

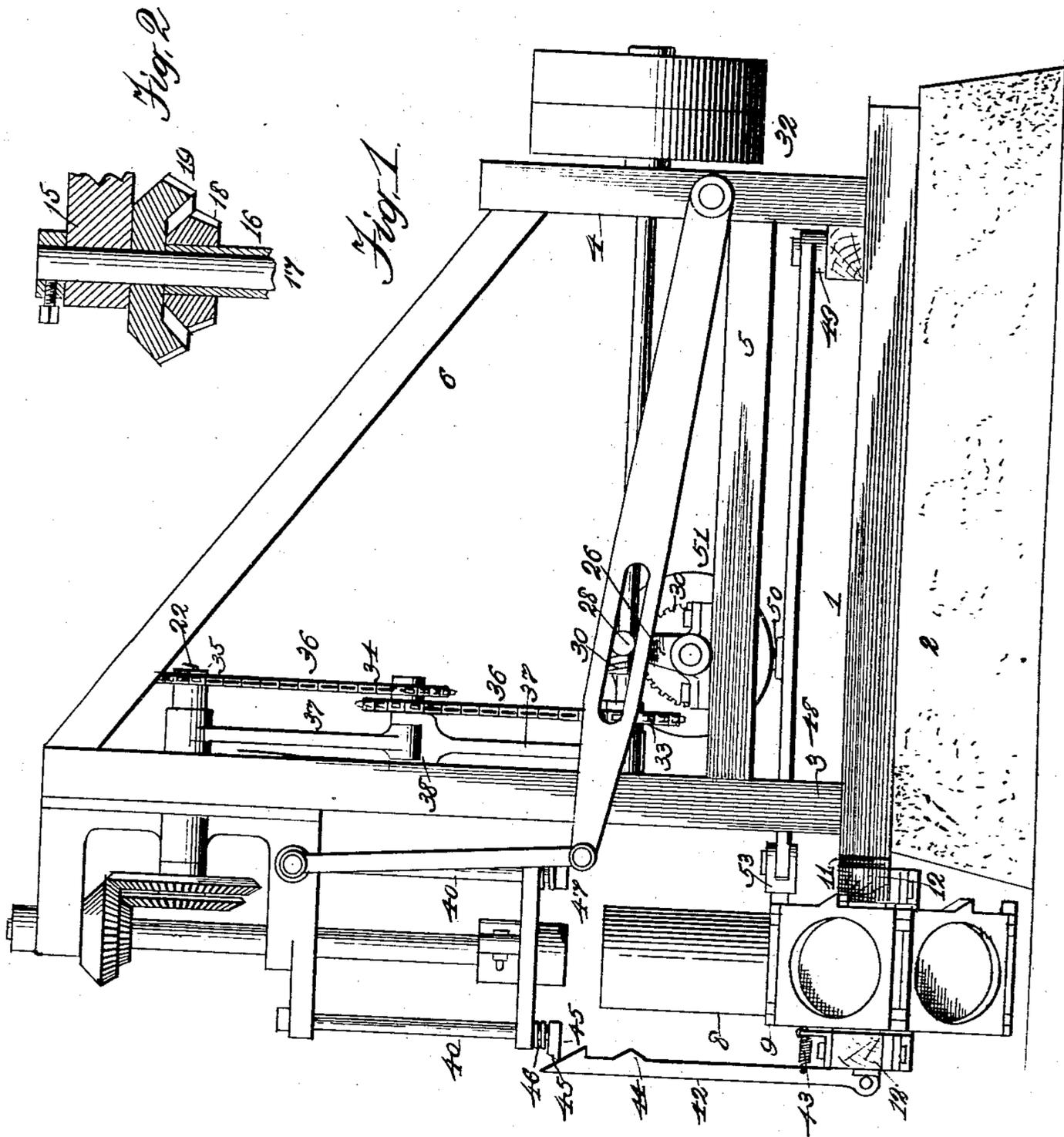
No. 859,377.

PATENTED JULY 9, 1907

G. FERGUSON.  
TILE MACHINE.

APPLICATION FILED FEB. 8, 1907.

2 SHEETS—SHEET 1.



Witnesses.  
L. A. Dr. John  
W. A. Hubbard

Inventor  
George Ferguson  
By J. M. G. John  
Atty.

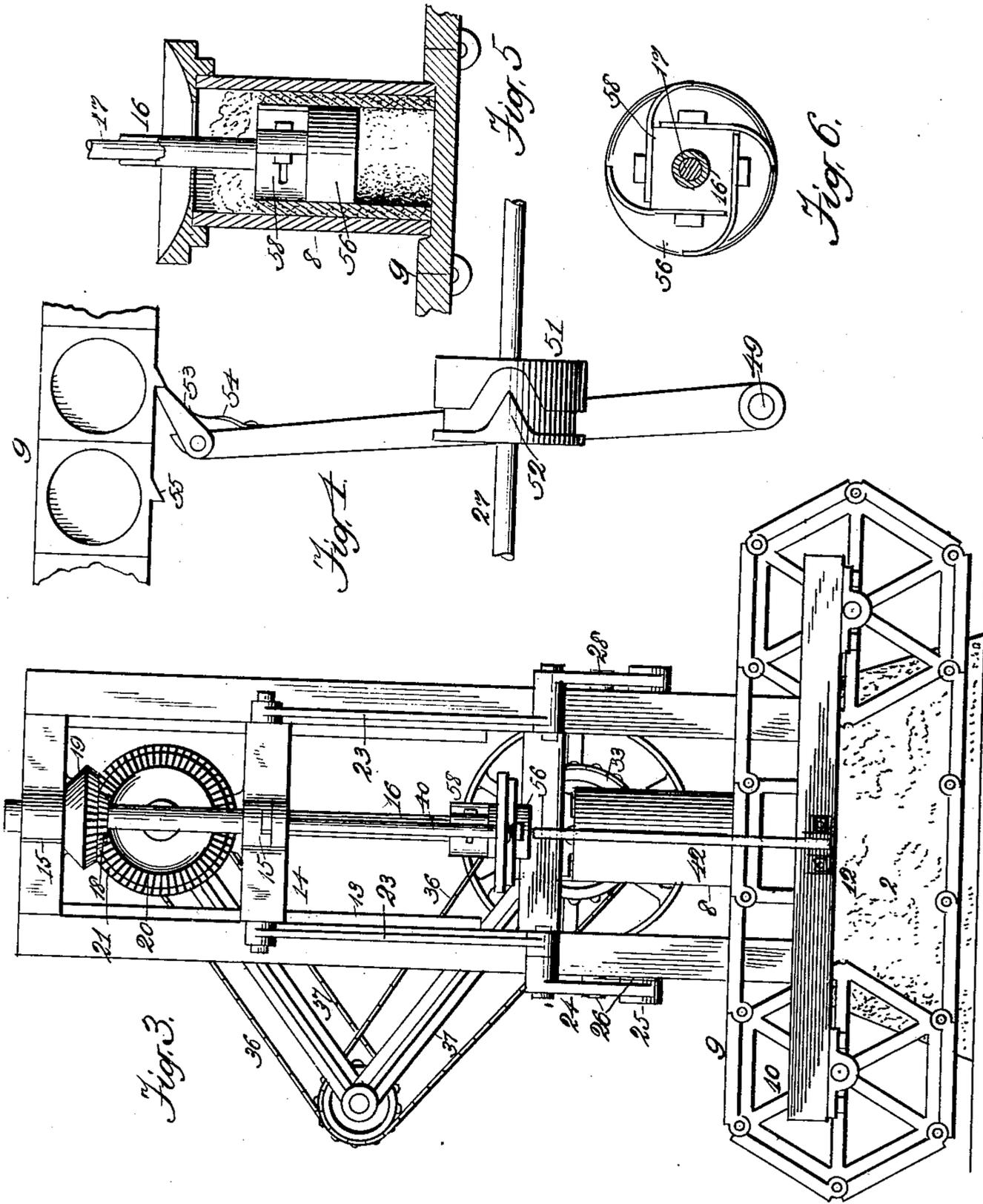
No. 859,377.

PATENTED JULY 9, 1907.

G. FERGUSON.  
TILE MACHINE.

APPLICATION FILED FEB. 8, 1907.

2 SHEETS—SHEET 2.



Witnesses

L. A. St. John.  
W. A. Bennett

Inventor  
George Ferguson  
By J. M. St. John  
Att'y.

# UNITED STATES PATENT OFFICE.

GEORGE FERGUSON, OF WATERLOO, IOWA.

## TILE-MACHINE.

No. 859,377.

Specification of Letters Patent.

Patented July 9, 1907.

Application filed February 8, 1907. Serial No. 356,332.

To all whom it may concern:

Be it known that I, GEORGE FERGUSON, a citizen of the United States, residing at Waterloo, in the county of Blackhawk and State of Iowa, have invented certain new and useful Improvements in Tile-Machines, of which the following is a specification.

This invention relates to the manufacture of tile from plastic material, more particularly concrete or the like; and the object of the invention is to produce a machine for this purpose adapted to form such material into tile, or similar tubular structures, which becomes a finished product by the simple process of drying.

The invention embodies certain modifications in structure of a machine, the type of which is illustrated and described in an application of even date herewith by the same applicant. The main difference between this invention and that referred to is that in this machine the forming-head for the interior of the tile is made to move up and down and revolve simultaneously, the mold or matrix remaining stationary.

This invention also embodies a modified form of mold-carrier or table and other minor details which will be set out in full hereafter.

In the accompanying drawing forming a part of this specification Figure 1 is a side elevation of a machine embodying the invention. Fig. 2 is a sectional detail illustrating the driving pinions for the revolving forming-head. Fig. 3 is a front view of the machine. Fig. 4 is a fragmentary top view illustrating the feed mechanism which actuates the mold-carrier. Fig. 5 is a sectional view illustrating the forming-head and related parts in the act of forming a tile and Fig. 6 is a plan view of a forming-head.

This machine is designed to take a plastic material, such as concrete, and form the same inside a mold or matrix into a tubular structure, such as tile, sewer pipe, or the like, by the action of a rapidly revolving head or core corresponding to the bore of the finished product. In my said former application the construction was such as to retract the mold from the revolving-head downwardly, whereas in this application the construction is reversed, the mold remaining stationary during the formation of the tile, while the head is both revolved and moved up and out of the mold simultaneously.

Referring now to the drawings, more particularly Fig. 1, the frame of the machine comprises suitable sills 1 preferably mounted on a stable base 2 of concrete or the like. From the sills rise upright posts 3 and 4 at the front and rear respectively, connecting by suitable cross-beams 5 and 6. The posts are also connected by transverse beams 7 and on the frame thus constructed are mounted the various metal parts hereafter to be described.

The matrix 8 which receives the plastic material is a tubular structure, preferably hinged so as to open and allow the tile to be easily removed, the particular construction of which need not, however, be described. This mold when in operation rests in a suitable socket formed in the carrying-plate or table 9 serving as its support. This table is shown as one of a series of similar tables linked together and so forming an endless carrier. It is mounted on sprockets 10 mounted on axles 11 supported by forwardly extending sills and an outside cross-beam 12. Provision is made for feeding these carrier tables successively into proper position with respect to the head which forms the bore of the tile, as will be described presently. Near the top of the front posts is mounted in suitable guides 13 a cross-head 14 provided with bearings 15 taking the shaft of the former-head which will be described in detail later. This shaft comprises an external tubular shaft 16 and an internal shaft 17. To the former is connected a pinion 18 and to the latter a larger pinion 19. These engage corresponding gears 20 and 21 secured to a shaft 22 mounted in the cross-head above mentioned. The cross-head is connected by links 23 to a pair of levers 24 pivoted at 25 and oscillated by cranks 26 on a shaft 27, the wrists 28 of which engage slots 29 in said levers. This shaft is driven by a worm 30 engaging worm-gear 31, the shaft being provided with suitable tight and loose pulleys 32. This shaft also carries a sprocket 33 which drives the gearing for the former head through the medium of sprockets 34 and 35 and sprocket chains 36. As the gearing moves up and down with the cross-head it is necessary to make provision for this vertical movement with respect to the driving mechanism. This construction as shown in Figs. 1 and 2, comprises a pair of toggle arms 37 connecting by a knuckle 38 at the middle and at which center the idle sprockets 34 are mounted and at the other ends pivoted on the same centers as the shafts 24 and 39 carrying the gears above mentioned. This construction, as will be evident, is such that a comparatively rapid revolution may be imparted to the former-head and a slow reciprocating vertical movement at the same time.

On suitable guides 40 attached to the cross-head is mounted a top-plate or pallet which forms the cap for the top of the mold and defines the upper edge of the tile. This pallet is in the nature of an annular ring flanged to fit over the top of the mold with a sort of cup-like cavity in the top to receive the charge of plastic material when the former-head is down in the mold. This pallet is free to slide on the guides so that the cross-head may descend to the full limit of its movement while the pallet is resting on the top of the mold. As the cross-head reaches the limit of its downward movement the pallet is forced into connection with a retaining hook 42 which is snapped into engagement

with the pallet by means of a spring 43. At a suitable point on this lever is a hump 44 which in the upward movement of the cross-head engages a cam 45 and this releases the hook so that the pallet may rise and the mold move out from under it. Preferably the guides are provided with springs 46 between the terminal heads 47 and the pallet-plate, so that the utmost nicety is not required in adjusting the action of the pallet-plate with reference to the engaging hook.

The carriers for the mold are moved in one direction by the swing of an arm 48 pivoted at 49 and provided with a stud or roller 50 engaging a cam 51, best shown in Fig. 4. This cam, as will be seen, has a short, angled shoulder 52 which acts quickly on the arm 48 and at the time when the forming-head is elevated above the top of the mold. The free end of the arm is provided with a pawl 53 held in engaging position by a spring 54 and adapted to engage successively lugs 55 on the edges of the mold-carrying tables. By this means the tables are advanced step by step, the finished tile being discharged to one side out of the path of the succeeding mold and in a position to be conveniently removed by the operator. While the former is descending, the operator has time in which to place a mold in the next succeeding carrier-recess, as well as to charge the receiving pallet with material for the next tile. A special advantage incident to this type of mold-carrier is that it is very compact in the direction in which room is desirable, that is to say, from front to back, enabling the operator to stand as close to the work as he desires for convenience in placing the mold, supplying material and removing the finished product.

The head for forming the interior of the tile is fully described in the other application, to which reference has been made, and need not be further described herein except to state that it is made in two parts, one a solid plug or disk 56 attached to a central shaft 57 and the other a winged head 58 running close to the disk and secured to a tubular shaft 59 through which the solid shaft passes. These heads revolve at different rates of speed and by their conjoint action throw the charge of plastic material up against the walls of the in-

closing mold and form it smoothly inside, as fully and specifically set forth in the other application.

Having thus described my invention, I claim:

1. In a tile machine, the combination of a forming-head composed of two or more differently rotating parts, a mold conforming to the exterior of the tile and concentric with said head and mechanism substantially as described to rotate said heads at differing rates of speed and simultaneously to raise and depress them.

2. In a tile machine, the combination with means for forming the interior of the tile of a mold conforming to the exterior, an endless carrier therefor socketed to receive the lower end of the mold, sprockets upon which said carrier is mounted and means for automatically advancing said carriers step by step when the former is raised out of the mold.

3. In a tile machine, the combination with a mold for the exterior of the tile, a head adapted to form the inside thereof, a cross-head in which said head is revolubly mounted, mechanism adapted to move the same up and down, a revolving shaft provided with a driving sprocket, a sprocket connecting with the shaft of the forming head by beveled gearing, toggle arms pivoted on the respective sprocket shafts and idle sprockets mounted concentric with the joint of said toggle arms, substantially as described.

4. In a tile machine, the combination with a mold for the outside of the tile, a forming head for the interior thereof, a cross-head adapted to raise and lower and to serve as a bearing for the axis of said head, a pallet or annular rim for the top of the mold, guides therefor, a hook to lock the same when depressed to operative position on the mold and means substantially as described to unlatch said hook when near the limit of the upward movement of the forming-head.

5. In a tile machine, the combination with a mold for the outside of the tile, a forming-head for the interior thereof, mechanism adapted to simultaneously revolve said head and raise and lower the same, an endless carrier for the mold, comprising a series of linked plates and carrying sprockets therefor and means for advancing said carrier step by step comprising a pivoted lever provided with a pawl to engage said carrier-plates and a cam adapted to shift said lever intermittently and while the forming-head is elevated above the mold.

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

GEORGE FERGUSON.

Witnesses:

E. COOLIDGE,  
H. BICKLEY.