

No. 701,602.

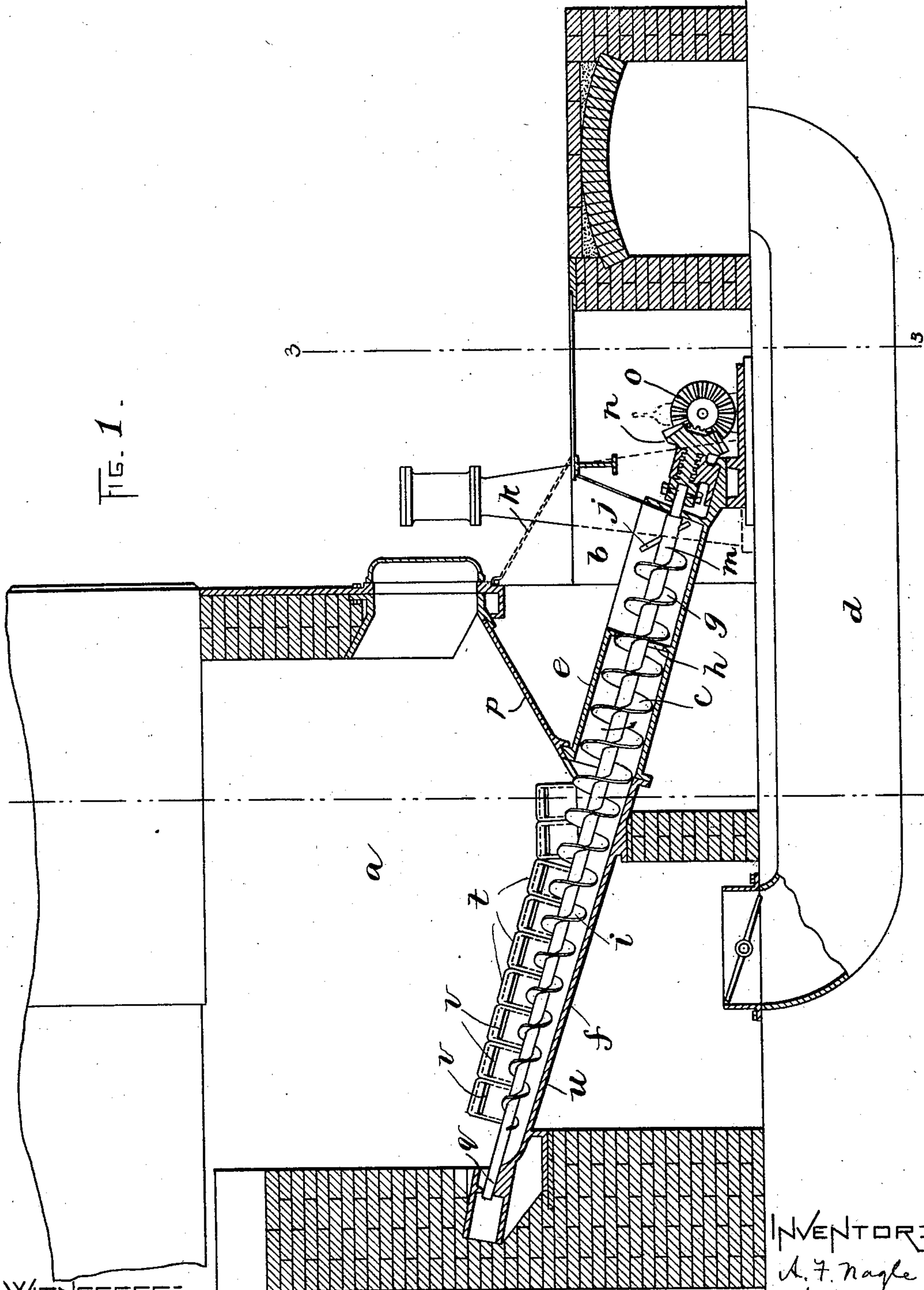
Patented June 3, 1902.

A. F. NAGLE.  
MECHANICAL STOKER.  
(Application filed July 8, 1901.)

(No Model.)

2 Sheets—Sheet 1.

FIG. 1.



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George Ryznar

INVENTOR:  
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Myrtle Brown Quincy  
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A. F. NAGLE.  
MECHANICAL STOKER.  
(Application filed July 6, 1901.)

2 Sheets—Sheet 2.

(No Model.)

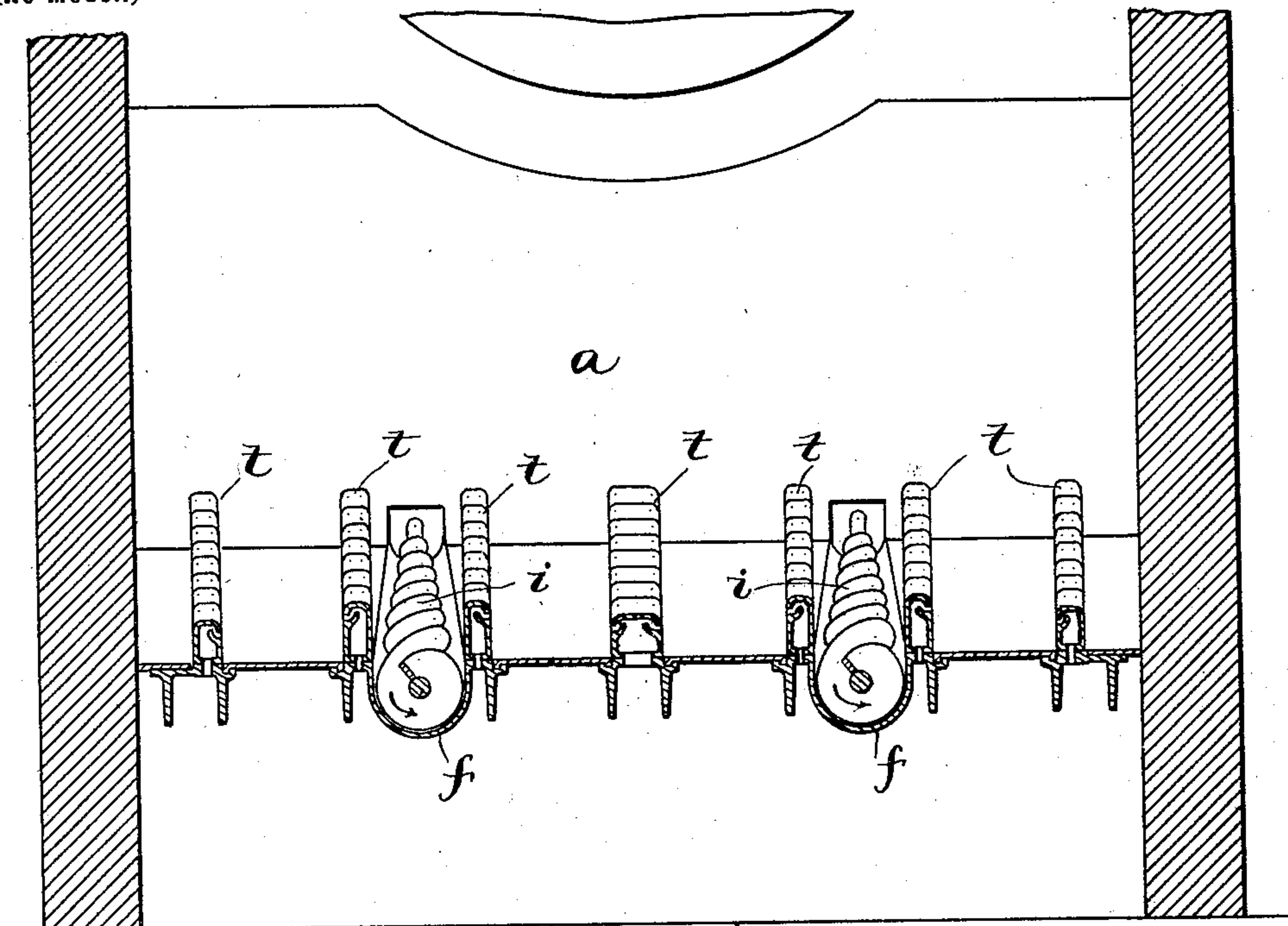
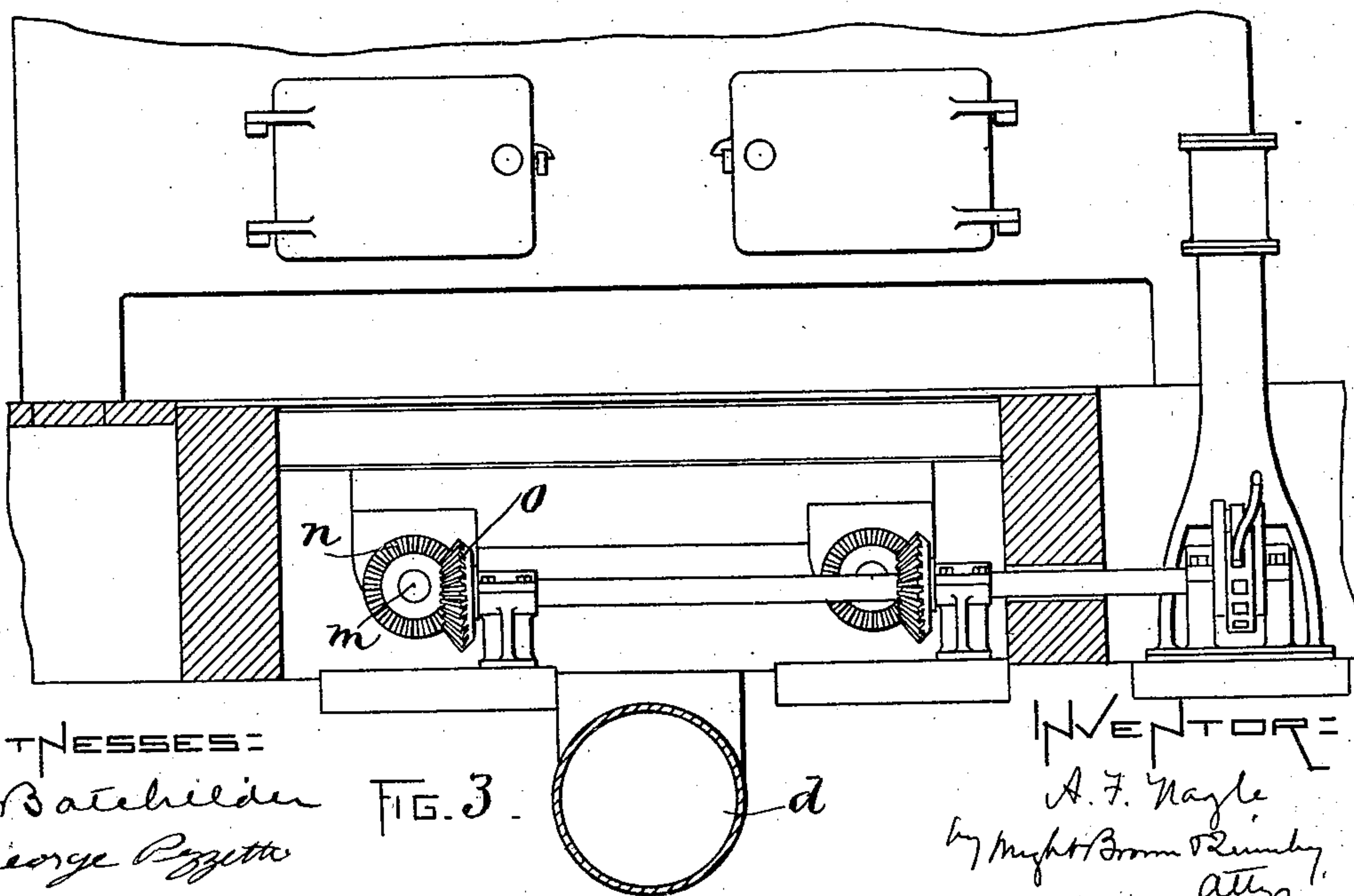


FIG. 2.



WITNESSES:  
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FIG. 3.

INVENTOR:  
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# UNITED STATES PATENT OFFICE.

AUGUSTUS F. NAGLE, OF MONTCLAIR, NEW JERSEY, ASSIGNOR TO EARLE H. GOWING, OF READING, MASSACHUSETTS.

## MECHANICAL STOKER.

SPECIFICATION forming part of Letters Patent No. 701,602, dated June 3, 1902.

Application filed July 6, 1901. Serial No. 67,344. (No model.)

*To all whom it may concern:*

Be it known that I, AUGUSTUS F. NAGLE, of Montclair, in the county of Essex and State of New Jersey, have invented certain new and  
5 useful Improvements in Mechanical Stokers, of which the following is a specification.

My improvements in mechanical stokers for furnaces relate to peculiarities of construction and arrangement of the screw conveyers and of parts associated therewith for  
10 feeding forward and distributing the fuel.

A distinguishing feature of my invention designed to prevent clogging the conveyer is the formation of the conveyer-screw with  
15 its blades or spiral flight of less diameter at the lower end, where they rotate in the hopper, than they are within the conveyer-tube, the throat or entrance to such tube being correspondingly reduced. Another novel feature  
20 to prevent packing of the fuel is a stirring-disk secured obliquely on the conveyer-shaft as an axis and having a gyratory motion as the shaft rotates. These features may be used together or separately in the hopper.

25 In my apparatus the conveyer rises obliquely from the bottom of the hopper to feed the fuel to the center and rear of the furnace, the bottom of which is inclined, and the conveyer extends within the furnace along a  
30 trough-like depression in the bottom, the spiral flanges being gradually diminished in height or diameter as the fuel is distributed at each side thereof. The inner end of the conveyer-shaft projects into a peculiar open  
35 bearing, through which it may protrude when elongated by heat. This open bearing also facilitates insertion of the shaft and its removal when required for repairs or otherwise, a limited longitudinal movement thereof serving  
40 to release its opposite end from its bearing, when the entire conveyer may be removed. For this purpose the oblique plate near the furnace-mouth and above the conveyer-tube is made removable, as is also the  
45 hopper-cover. An air-blast beneath and through the furnace-bottom supplies oxygen to support combustion, the current being admitted through twyers of peculiar construction each side of the conveyer-trough. My  
50 twyers are cast hollow with downwardly-extending air-exits in their outer faces well

above the inclined base-plates, so that they will not be clogged by fuel forced over them by the conveyer-screw nor by the accumulation of ashes. 55

In the drawings, Figure 1 is a vertical longitudinal section through a boiler-furnace embodying my invention. Fig. 2 is a transverse section on line 2 2 of Fig. 1, and Fig. 3  
60 an elevation about on line 3 3 of Fig. 1.

In said drawings, *a* represents the furnace proper, *b* the coal-hopper, and *c* the conveyer-screws, rising from the bottom of the hopper at an inclination about the same as the main floor of the furnace. One, two, or more of  
65 these conveyers will be employed, the bed of each being an inclosing tube *e* and an elongated trough *f*.

The peculiarities of the conveyer are well shown in Fig. 1. The lower coils *g* of the  
70 screw being exposed to the coal in the hopper are made of less diameter than the adjacent coils within the tube *e*, so that less coal than the full capacity of the conveyer-tube will be taken up by the screw. Hence all  
75 danger of clogging is avoided. This feature is advantageous in screw conveyers otherwise differently arranged. The throat *h* where the screw enters the tube *e* is smaller than the tube and limits the amount of fuel  
80 entering it. An obliquely-arranged stirring-pin *j* is fixed rigidly upon the conveyer-shaft *m* adjacent to the lower end of the spiral flange, where it serves to loosen the coal in the hopper. At the upper end of the screw,  
85 within the furnace, the coils *i* of the spiral flange are gradually reduced in height or diameter as the coal is thrown off laterally from the trough. The comparative height of the flanges at different points will be varied ac-  
90 cording to the nature of the fuel and other circumstances.

Raised twyers *t* are arranged at the sides of the conveyer-screw to admit air without danger of the air-vents becoming clogged by  
95 the fuel or ashes. Said vents *v* are formed in the outer faces and near the top of the twyers, so that coal and ashes cannot enter. Air is admitted to the twyers under pressure through the inclined bottom *u* of the furnace  
100 from the air-chamber beneath it, to which chamber it is supplied through air-duct *d*,



leading from a fan or compressed-air reservoir. (Not shown.) Intermediate twyers having openings or vents in both faces are shown in the center of Fig. 2.

5 The shafts *m* of the conveyer-screws will be driven by any suitable motor, and gearing *n o*, applied at the lower ends, may operate both screws in unison. The arrangement shown in Fig. 3 is appropriate. For insertion  
10 and removal of the shaft *m* when required I make it detachable at bottom from the gearing and mount its upper end in an open bearing *q*, having space beyond the bearing-point, into which the tip of the shaft may protrude,  
15 if required. The inclined ash-plate *p*, Fig. 1, within the furnace-mouth being removable, as well as the upper side of the conveyer-tube *e* beneath it, it is feasible to raise and remove the shaft and screw or to gain access  
20 to them for any repairs. The hopper-cover *k* (shown in dotted lines in Fig. 1) is removable when desired. When said cover is in place, ashes may be removed up the inclined plate *p*, out through the door, and down along  
25 said cover and the floor beyond it to or in any proper receptacle.

I claim—

1. A furnace fuel-feeder comprising in its construction a fuel-hopper, a screw conveyer  
30 for transporting the coal from the fuel-hopper to the furnace, means for obtaining a smaller carrying capacity at the bottom of the hopper than in the passage leading from the hopper to the furnace, such means consisting in re-  
35 ducing the diameter or pitch of the screw in the part which lies in the hopper, as compared with the part within the conveyer-tube.

2. A furnace fuel-feeder comprising in its construction a fuel-hopper, a screw conveyer  
40 for transporting the coal from the fuel-hopper to the furnace, in combination with a conveyer-tube having a contracted opening or throat at the inlet of the hopper, said conveyer-screw being of less diameter in the hopper  
45 than in the passage leading from the hopper to the furnace.

3. A furnace fuel-feeder comprising in its construction a fuel-hopper, a screw conveyer for transporting the coal from the fuel-hopper  
50 to the furnace, and an obliquely-set stirring device fixed on the conveyer-shaft at the end of the screw which lies in the hopper.

4. In a mechanical stoker, a coal-hopper located below the line of the boiler-room floor  
55 at or near the front of the furnace, upwardly-inclined bottom plates at the rear portion of the furnace for the support of the coal during combustion, means for transferring the coal from the hopper to said rear portion of the  
60 furnace, an inclined ash-plate within the front end of the furnace for the deposit and removal of ashes, and means for supplying air beneath the coal to secure combustion.

5. In an underfeed-stoker, a coal-hopper lo-  
65 cated below the line of the boiler-room floor

at or near the front of the furnace, an upwardly-inclined conveyer-tube leading from the bottom of the hopper into the lower portion of the furnace, an upwardly-inclined  
70 trough extending backward from the end of the conveyer-tube to the rear part of the furnace and having for an axis a continuation of the axis of the tube, an upwardly-inclined screw conveyer extending from the bottom of  
75 the hopper through the tube and trough to the rear end of the furnace, and means for driving said conveyer, in combination with rows of upwardly-inclined twyers placed at the sides of the trough, a downwardly-inclined  
80 ash-plate located at the front end of the furnace and extending from the level of the fire-door downward to the front end of the trough, a number of ash-plates inclined upward and placed parallel with the trough and filling the  
85 openings between contiguous rows of twyers and between twyers and the walls of the furnace, and means for supplying the twyers with air under pressure, substantially as set forth.

6. In an underfeed-stoker, a coal-hopper lo-  
90 cated below the line of the boiler-room floor at or near the front of the furnace, an upwardly-inclined conveyer-tube leading from the bottom of the hopper into the lower portion of the furnace and having a restricted  
95 opening, an upwardly-inclined trough extending backward from the end of the conveyer-tube to the rear part of the furnace, an upwardly-inclined screw conveyer extending from the bottom of the hopper through the  
100 tube and trough to the rear end of the same, the conveyer being of smaller diameter in that portion which lies in the hopper and extends through the restricted opening in the  
105 lower end of the tube than it is in the portion lying within the tube, and being of gradually reduced diameter from the front end of the trough to the rear end of the trough, in combination with means for driving said conveyer, one or more rows of upwardly-inclined  
110 twyers placed at each side of the trough having air-openings into the furnace situated several inches above the ash-plates to allow for the accumulation of ashes below the openings, a downwardly-inclined ash-plate located  
115 at the front end of the furnace extending from the level of the fire-door downward to the front end of the trough, a number of upwardly-inclined ash-plates parallel to the trough and filling the openings between con-  
120 tiguous rows of twyers and between twyers and the walls of the furnace, and means for supplying the twyers with air under pressure, substantially as set forth.

In testimony whereof I have affixed my signature in presence of two witnesses.

AUGUSTUS F. NAGLE.

Witnesses:

JAS. H. CHURCHILL,  
E. BATCHELDER.