

No. 773,732.

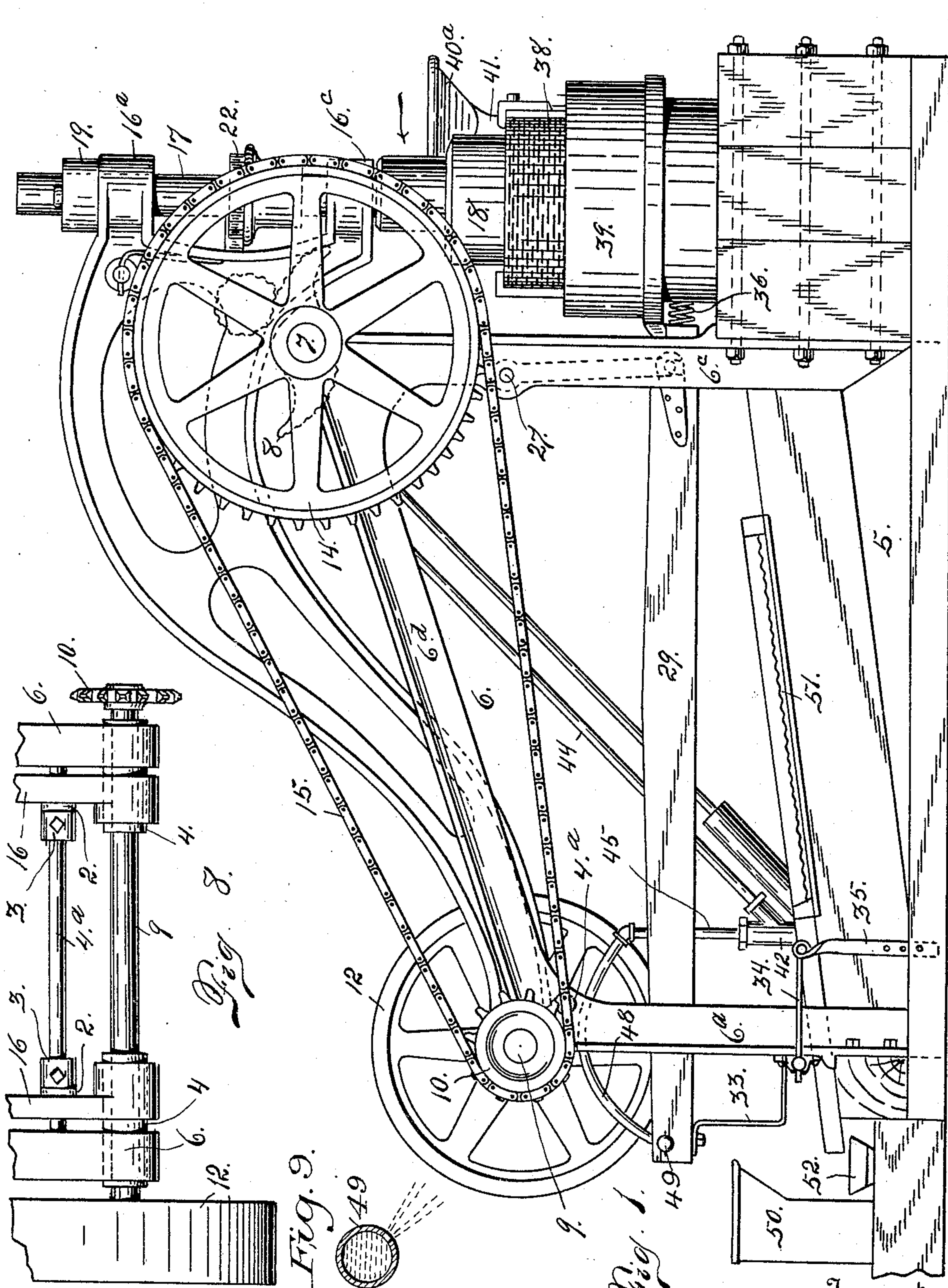
PATENTED NOV. 1, 1904.

A. P. GRANGER.
STAMP MILL.

APPLICATION FILED MAR. 16, 1903.

NO MODEL.

3 SHEETS—SHEET 1.



Witnesses
Otto E. Haddick.
Lena Nelson.

Inventor
A. P. Granger.
By *A. P. Granger* Attorney

No. 773,732.

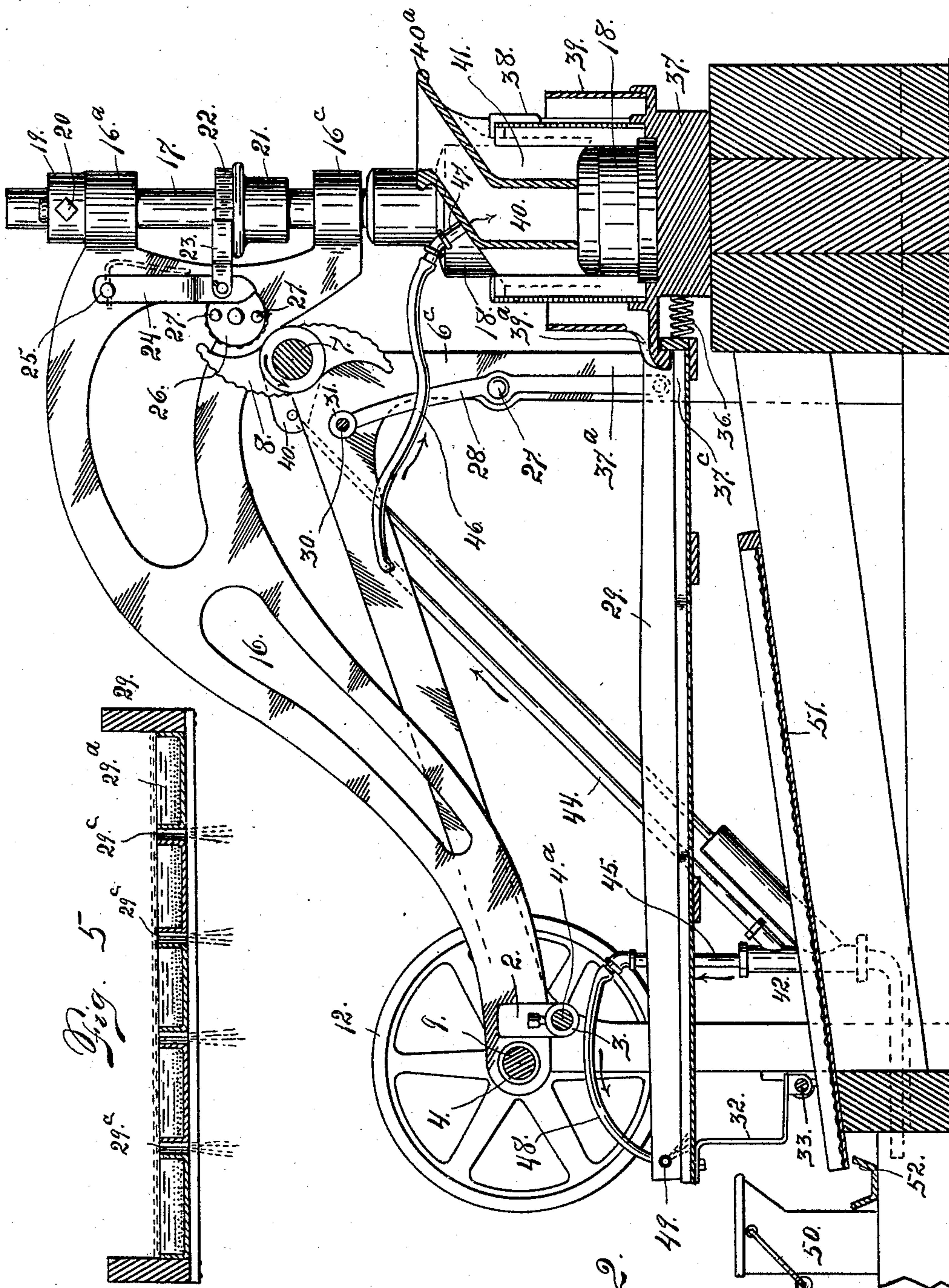
PATENTED NOV. 1, 1904.

A. P. GRANGER.
STAMP MILL.

APPLICATION FILED MAR. 16, 1903.

NO MODEL.

3 SHEETS—SHEET 2.



Witnesses
Otto E. Haddock.
Dena Nelson.

Fig. 2.
Inventor
A. P. Granger.
By A. J. R. Miller
Attorney

No. 773,732.

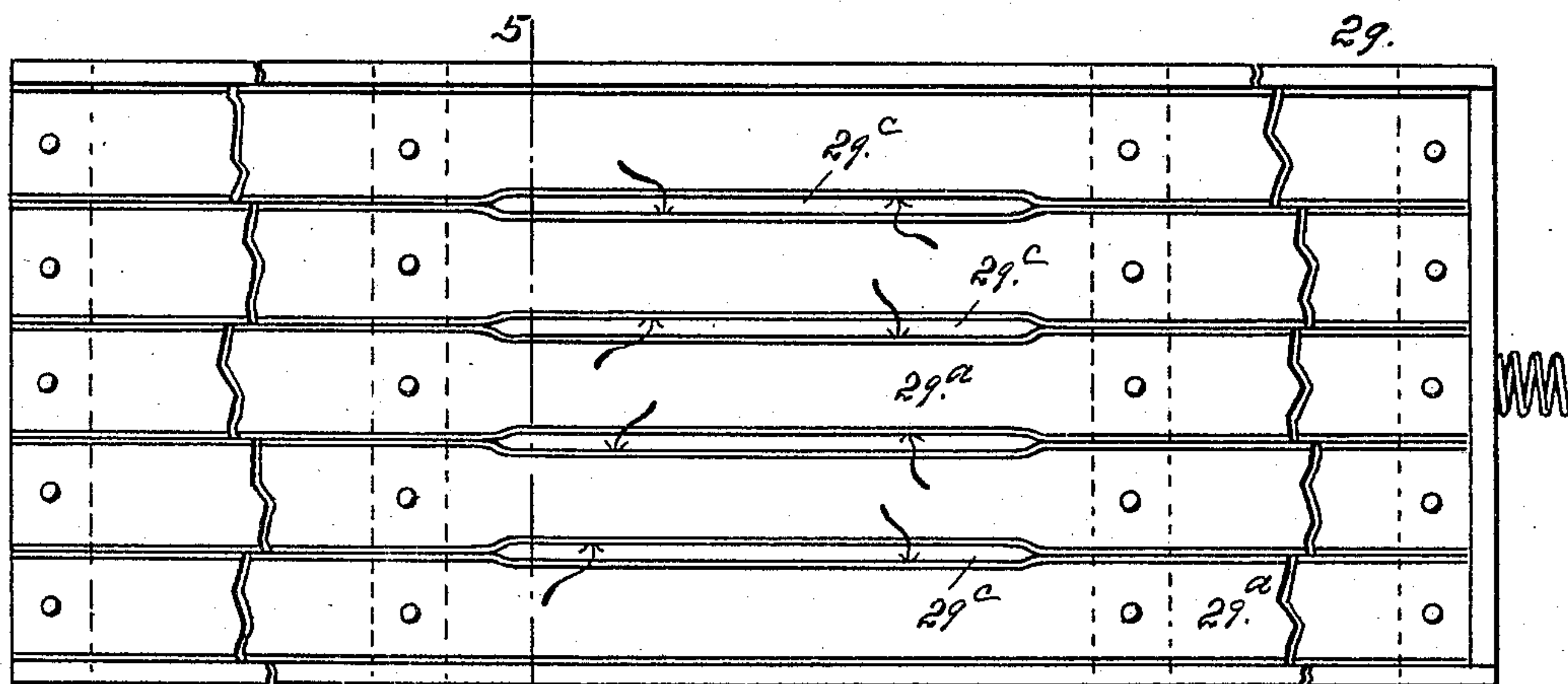
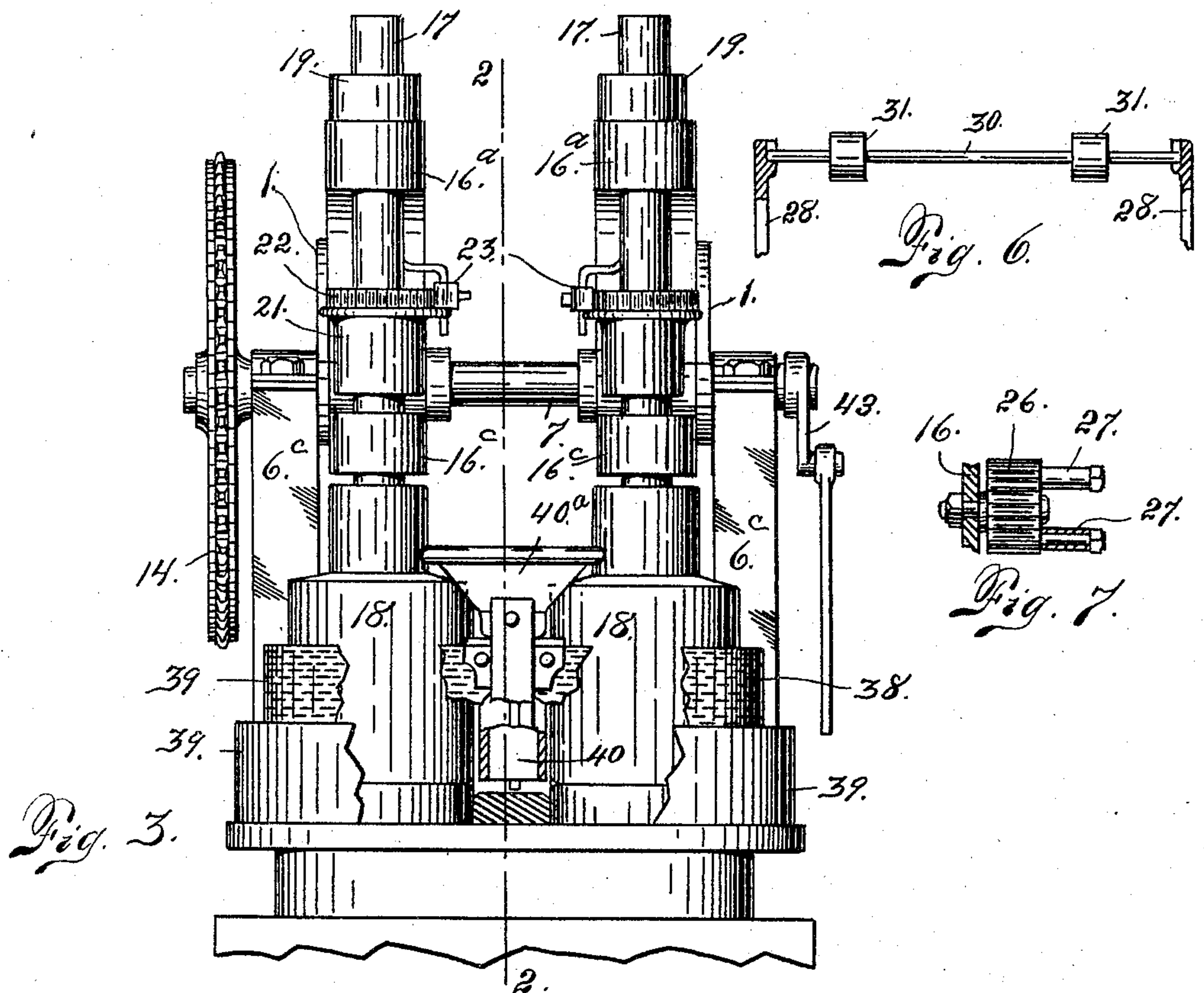
PATENTED NOV. 1, 1904.

A. P. GRANGER.
STAMP MILL.

APPLICATION FILED MAR. 16, 1903.

NO MODEL.

3 SHEETS—SHEET 2.



Witnesses
Otto C. Haddock.
Lena Nelson.

Fig. 4. Inventor
A. P. Granger.
By A. P. Granger
Attorney

UNITED STATES PATENT OFFICE.

ALVAN P. GRANGER, OF DENVER, COLORADO.

STAMP-MILL.

SPECIFICATION forming part of Letters Patent No. 773,732, dated November 1, 1904.

Application filed March 16, 1903. Serial No. 148,132. (No model.)

To all whom it may concern:

Be it known that I, ALVAN P. GRANGER, a citizen of the United States of America, residing in the city and county of Denver and State of Colorado, have invented certain new and useful Improvements in Stamp-Mills; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in stamp-mills.

In my improved construction swinging arms for lifting the stamps are mounted on a counter-shaft, from which motion is transmitted to the cam-shaft. The lifting-arms are provided with tappet-rollers located adjacent the stamp-stem, which rollers are engaged by the cams for lifting the stamps. These rollers also actuate pawls carried by the arms, which pawls engage ratchets of the stamp-stems for rotating the stamps during their upward movement. The cams also act on devices which, in conjunction with the spring, impart a vibratory movement to an ore-separating pan or table, which may perform either a concentrating or an amalgamating function, or both. The pulverized material is fed from the stamp-mill mortar to the ore-separating pan. The necessary water or other liquid for use in connection with the machine is preferably pumped from any suitable source by connecting the pump-rod with a crank on the cam-shaft.

Having briefly outlined my improved construction, I will proceed to describe the same in detail, reference being made to the accompanying drawings, in which is illustrated an embodiment thereof.

In the drawings, Figure 1 is a side elevation of the machine. Fig. 2 is a section taken through the machine between the stamps slightly to one side of the center. The section-line may be designated as 2 2 in Fig. 3. Fig. 3 is an end elevation of the machine looking in the direction of the arrow in Fig. 1. Fig. 4 is a top or plan view of the ore-sepa-

rating pan, shown on a larger scale than in Figs. 1 and 2. Fig. 5 is a cross-section of the same shown on a still larger scale. This section may be designated as 5 5 on Fig. 4. Fig. 6 is a detail view of the rod connecting the upper extremities of the two levers for actuating the concentrating-pan, a fragment of each lever being shown. Fig. 7 is a detail view of the roller 26 and its connections. Fig. 8 is a fragmentary plan view of the machine looking downwardly from a point directly above the pulley 12. Fig. 9 is a cross-section of the water-pipe 49 shown on a larger scale.

The same reference characters indicate the same parts in all the views.

Let the numeral 5 designate a suitable base, upon which are mounted two integral cast-iron frame parts or members 6, composed of upright bars or legs 6^a and 6^c and an upper inclined bar 6^d, connecting the bars 6^a and 6^c at the top. In these frame members 6 is journaled a shaft 7, carrying the cams 8. A counter-shaft 9 is also journaled in these frame members, remote from the cam-shaft, which is located between the counter-shaft and the stamps. The counter-shaft is provided with a sprocket-wheel 10 and an operating-pulley 12. The pulley may be connected by means of a belt (not shown) with any suitable motor or source of power. Power is transmitted from the counter-shaft to the cam-shaft by a chain 15, connecting the sprocket 10 on the shaft 9 with a larger sprocket 14 on the shaft 7.

My improved machine, as illustrated in the drawings, is provided with two stamps operated from the cam-shaft, as hereinafter explained. It must be understood, however, that a battery composed of any convenient number of stamps may be operated from the same cam-shaft. The two-stamp construction shown in the drawings will, however, be described in this specification.

On the counter-shaft 9 are movably mounted two swinging arms 16, which extend forwardly from the counter-shaft. Each of these arms terminates at its forward extremity in two bearings 16^a and 16^c, which are considerably separated, the bearing 16^a being above and the bearing 16^c below. The stem 17 of

a stamp 18 passes through the bearings of each arm. The bearing 16^a is located immediately below and engages a collar 19, held in place on the stamp-stem by a set-bolt 20, whereby the collar 19 is adjustable on the stem. This collar forms a stop to allow the arm to raise the stamp during the arm's upward movement. Between the bearings 16^a and 16^c of the stamp-stem is located a collar 21, fast on the stem, and whose upper extremity is provided with a ratchet 22, engaged by a pawl 23, pivoted on a depending support or holder 24, the latter being pivotally mounted on the swinging arm 16. Mounted also on the arm 16, adjacent the pawl-holder, is a roller 26, provided with small rollers, 27, located on opposite sides of its center and arranged to act on the pawl-holder as the roller is operated. This roller is located in convenient proximity to the cam 8, and the faces of both the roller and cam are preferably corrugated to insure the turning of the roller when engaged by the cam. As the cam-shaft is rotated the cam acts on the roller and raises the swinging arm, together with its stamp. At the same time the roller is turned and acts on the pawl-holder, whereby the pawl is moved forwardly and acting on the ratchet imparts a partial rotation to the stamp every time the latter is raised, causing the stamp-shoe to wear evenly.

Fulcrumed on each frame-bar 6^c, as shown at 27, is a lever 28. The lower extremities of these levers engage the forward extremity of a pan 28 on opposite sides. The upper extremities of these levers are connected by a rod 30, provided with rollers 31, located in the path of the cams 8 as the latter rotate in the direction indicated by the arrow in Fig. 2. As the upper extremities of these levers are actuated their lower extremities impart a forward movement to the pan 29, whose rear extremity is supported by a sheet-metal plate 32, whose upper extremity is attached to the pan and whose lower extremity is rigidly secured to a rock-shaft 33. Intermediate its extremities the plate 32 is bent at right angles. This plate yields sufficiently to allow the necessary vibratory movement of the pan. The elevation of the rear extremity of the pan is regulated by a rod 34, made fast to the shaft at one extremity and whose opposite extremity is connected with a metal strap 35, connected with the base of the machine and vertically adjustable. The forward extremity of the pan engages a coil-spring 36, inserted between the end of the pan and the bed or base of the mortar 37. A flange 37^a, formed on the base of the mortar, is provided with a depending lip 37^c, which forms a bumper, engaged by the end flange of the pan during its rearward movement when actuated by the recoil of the spring 36. The mortar is provided with a screen 38, and its wall 39 is open in front, as shown at 39^a,

to allow the pulverized material which passes through the screen to enter the forward extremity of the pan 29. The material to be treated is discharged from a crusher (not shown) to a hopper 40^a and passes thence to a feed-passage 40, formed in a partition 41, located between the two stamps. The passage 40 is open at the bottom to allow the material to escape to the mortar.

The necessary water or other liquid for stamping purposes is supplied to the machine by a pump 42, whose reciprocating rod is connected with a crank 43 on the cam-shaft 7. The liquid raised by the pumping action passes from the cylinder of the pump through two pipes 44 and 45. To the upper extremity of the pipe 44 is connected one extremity of a hose 46, whose opposite extremity is connected with a nozzle 47, leading to the feed-passage 40 for supplying the stamps. The upper extremity of the pipe 45 is connected with a hose-pipe 48, leading to a perforated pipe 49, which extends transversely across the rear extremity of the pan 29 to supply wash-water to the pan. This pan is provided with a series of longitudinal compartments 29^a, the central portion of the pan between these compartments being provided with openings 29^c between the partitions, through which the water and gangue are discharged.

When the machine is in operation, the pulley 12 is connected by a belt (not shown) with any suitable source of power, whereby motion is transmitted from the counter-shaft 9 to the cam-shaft 7 through the instrumentality of the sprockets 10 and 14 of the chain 15. The rotation of the shaft 7 raises the stamps alternately by virtue of an arrangement of the cams 8 to produce this effect. Each cam acts on its roller 26 and raises the corresponding swinging arm 16, whereby the stamp is lifted and released to drop into the mortar. The two stamps are closely arranged in the mortar, whereby the splash from one stamp enters the compartment of the other stamp. The material to be treated is fed into the spout or passage 40, formed in the partition 41, and passes therefrom into both stamp-compartments. As each stamp is raised it is given a partial rotation by the action of a small roller 27, mounted on the cam-actuated roller 26, by means of the pawl 23, mounted on the pawl-holder 24, as heretofore explained. The cam also acts on a roller 31 of the rod 30, connecting the two levers 28, and imparts the forward movement to the pan 29, compressing the spring 36, whose recoil gives the reverse movement to the pan, whereby the latter is vibrated. The material from the mortar is fed to the pan 39^a and is separated therein, the gangue passing through the openings 29^c and the concentrates or values passing over the rear extremity of the pan into the receptacle 50. The water and gangue passing through the openings 29^c of the pan fall upon

an inclined plate 51, which may be amalgamated or coated with quicksilver for the purpose of catching any values that may have escaped from the pan 29. The water which falls upon the plate 51 passes into a receptacle 52 and may be pumped into the pipes 44 and 45 and reused in connection with the machine.

The oscillating arms 16 are preferably mounted on sleeves 4, which are fast in the frame-bar 6 and in which sleeves the shaft 9 turns. The oscillating arms 16 are guided at their rear extremities by short arms 2, made fast to sleeves 3, the latter being mounted on a stationary rod 4^a, made fast to the frame-bars 6. The sleeves 3 are connected with the rod 4^a by suitable set bolts or screws 3^a. The parts 2 guide the oscillating arms 16 on the inside, while arms 1, mounted on the frame-bars 6, (see Fig. 3,) guide the oscillating arms on the outside and prevent lateral movement.

Having thus described my invention, what I claim is—

1. The combination with a stamp, of a swinging arm provided with bearings through which the stem of the stamp passes, one of the bearings engaging a stop on the stamp, whereby as the arm is lifted, the stamp is raised, and means acting on the arm between the stamp and the axis of the arm to lift the stamp, substantially as described.

2. The combination with a stamp and a cam-tappet, of an arm mounted to swing on an axis remote from the cam-shaft, a roller-tappet mounted on the arm, a cam on the cam-shaft, said cam acting on the tappet, and a pawl supported by the arm and acted on by the tappet for imparting the rotary action to the stamp, the stem of the latter being provided with a ratchet which the pawl engages.

3. The combination with a stamp, of a counter-shaft, a cam-shaft intermediate the coun-

ter-shaft and the stamp, an arm mounted to swing on the counter-shaft, and provided with a collar through which the stamp-stem passes, the stem having a stop engaged by the collar of the arm, a cam mounted on the cam-shaft, a roller-tappet mounted on the arm and lying in the path of the cam, and a pawl supported by the swinging arm and actuated by the tappet to rotate the stamp, the stem of the latter being provided with a ratchet which the pawl engages.

4. The combination with a pair of stamps, of a counter-shaft, a cam-shaft, means for transmitting motion from the counter-shaft to the cam-shaft, arms mounted to swing on the counter-shaft and connected with the stamps, and cams mounted on the cam-shaft and arranged to act on the arms to lift the stamps.

5. In a stamp-mill, the combination with a battery of stamps, of a counter-shaft, a cam-shaft, means for transmitting motion from the counter-shaft to the cam-shaft, arms mounted to swing on the counter-shaft and connected with the respective stamps in operative relation, and cams mounted on the cam-shaft and acting on the arms to lift the stamp, substantially as described.

6. The combination with a mortar and a pair of stamps, of a partition separating the mortar into two compartments, being provided with a passage-way for the material to be treated, the said passage-way being open at the bottom and arranged to discharge simultaneously into both stamp-compartments.

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

ALVAN P. GRANGER.

Witnesses:

DENA NELSON,
A. J. O'BRIEN.