

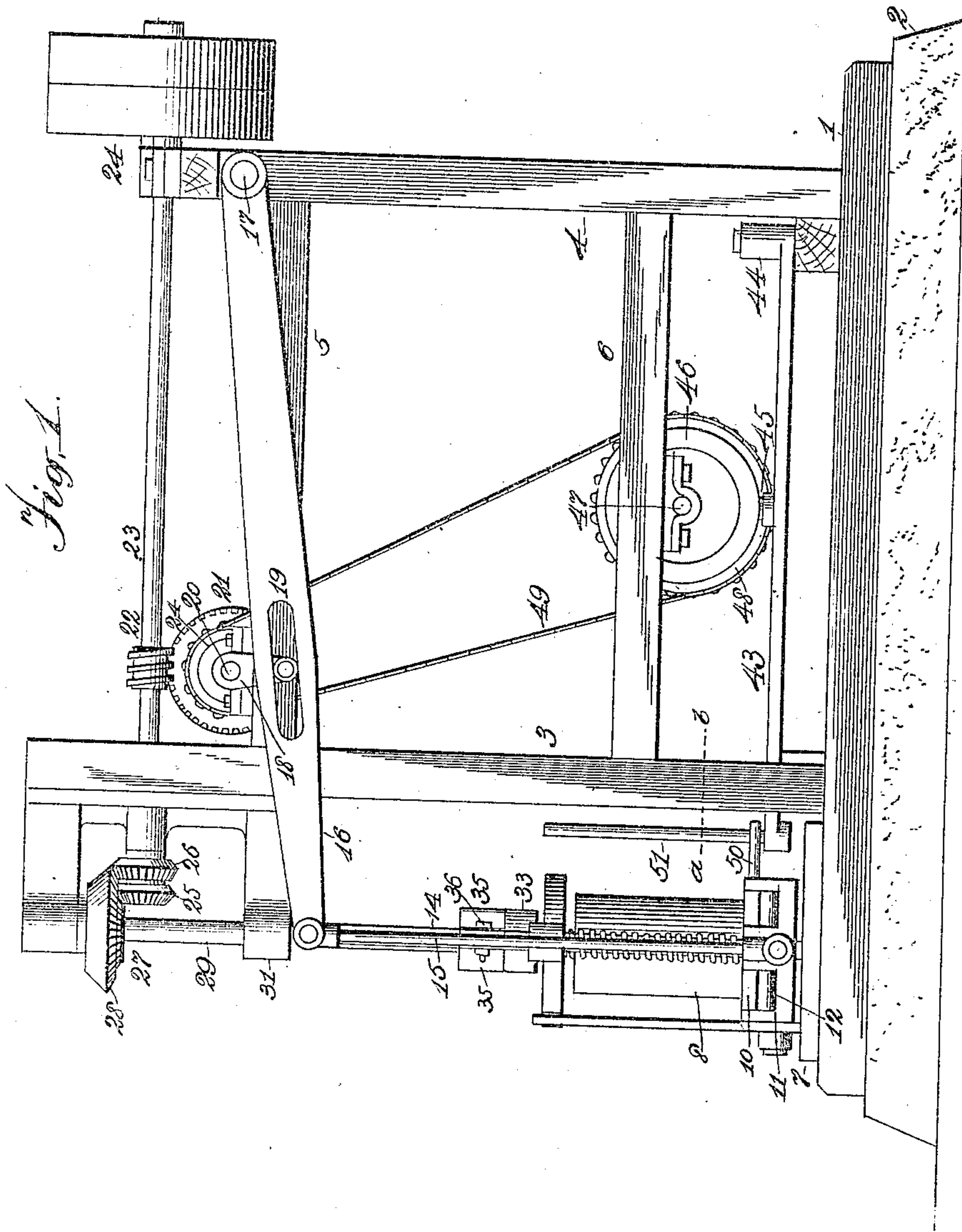
No. 859,287.

PATENTED JULY 9, 1907.

G. FERGUSON.  
TILE MACHINE.

APPLICATION FILED FEB. 8, 1907.

3 SHEETS—SHEET 1.



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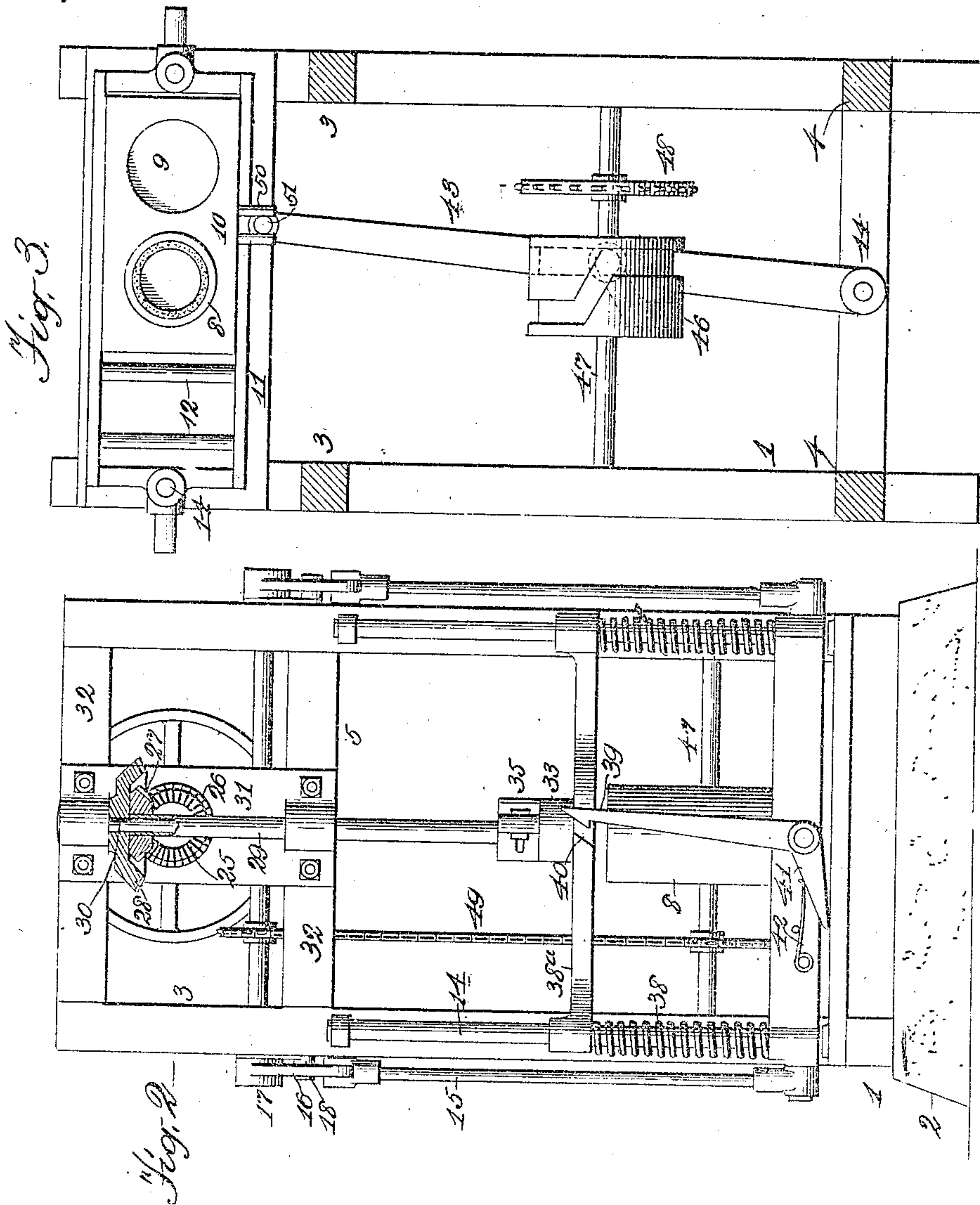
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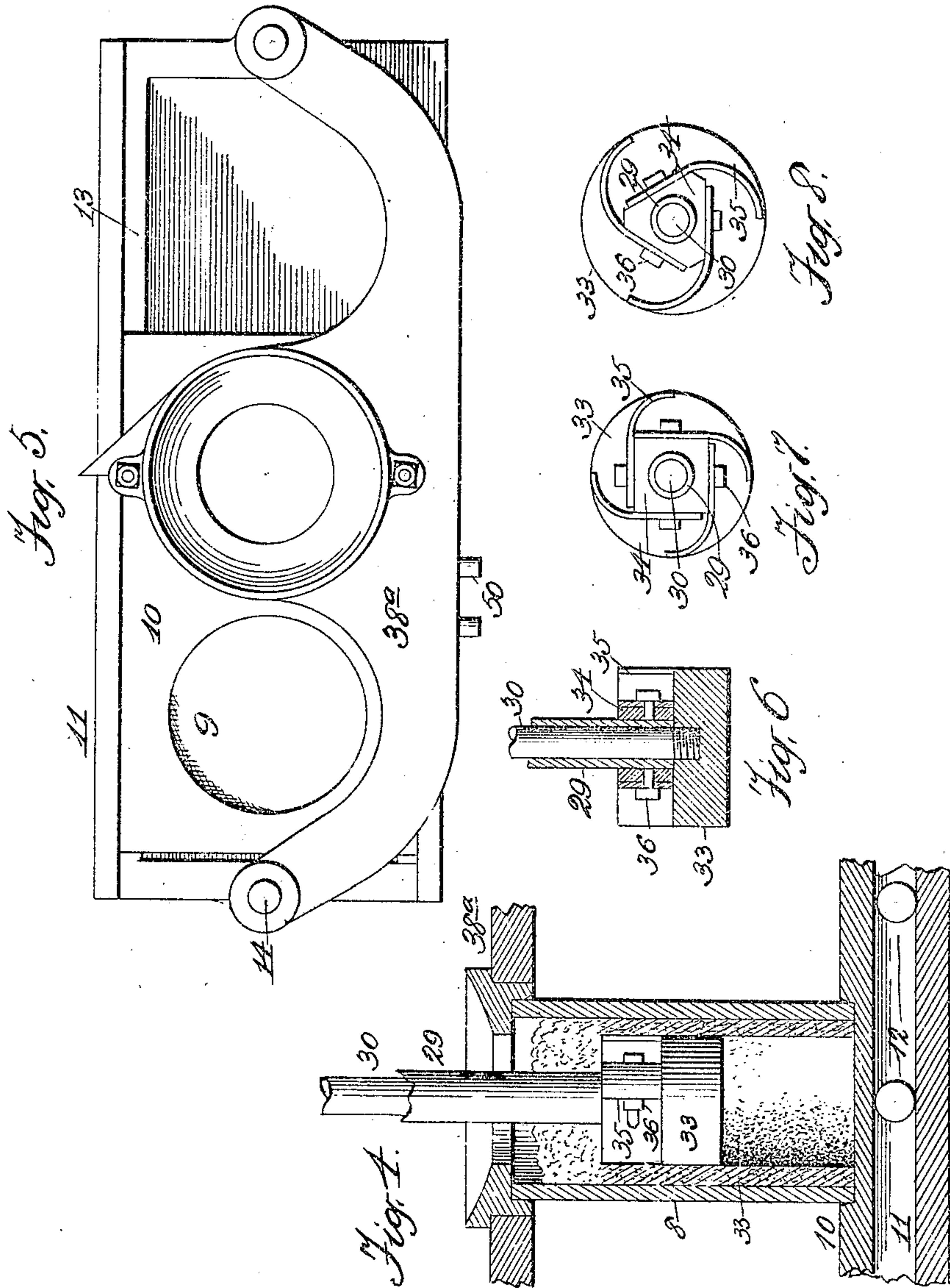
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3 SHEETS—SHEET 3.



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# UNITED STATES PATENT OFFICE.

GEORGE FERGUSON, OF WATERLOO, IOWA.

## TILE-MACHINE.

No. 859,287.

Specification of Letters Patent.

Patented July 9, 1907.

Application filed February 8, 1907. Serial No. 356,331.

*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 concrete or the like cementitious material; and has for its object to produce a machine whereby such tile may be perfectly and rapidly formed by nearly automatic operations.

The invention embodies an organized machine for producing cement tile and embraces as one of its more essential features a peculiar head for forming and finishing the interior of the tile.

The full nature of the invention will clearly appear in the specification and claims following, by reference to the accompanying drawings in which—

Figure 1 is a side elevation of a machine embodying my improvements. Fig. 2 is a front view of the same. Fig. 3 is a plan view of the same below the line *a—b* in Fig. 1. Fig. 4 is a sectional detail showing the mold and the forming head as in the operation of making the tile. Fig. 5 is a plan view illustrating the annular rim or pallet through which the material is deposited within the mold. Fig. 6 is a section of the forming head. Fig. 7 is a plan view of the same as seen from above. Fig. 8 shows a modification of the same.

The machine is designed to take a plastic material commonly known as concrete or the like, and by a combined pressing and rubbing operation, in connection with a suitable mold, to produce a tubular structure which on drying becomes a perfect tile. The machine will now be described as follows:

In the drawings is shown a suitable frame comprising a sill 1, preferably mounted upon a concrete base 2 and provided with upright posts 3 and 4 at the front and rear respectively; these are connected by suitable cross beams 5 and 6 and about this frame work the metal parts are suitably mounted, as will be described presently. At the front of the machine is mounted a suitable bed plate 7, preferably of iron, adapted to form a stable support for the tile mold 8 which conforms to the exterior of the tile. This mold is supposed to part into halves, but this feature I have not thought necessary to illustrate as it is of simple and well known construction. When in operative position the mold stands in a shallow recess 9 in a carrier 10 which is mounted to slide back and forth on a cross head 11. Preferably the carrier should ride on rollers 12 as shown, but need not necessarily, and in Fig. 5 it is shown resting on side ledges 13 of the cross head. The carrier is arranged to slide side-wise in either direction a distance somewhat more than the diameter of the mold, so that when a tile

has been formed and finished it is slid side-wise out of the path of the former and may be removed by the operator and another mold put into its place; the movement of the slide or carrier then reverses, bringing the new mold into operative position with respect to the former and discharging the finished mold on the other side, as clearly shown in Fig. 5. The construction is such that the operator may stand close to his work in front and within easy reach of the molds, the shifting of which is the only manual labor connected with the machine, except that of supplying the plastic material to the molds. The mechanism by which this carrier is moved back and forth will be described presently. The cross head is mounted to slide up and down on guides 14. The ends of the cross head connect by links 15 with a pair of long levers 16 pivoted at 17 and operated by the revolution of cranks 18, the wrists of which move in slots 19 as clearly shown in Fig. 1. The cranks 18 are connected at each end of a shaft 20 which is provided with a worm-gear 21 operated by a worm 22 on a shaft 23 provided with the driving and idle pulleys 24; the other end of this shaft is provided with a pair of pinions 25 and 26 which respectively engage gears 27 and 28 of different diameters. The former of these gears is attached to a tubular shaft 29, to the lower end of which is connected one portion of the forming head soon to be described. The other gear 28 connects with a shaft 30 running through said tubular shaft and having the other portion of the forming head attached to its lower end; these shafts are journaled in a bracket bearing 31 secured to cross-beams 32 connecting the posts 3. The effect of this construction, as will be evident, is to give differing rotary movement to the two parts of the head and this differential movement is of the highest importance as regards the work performed by the head.

Referring now to Figs. 4 to 8, the construction of this head will be clearly seen; the part 33 secured to the inner shaft 30 is simply a cylindrical plug or disk, preferably a little rounded at its upper edge so as to move freely up in the tile as it is being formed. The other part secured to the tubular shaft comprises an angular head 34 and one or more flat and curved wings 35 which are preferably slightly flexible and in practice are best made of steel, tempered to give a little elasticity. These wings are fastened to the head by cap screws 36 through slots 37 and are thus adapted to be adjusted very nicely, both to give the proper external diameter originally and also to take up any wear due to the abrasion of the material in use. The practical operation of this head is illustrated in Fig. 4, the head being here represented in the act of coming out, or in other words, with the mold descending. It will be understood that this action takes place simultaneously with



the revolution of the head, and during the operation the plastic material which is thrown in on top of the head when the latter is at the bottom of the mold, is thrown outwardly to the walls of the mold by the rapid revolution of the winged part and plastered against said walls much as a workman's trowel would do. The finishing follower head 33 also revolves, but at a different speed, (preferably slower than the winged part) and in its action serves to smooth and finish to a fine surface the interior of the tile. It will be evident from the mechanism shown in Fig. 1 that the rotation of the head is quite rapid as compared with the raising and lowering of the mold and its connected parts.

The annular pallet or rim 38<sup>a</sup> is shown mounted on the guides for the cross-head with coil springs 38 interposed between them; these springs serve to throw up the pallet when disengaged, as shown in Fig. 2. When in operative position it is locked down upon the mold, over which it shuts neatly, as shown in Fig. 4 as by a hook 39 engaging a shoulder 40. This hook is provided with a short arm 41 adapted to abut upon the bed plate when the cross-head is nearly depressed. A spring 42 throws the hook into engagement. In practice advantage is taken of the interval of time when the forming head is above the mold in which to engage and disengage this hook and also to shift the mold carrier. The latter movement is effected by means of a lever 43 pivoted at 44 and engaging by a suitable roll 45 and cam 46 mounted on a shaft 47; this shaft is driven at one-half the speed of the shaft 20 and by means of sprockets 24 and 48 and a sprocket chain 49. The cam itself is best shown in Fig. 3 and is made to shift the lever in both directions as indicated; moving, as it does, at one-half the speed of the upper shaft, it is evident that these cam faces successively operate the cam alternately and in time with the vertical movement of the mold cross-head, as above mentioned.

Referring to Fig. 5 it will be noted that the pallet plate is cut out at each side of the middle part, this being for convenience of the operator in putting in and taking out the mold.

The forming head is not only adapted to perform its work very efficiently, producing a smooth, compact and highly finished tile, but as before mentioned it is adapted to be adjusted to take up for wear and so preserve perfect uniformity in the tile. This is a great advantage in practice, inasmuch as it has been found that heads for this purpose formed of solid material are, by the attrition of the abrasive material of the concrete, rendered useless in a very short time.

One of the more important uses of the solid portion of the forming-head is to serve as a table to receive the charge of plastic material as deposited in the mold. This charge, as will be evident, is taken by the winged part of the head and by combined centrifugal and plastering action is distributed and deposited against the walls of the mold as the same slowly retreats downwardly. The winged part is made to run quite closely to the upper surface of the solid portion and inasmuch as the winged head revolves faster than the other, all the material is continuously wiped off the solid head and thrown outwardly against the walls of the mold.

This not only uses up all of the charge, but prevents any portion thereof escaping downwardly and lodging

in the carrier-plate which supports the mold. In case there should be an excess of material in the charge, this solid follower carries up such surplus and this, by the rotation of the wing, after passing up through the pallet-plate is thrown outwardly and deposited in a ring thereon.

It will be noted by reference to Fig. 1 that the mold and its connections has a vertical reciprocating action, whereas the lever which slides the mold carrier back and forth simply swings sidewise. This makes it necessary to extend the lever upwardly so that engagement with the mold carrier is not broken when it is moved up and down, as otherwise might happen through vibration or the like. This connection is very simple, comprising a pair of pins or lugs 50 straddling a simple post 51 running up from the free-end of the lever 43. This post need not necessarily be very stiff, since all the work of shifting the mold-table or carrier is done when at the bottom of its movement.

Having thus described my invention I claim:

1. In a tile machine, a forming-head for the interior of the tile composed of two or more parts revolving at different speeds. 85
2. In a tile machine, the combination of an external mold and a forming-head composed of two or more parts revolving at different speeds. 90
3. In a tile machine, the combination of a mold-carrier, the mold fitted therein, and a head composed of two or more parts revolving at different speeds.
4. In a tile machine, the combination of a mold, a bottom plate therefor an annular top ring or pallet and a forming-head for the inside, composed of two or more parts, revolving at different speeds. 95
5. A forming-head for a tile machine, composed of a smooth surfaced finishing portion and a winged part concentric therewith, the two parts of the head revolving at different speeds. 100
6. A forming-head for the interior of tile, comprising a solid, cylindrical plug or disk and a winged head mounted adjacent thereto and concentric therewith, the wings of said head being adjustable to take up for wear or the like. 105
7. A forming-head for the interior of tile, composed of a smooth surfaced cylindrical part and a separate head mounted adjacent thereto and concentric therewith and provided with one or more tangential curved and slightly flexible wings. 110
8. In a tile machine, a head substantially as described, comprising a smooth cylindrical finishing part and an adjacent head mounted concentric therewith and adapted to revolve at a different speed and having one or more curved tangential and adjustable wings. 115
9. In a tile machine, the combination of a mold for the exterior of the tile and revolving-head adapted to form the mold thereof, a bottom plate or carrier for the mold, an annular top ring or pallet therefor and mechanism adapted to revolve the forming-head and to slowly withdraw or retract the mold therefrom. 120
10. In a tile machine, the combination of an external mold, a lower support therefor, a pallet or annular ring for the top thereof, with a bore corresponding to the bore of the finished tile, a forming-head for the inside of the tile, means for revolving said forming-head, means for retracting the mold during the revolution of said head, a lock to hold the top plate in position during the forming of the tile and mechanism to release said lock and allow the top plate to lift on the completion of the tile. 125
11. In a tile machine, the combination of a forming-head corresponding to the bore of the finished tile, a mold corresponding to the exterior of the tile, a carrier plate to support said mold, a vertically reciprocating cross-head to support the carrier-plate and means substantially as described to move said carrier-plate alternately from side to side on the completion of a tile. 130
12. In a tile machine, the combination with mechanism substantially as described to form the tile, a carrier for 140



the tile mold, a cross-head adapted to move the same up and down, an oscillating lever engaging said carrier and a cam adapted to shift said lever alternately on the completion of a tile.

- 5 13. In a tile machine, the combination with tile forming mechanism substantially as described, of a tile mold carrier, a lever adapted to shift the same alternately from side to side, the said lever being extended upwardly to be in engagement with said carrier as the latter moves up and  
10 down, and means for shifting said lever alternately.

14. In an organized tile machine, the combination of a vertically reciprocating mold for the outside of the tile,

a revolving-head adapted to form the inside thereof, levers and connecting links adapted to move the mold up and down, cranks connecting with said levers and driving 15 mechanism substantially as described to revolve the forming-head and to slowly raise and lower said mold.

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

GEORGE FERGUSON.

Witnesses:

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H. BICKLEY.