

No. 675,516.

Patented June 4, 1901

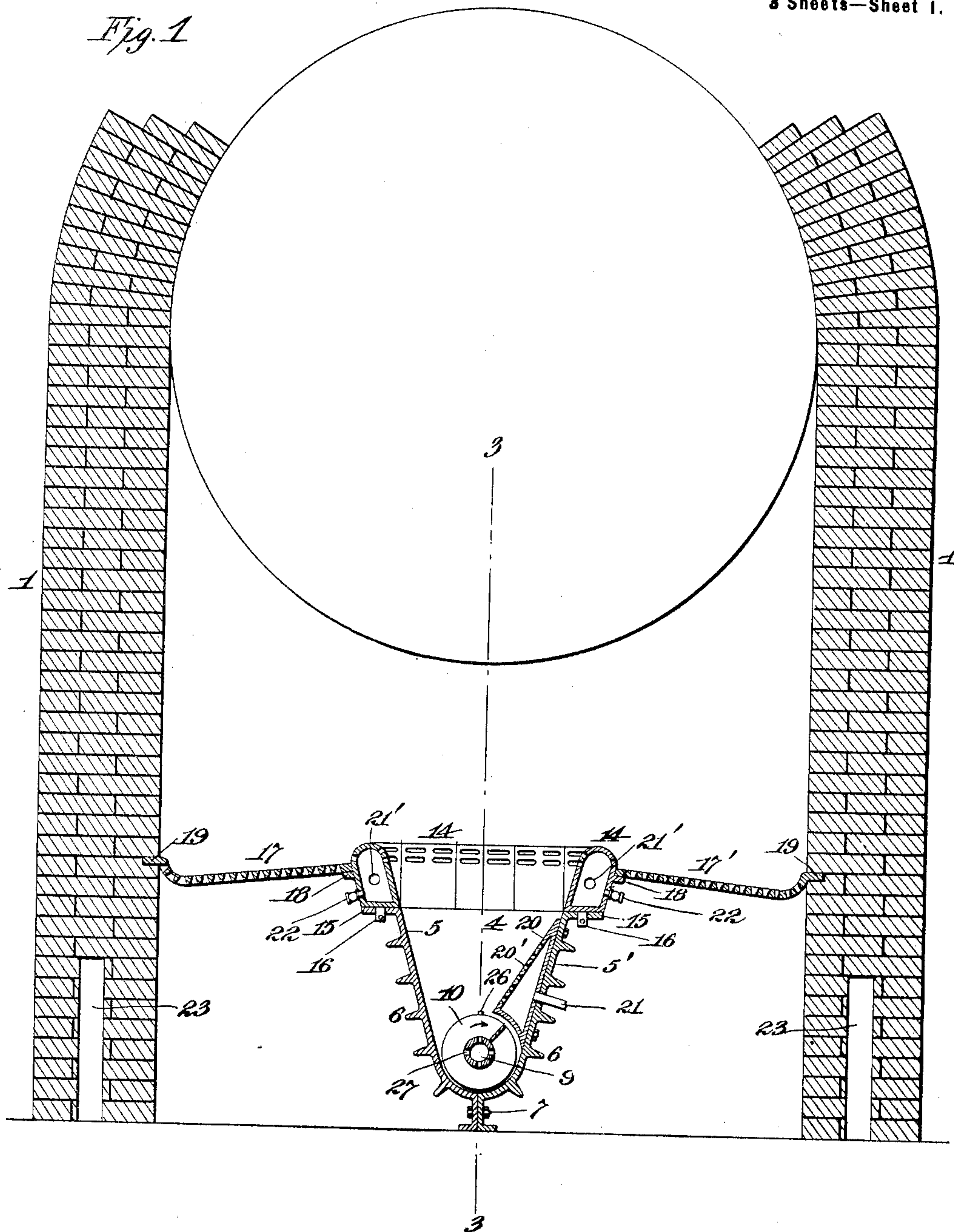
J. MACCORMACK.
AUTOMATIC STOKER.

(Application filed Aug. 16, 1900.)

(No Model.)

3 Sheets—Sheet 1.

Fig. 1



Witnesses:

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*John Mac Cormack
 By Alfred Edmunds*

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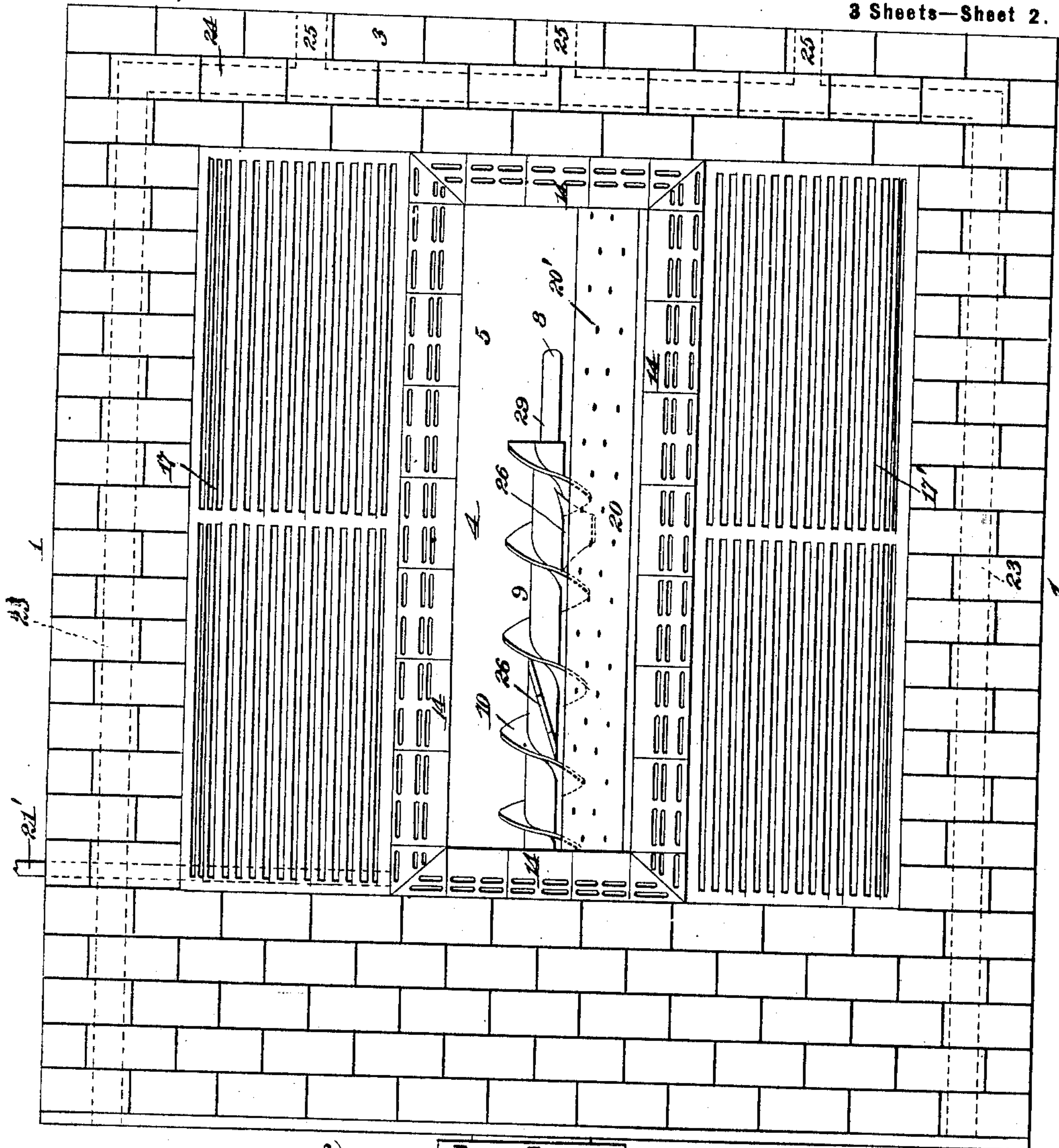
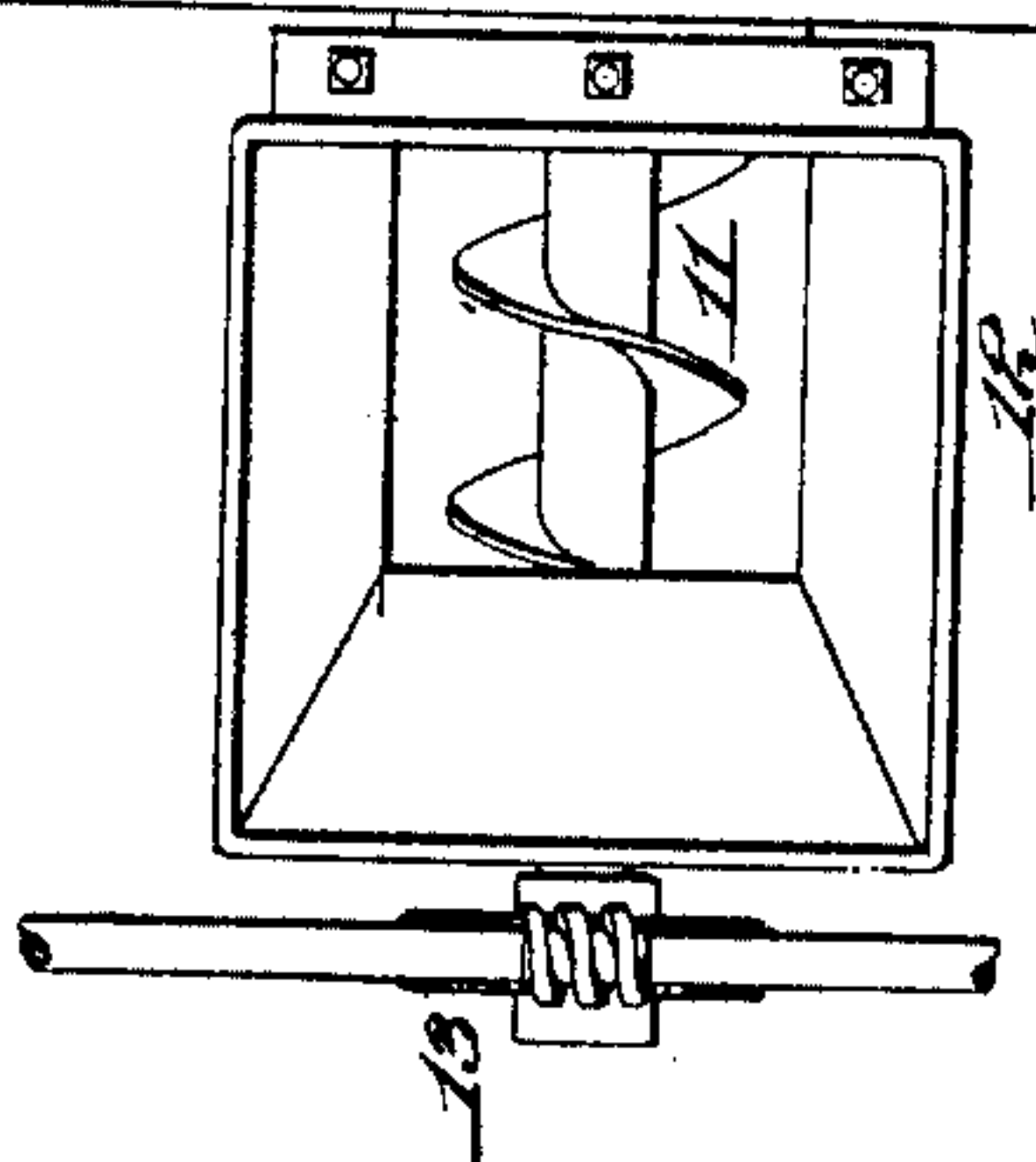


Fig. 2



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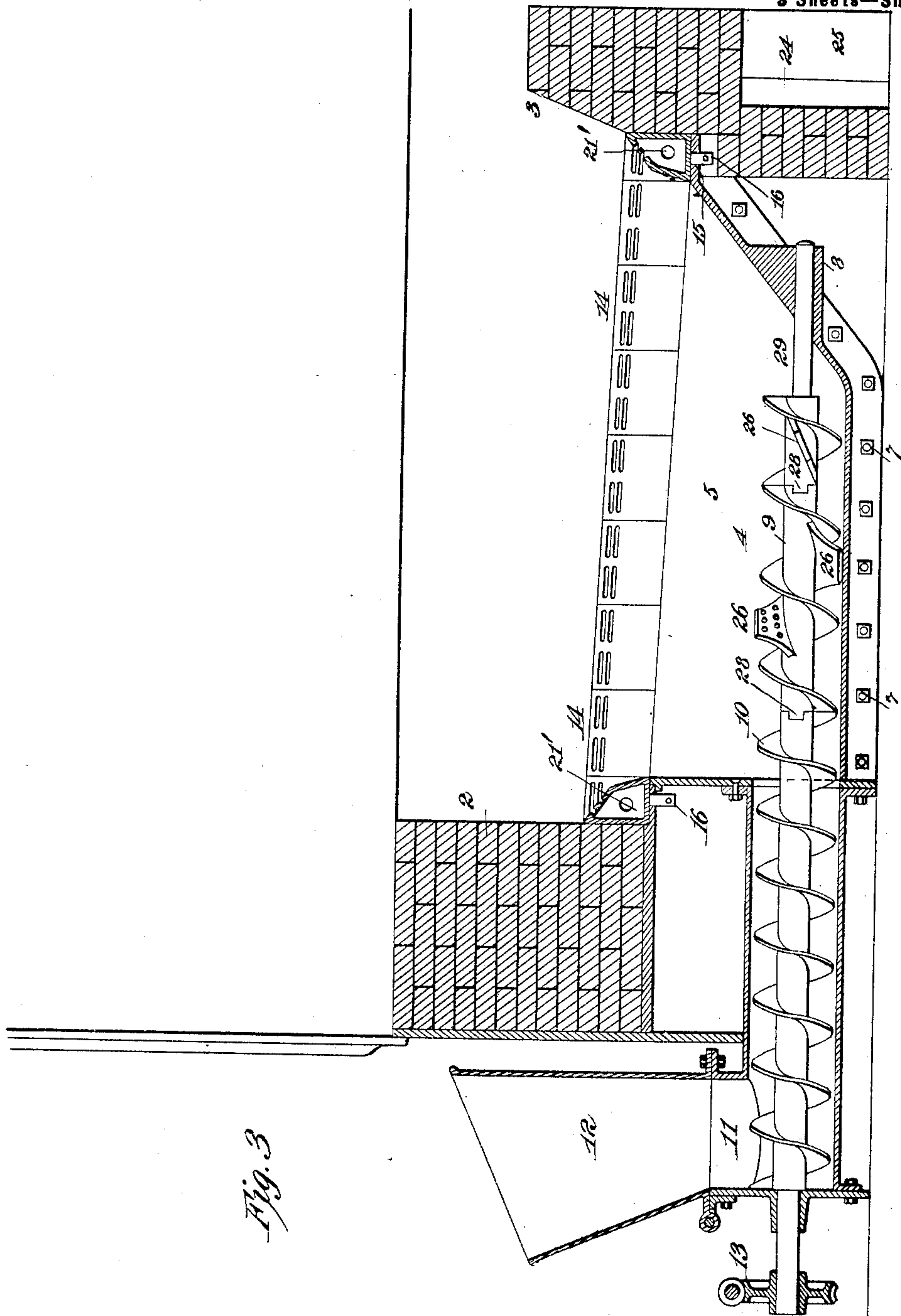


Fig. 3

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UNITED STATES PATENT OFFICE.

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AUTOMATIC STOKER.

SPECIFICATION forming part of Letters Patent No. 675,516, dated June 4, 1901.

Application filed August 16, 1900. Serial No. 27,012. (No model.)

To all whom it may concern:

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

My invention relates to improvements in devices for automatically stoking furnaces; and the invention relates to that type of stokers wherein a magazine is employed having an open upper end, out of and over the edges of which the fuel is caused to pass onto the grate-surfaces by being forced into the magazine by a conveyer or feed-screw. Generally the upper edges of the magazine are formed of sectional twyer-blocks, supplied with air or steam for the purpose of protecting such blocks from the effect of the heat and more particularly for supplying the necessary oxygen to effect combustion. With stokers of this type as heretofore used it has been observed that the rotation of the feed-screw tends to force the fuel in greater quantity toward one side of the magazine than toward the other, so that one of the grate-surfaces will be supplied with more fuel than the other.

The primary object of my invention is to provide a stoker of the type referred to wherein the objection noted will be in a large measure overcome. In order to effect this object, I provide or equip the magazine with a wing or shield, which partially surrounds the feed-screw and by means of which the feed of fuel will be rendered practically uniform at both sides of the magazine.

With stokers of the class referred to as heretofore used two sets of grate-surfaces have been employed on both sides of the magazine. It is desirable in practice to be able to furnish varying air-supplies to both sets of grates; but with stokers of the class referred to as at present in use this has been impossible, since both grates connect with the same ash-pit, and hence will be equally subject to any air-supply introduced therein. With my present stoker the magazine extends to the bottom of the ash-pit, so as to divide the same into two sections, whereby the two grates may be independently supplied with air.

My improved stoker also provides for an accurate fitting of the grate-sections in furnaces of different widths, whereby the grate-sections may be made in a minimum number of sizes and may be accurately fitted to furnaces differing widely in their cross dimensions. I effect this object by dividing the magazine into two sections, which may be separated or spread with respect to each other to fit the grate-sections to the furnace, as I will explain in detail.

My invention also provides for the provision of lifting wings or sections on the feed-screw by means of which the fuel will be more effectively distributed into the magazine and projected toward the open upper end thereof.

My invention further provides, in a stoker of the class described, for a steam-supply to the twyer-blocks to assist in the combustion of the fuel, which steam-supply may be augmented by an additional auxiliary air-feed when the character of the fuel under consumption requires it.

My invention further provides for means by which a liquid hydrocarbon may be conveniently and effectively intermixed with the solid combustible in the magazine when the latter is of poor quality, as I find in practice that a very small proportion of oil is sufficient to enrich very poor fuel to make the same of a highly-combustible nature.

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

Figure 1 is a cross-sectional view through the fire-box of a boiler, showing my present improvements; Fig. 2, a horizontal section taken below the line of the boiler, showing the grate-surfaces and twyer in plan; and Fig. 3, a longitudinal section on the line 3 3 of Fig. 1.

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

1 1 are the side walls of an ordinary boiler-furnace, 2 the front wall thereof, and 3 the bridge-wall.

4 represents the magazine, which is illustrated as being made of two cast sections 5 5',

formed with ribs 6 to strengthen the sections and to increase the radiating surface thereof, said sections being connected together at their lower ends by bolts 7. By making the magazine in two sections, as shown, the sections may be spread more or less to fit the grates to furnaces the side walls of which are separated to varying extents. At the inner end the magazine 4 is formed with a bearing 8 for the shaft 9 of a feed-screw 10. The feed-screw extends through the throat 11 of the magazine below a hopper 12, to which the fuel is supplied in any suitable way. The feed-screw 10 is driven in any suitable way—as, for instance, through a gear and worm 13, connected to the shaft 9 outside of the fire-box. The upper walls of the magazine are formed by hollow twyer-blocks 14, made, preferably, in sections secured together in any suitable way, said twyer-blocks resting upon a flange 15, cast with the magazine-sections 5 5'. The twyer-blocks 14 are provided with studs 16, which pass through the flanges 15 and are keyed in place, as shown.

17 17' are the two grate-surfaces, which may be of any suitable character—stationary, shaking, or dumping. Ordinary stationary grate-sections are shown, carried on one side upon flanges 18, cast integrally with the twyer-blocks and formed at their other edges with lugs 19, which are embedded in the side walls 1 1 of the furnace. It will be obvious that by spreading the sections 5 5' of the magazine to a greater or less extent and by inserting additional sections of twyer-blocks at the front and back of the magazine the grate-surfaces 17 17' may be accurately fitted to wider furnaces than that indicated without in any way affecting the operation of the apparatus.

The section 5' of the magazine is formed with a wing or deflecting-plate 20, which at its lower end partially surrounds the feed-screw 10. The object of this deflecting wing or partition is to direct the fuel toward the section 5 of the magazine, so as to equalize the fuel-supply to the two grate-surfaces. If this deflecting wing or partition were not used, the rotation of the feed-screw in the direction of the arrow would tend to force a greater supply of fuel toward the grate-surface 17' than toward the grate 17. The deflecting wing or plate 20 may be cast integrally with the section 5' of the magazine, but preferably it is in the form of a hollow box removably secured to the section of the magazine, as illustrated. By making the plate or wing in the form of a hollow box it may be perforated, as shown at 20', and be supplied by a suitable conveying-pipe 21 with a liquid hydrocarbon, such as petroleum of low grade, which will intermix with the fuel in the magazine, so as to enrich the same. I find in practice that fuel of very low grade will be sufficiently enriched as to be highly combustible by the addition of a small proportion of low-grade petroleum thereto. The

perforated twyer-blocks 14 are preferably supplied with steam introduced at any point—as, for instance, through a steam-pipe 21, which steam in issuing from the openings in the twyer-blocks will mingle with the combustion-gases to increase the combustion in the usual way. With some classes of fuel an additional air-supply may be desirable to increase the combustion effect, and I therefore preferably provide the twyer-blocks with a series of petcocks 22, which may be opened when this additional air-supply is necessary. The steam entering the hollow twyer-blocks and escaping through the orifices thereof will result in a diminution of the air-pressure within such blocks, so that when the petcocks 22 are opened air from the ash-pit beneath the grate may enter the twyer-blocks, so as to escape through the openings therein with the steam. The forcing of air or steam through the twyer-blocks above the grate-surfaces also results in the creation of a natural draft in the ash-pit to effect combustion of the fuel on the grate-surfaces in the usual way.

Preferably the side walls 1 1 of the furnace are provided with air-passages 23 therein, connecting with the outside air at the front of the furnace, which passages communicate with a passage 24 in the bridge-wall 3, and leading out of said passage 24 are the openings 25, by means of which air will be permitted to mingle with the products of combustion beyond the bridge-wall. By thus introducing an additional air-supply to the products of combustion after they have passed beyond the furnace any combustible gases in such products will be immediately consumed.

Preferably the feed-screw 10 is formed with a series of lifting-wings 26, which extend slightly beyond the line of the screw, so as to engage the bottom of the magazine 4, as shown in Fig. 1. These lifting-wings do not interfere with the proper longitudinal feed of the fuel into the magazine, and they assist materially in the elevation of the fuel toward the twyer-blocks. The said lifting-wings also tend to clean out the bottom of the magazine to prevent the accumulation therein of fine dust, which might otherwise interfere with the operation. These lifting-wings may be either imperforate or they may be perforated, both of which constructions are illustrated. In Fig. 1 I illustrate the shaft 9 as being tubular and provided with openings 27, through which an air-blast may be introduced into the magazine, which air will pass up through the fuel therein to assist in the combustion. When such an air-supply is not desirable, however, the shaft 9 may be made continuous. Instead of using either a tubular shaft, as shown in Fig. 1, or a continuous shaft, as illustrated in Fig. 2, the shaft 9 may be made of sections, as indicated in Fig. 3, each section carrying a part of the feed-screw and also one or more of the lifting-wings 26 if

used. Such sections will be locked together by interlocking tenons 28 or other interlocking joints, and they may be strung continuously upon a shaft 29, as shown, whereby a very strong and durable construction will be secured. By making the feed-screw of sections, as indicated, it will be understood that one or more of such sections may be removed and replaced when worn.

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

1. In an automatic stoker of the class described, the combination with a magazine and a feed-screw supplying fuel thereto, of a removable deflecting wing or partition secured to the magazine and forming one of the inner surfaces of said magazine, the wing or partition partially surrounding the feed-screw, substantially as and for the purposes set forth.

2. In an automatic stoker, the combination of a magazine made in two sections so secured together as to permit a relative spreading thereof, sectional twyer-blocks carried by the upper part of the magazine, and grate-surfaces carried by said twyer-blocks, substantially as set forth.

3. The combination with a furnace, of a magazine carried on the floor of the ash-pit so as to divide the ash-pit in two non-communicating parts, and two grate-sections connected to the magazine on both sides thereof, substantially as set forth.

4. In an automatic stoker, the combination

with a magazine, of a feed-screw for feeding fuel thereto, and a series of lifting wings or partitions on said feed-screw, substantially as set forth.

5. In an automatic stoker, the combination with a magazine, of a feed-screw for feeding fuel thereto, and a series of lifting wings or partitions on said feed-screw, said lifting wings or partitions extending diametrically beyond the line of the feed-screw, substantially as set forth.

6. In an automatic stoker of the class described, the combination with a magazine and a feed-screw supplying fuel thereto, of a hollow perforated wing or partition carried by the magazine and partially surrounding the feed-screw, and means for supplying a combustible fuel element to said wing or partition, substantially as set forth.

7. In an automatic stoker of the class described, the combination with a magazine and a feed-screw supplying fuel thereto, of a hollow perforated wing or partition carried by the magazine and partially surrounding the feed-screw, and means for supplying a liquid hydrocarbon to said hollow wing or partition, substantially as set forth.

This specification signed and witnessed this 3d day of August, 1900.

JOHN MACCORMACK.

Witnesses:

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JNO. R. TAYLOR.