1. In a mechanical stoker, the combination of a magazine, a vertically-movable bottom therefor, means for continuously supplying fuel upon said bottom, means for continuously operating said bottom, said fuel-feeding means being at all times in communication with the magazine, whereby fuel may be fed continuously thereto, substantially as set forth.

2. In a mechanical stoker, the combination of a magazine, a vertically-movable bottom therefor, means for continuously supplying

fuel upon said bottom, means for continuously operating said bottom, said fuel-feeding means being at all times in communication with the magazine, whereby fuel may be fed continuously thereto, the feeding means and the magazine-bottom being operated from a common source of power, substantially as set forth.

3. In an automatically-operating mechanical stoker, the combination of a magazine, a substantially flat horizontal movable bottom therefor, said bottom being provided at its forward end with a tapered edge, a feed-tunnel leading into the magazine for supplying fuel thereto, a device in the feed-tunnel for continuously supplying fuel to the magazine, and means for reciprocating the magazine-bottom without fully closing at any time the outlet from the feed-tunnel and for simultaneously and continuously operating the device in the feed-tunnel, substantially as set forth.

This specification signed and witnessed this 16th day of July, 1900.

JOHN MACCORMACK.

Witnesses:

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JNO. R. TAYLOR.