

(No Model.)

3 Sheets—Sheet 1.

H. E. LONG.
CLAY GRINDING MILL.

No. 428,172.

Patented May 20, 1890.

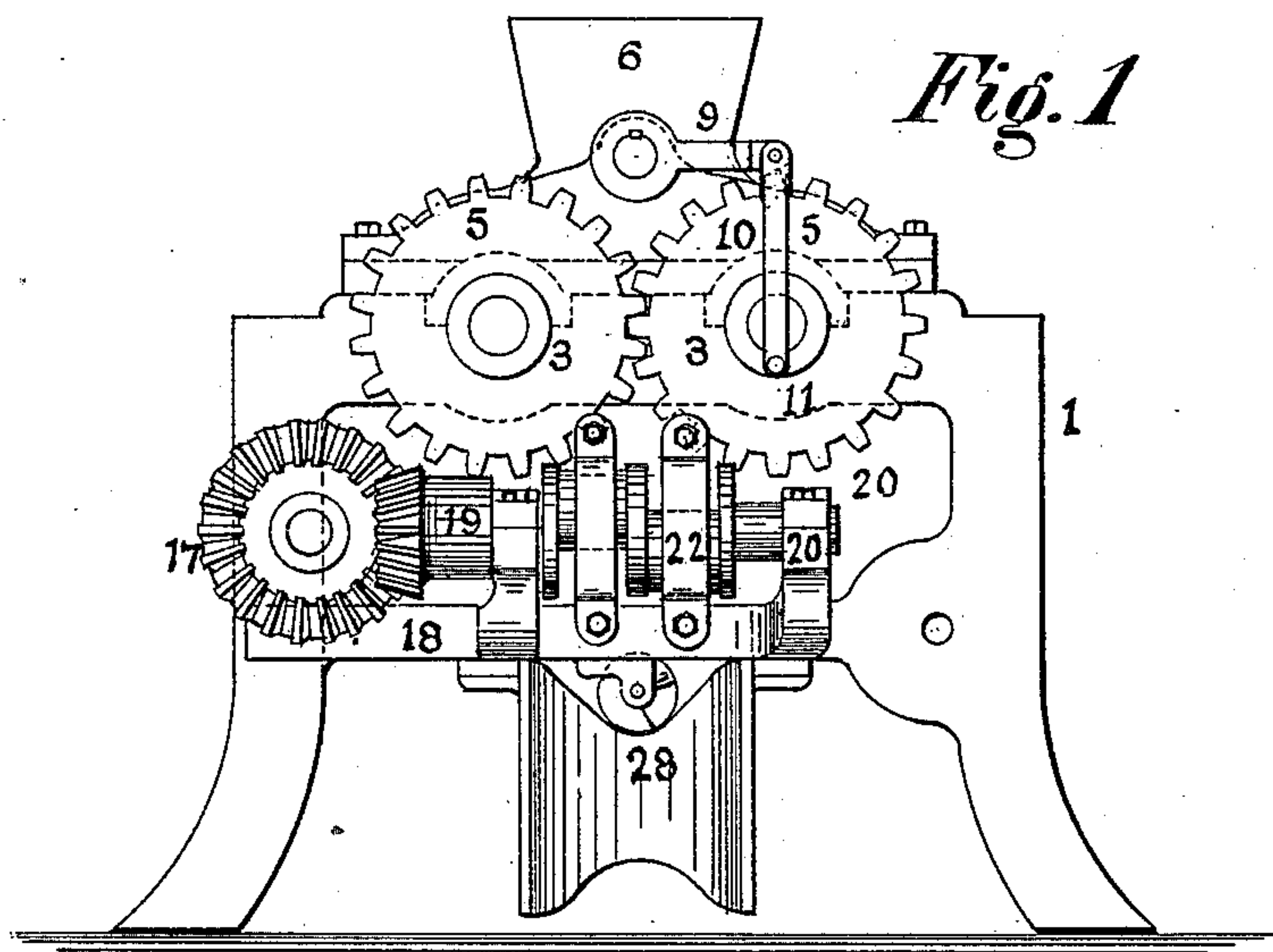
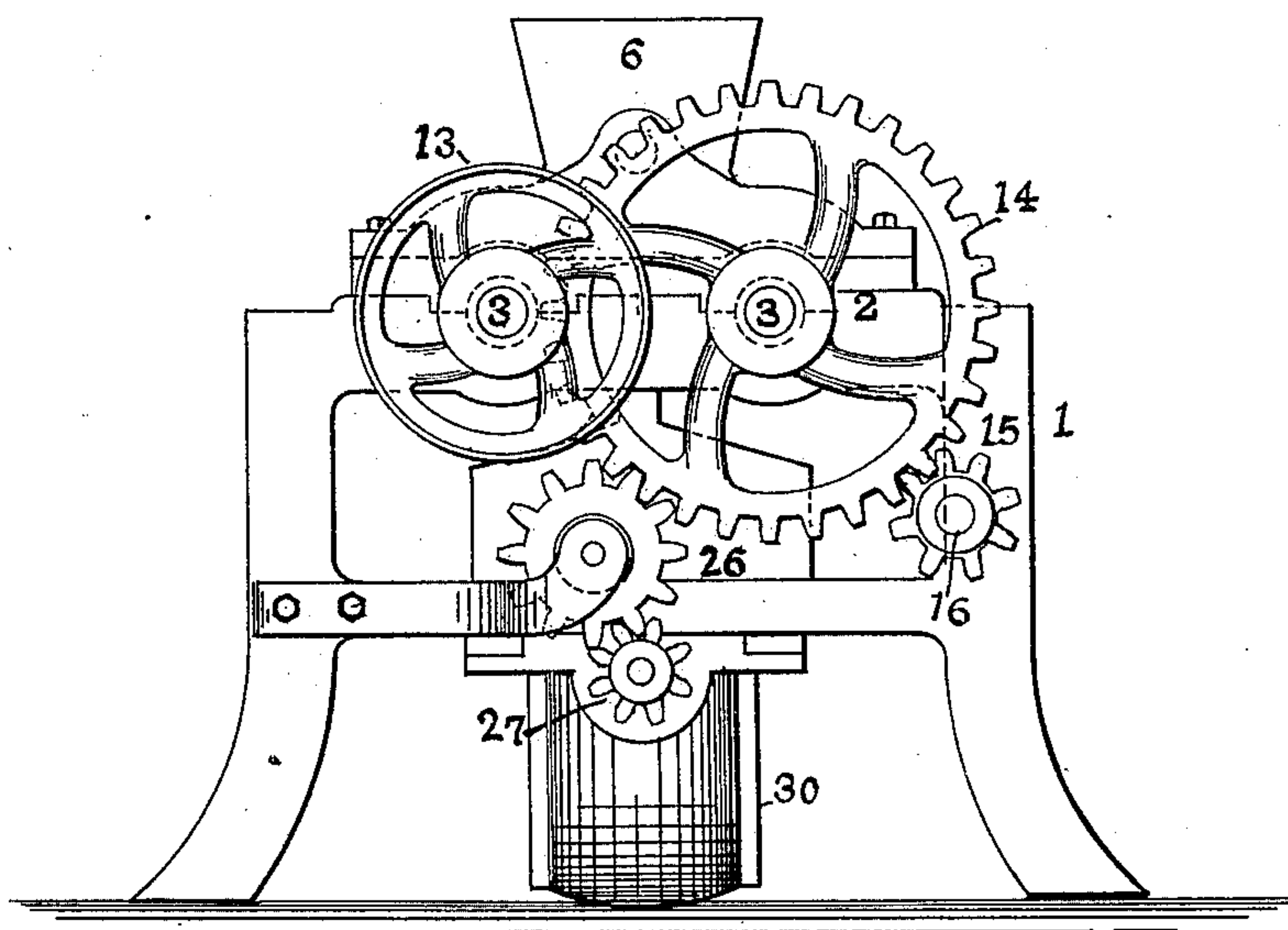


Fig. 2



WITNESSES:

L. D. Little
Wm. Metcher.

INVENTOR

Hezekiah E. Long
BY *Ellis + Johnston*

ATTORNEYS

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3 Sheets—Sheet 2.

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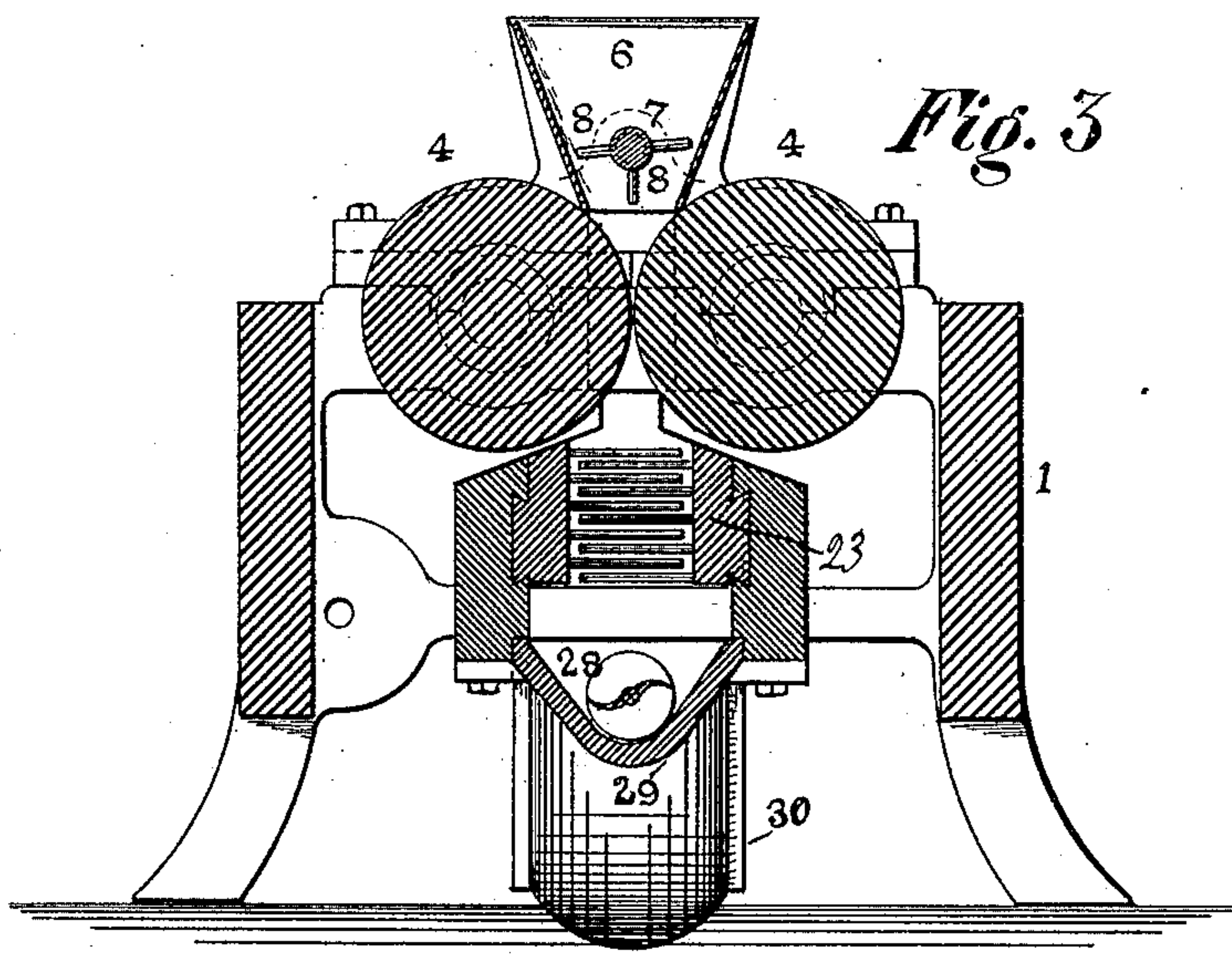
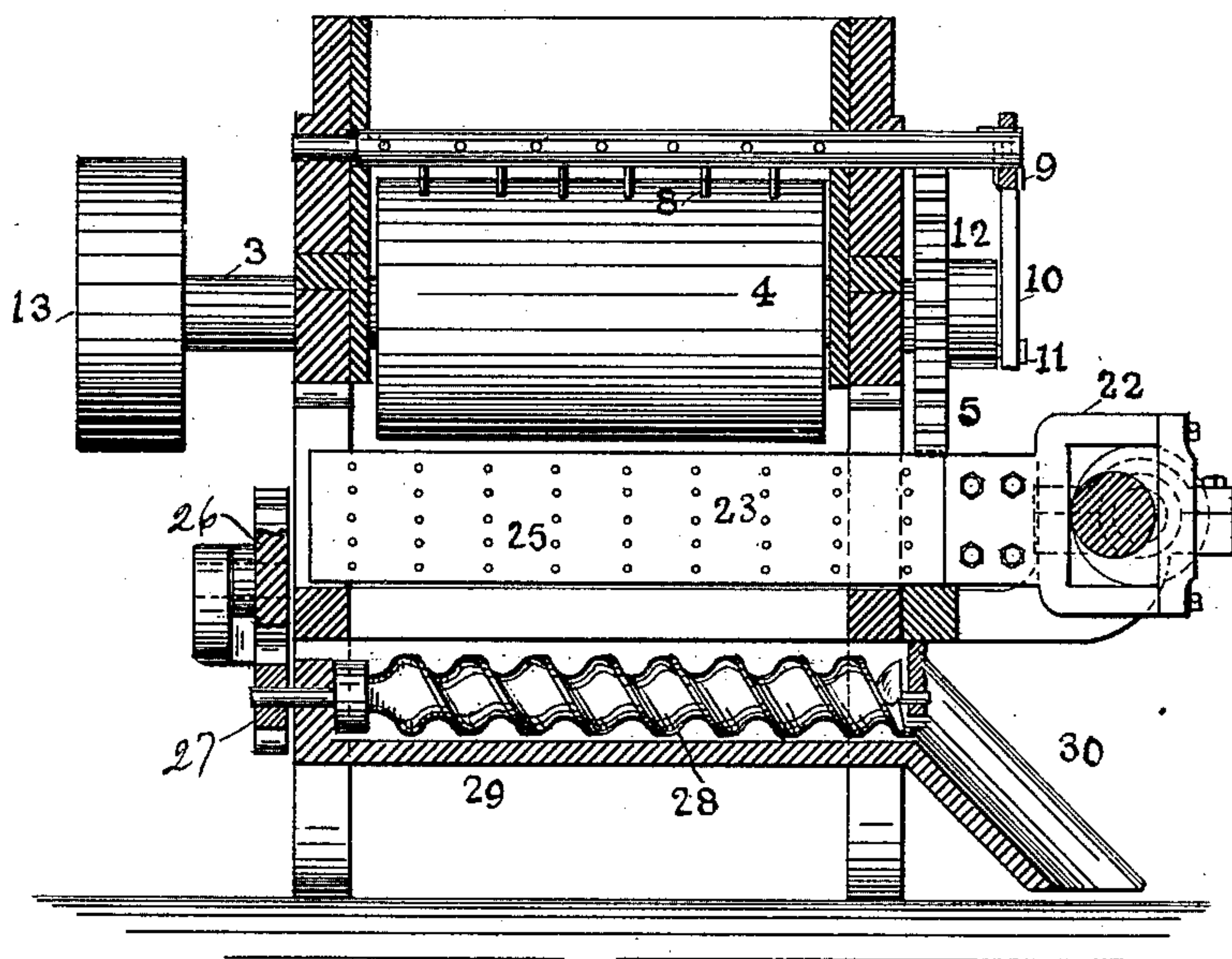


Fig. 3

Fig. 4



WITNESSES:

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Fig. 5

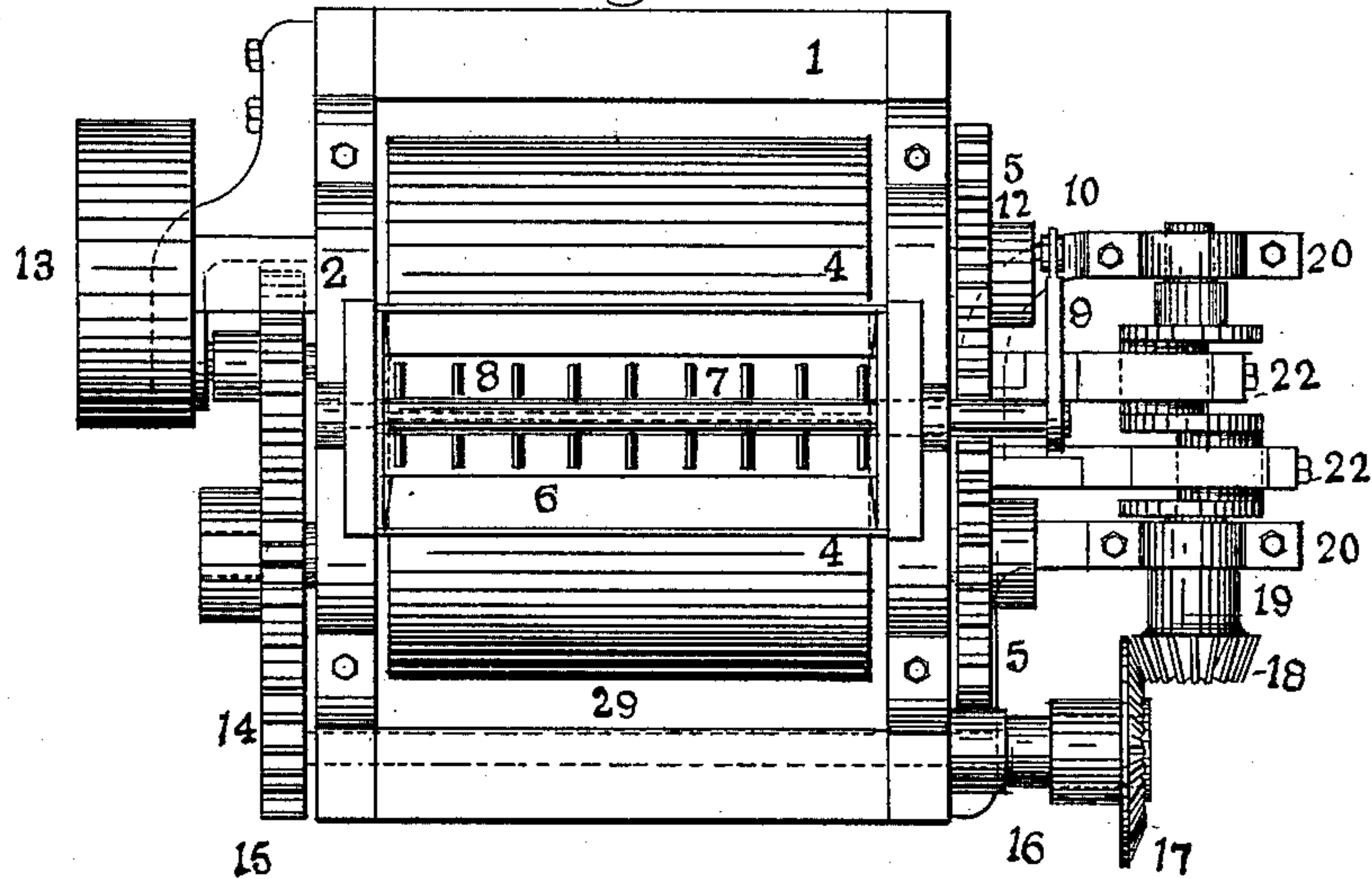


Fig. 6

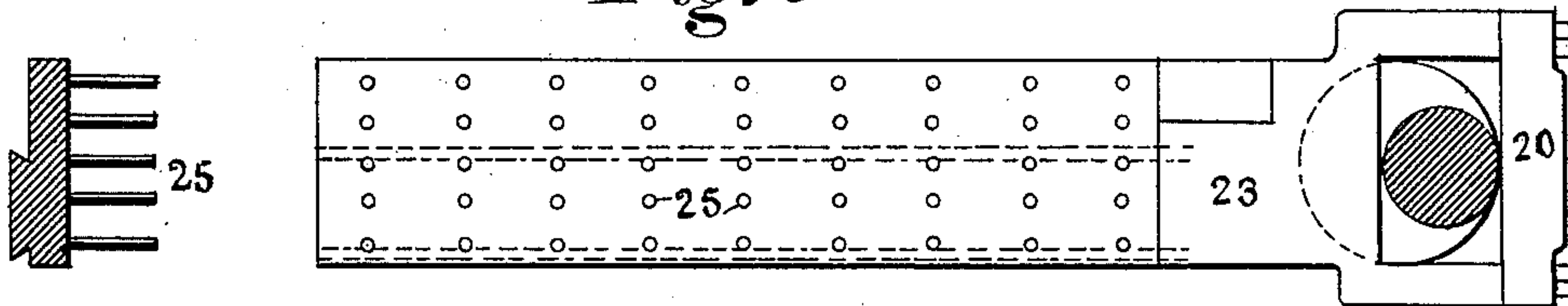


Fig. 7

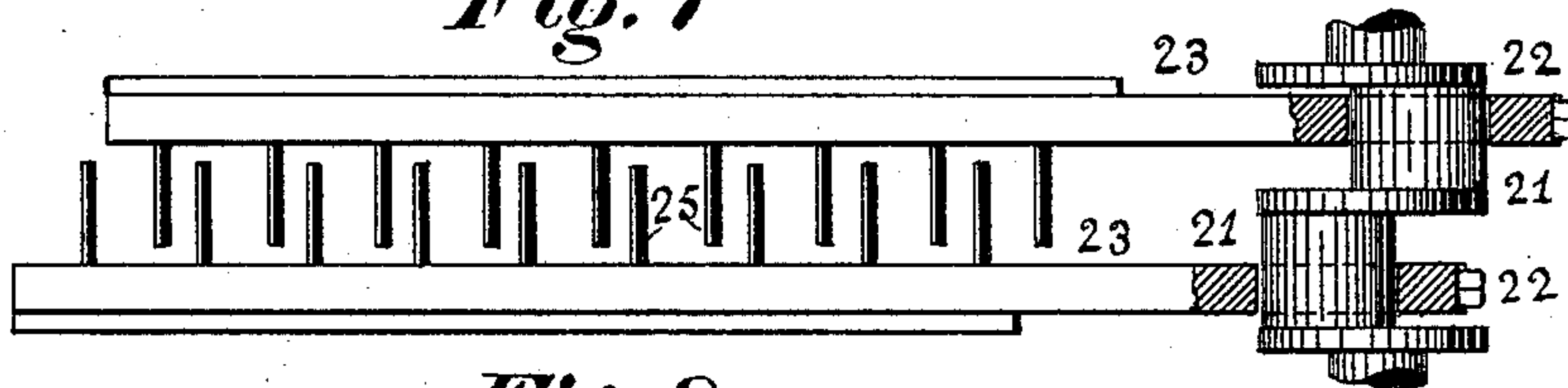
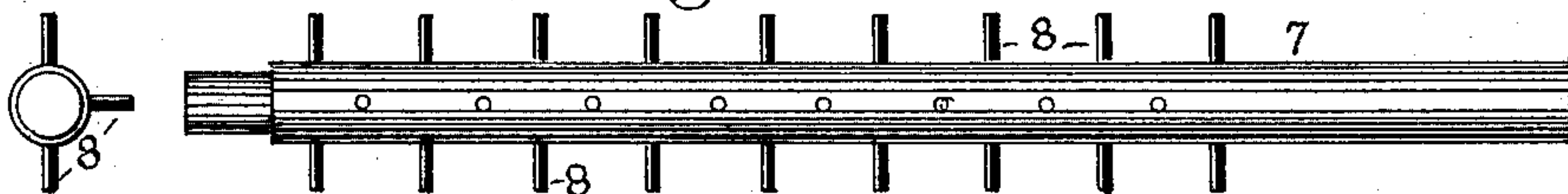


Fig. 8



WITNESSES:

L. D. Little
Wm. Metcher

INVENTOR

Hazekiah E. Long
BY Ellis + Johnston

ATTORNEYS

UNITED STATES PATENT OFFICE.

HEZEKIAH E. LONG, OF PITTSBURG, PENNSYLVANIA.

CLAY-GRINDING MILL.

SPECIFICATION forming part of Letters Patent No. 428,172, dated May 20, 1890.

Application filed February 5, 1890. Serial No. 339,310. (No model.)

To all whom it may concern:

Be it known that I, HEZEKIAH E. LONG, of
Pittsburg, in the county of Allegheny and
State of Pennsylvania, have invented a new
5 and useful Improvement in Clay-Grinding
Mills; and I do hereby declare that the follow-
ing is a full, clear, and exact description there-
of, reference being had to the accompanying
drawings and the figures of reference marked
10 thereon.

Heretofore clay-mills have been constructed
consisting of a pair of horizontal rolls geared
together in such manner as that their upper
surfaces revolve toward each other, and these
15 rolls are provided with a hopper into which
the crude clay is thrown, to be caught by the
rolls and ground in its passage between them,
being discharged on the under side of the
rolls into a trough or receptacle placed be-
20 neath them for that purpose. In such con-
struction of clay-mills great trouble has been
experienced in properly feeding the rolls, by
reason of the clay adhering to the sides of the
hopper and failing at times to sink within
25 the grip of the rolls, and to overcome that
difficulty the workmen are often compelled to
force the clay downward into the bite of the
rolls by means of shovels or other tools, and
oftentimes in so doing the shovel or other im-
30 plement used is caught by the rolls, drawn
through, and completely destroyed. Another
disadvantage arises from the fact that the
clay in passing between the rolls is laminated
or drawn out into the form of a long broad
35 sheet, comparatively glazed on both sides,
and falls into the receptacle beneath in an
irregular series of laminated folds, and in
that condition taken from the mill and molded
into brick, producing an article having irregu-
40 lar stratification, instead of being, as it should,
perfectly amorphous or homogeneous through-
out.

My invention consists, in combination with
the grinding-rolls of a clay-mill, of a means or
45 mechanical device whereby the clay is agi-
tated and fed from the hopper and forced be-
tween the rolls by a positive mechanical ac-
tion of the machine.

My invention also comprises a means where-
50 by the broad sheet of clay as it comes from
the rolls is caught, ground, and thoroughly
mixed by means of a series of fingers attached

to adjacent sides of a pair of reciprocating
horizontal bars supported in suitable bear-
ings beneath the rolls, each bar having a re- 55
ciprocating rectilinear movement alternately
in opposite directions, whereby the fingers on
one bar are constantly passing between the
fingers of the opposite bar, so that the sheet
of clay as it emerges from the rolls is torn 60
into fine fragmentary pieces and thoroughly
mixed.

My invention also comprises a means where-
by the clay after being acted upon by said
fingers is received, carried forward, and dis- 65
charged from the machine by an endless screw
or spiral rotary conveyer, all of said parts be-
ing so geared to the rolls as to work with dif-
ferent degrees of speed and in unison there-
with, whereby the clay is carried from the 70
hopper to and between the grinding-rolls,
seized, and thoroughly mixed on its issuance
therefrom, and subsequently conveyed into a
trough or chute leading from the machine.

To enable others skilled in the art to thor- 75
oughly understand and put in practice my
invention, I will proceed to describe it by
reference to the accompanying drawings,
wherein—

Figure 1 represents an end view or rear 80
elevation of my improved clay-mill. Fig. 2
is an end elevation of the opposite end. Fig.
3 is a transverse vertical section of the same
through the center of the machine. Fig. 4
is a longitudinal vertical section of the same. 85
Fig. 5 is a top view of the entire mill. Fig.
6 is an enlarged face view of one of the re-
ciprocating bars provided with projecting
teeth or fingers. Fig. 7 is a top view of both
of said fingered bars arranged in proper rela- 90
tive position and each attached to its respect-
ive crank or eccentric. Fig. 8 represents a
horizontal cylindrical bar or rock-shaft pro-
vided with projecting fingers arranged within
the hopper on a line between and parallel 95
with the rolls.

To construct my improved clay-mill, I pre-
pare a substantial frame 1, provided on oppo-
site ends thereof with suitable bearings 2, in
which rest the journals 3 of two horizontal 100
metallic rolls 4 of suitable length and diame-
ter, which rolls 4 are geared together by means
of toothed wheels 5, so that their upper con-
verging surfaces shall revolve toward each

other. Above and sloping downward between these rolls is affixed and held stationary by suitable means a hopper 6 for the reception of clay in its crude or unworked condition as it comes from the bank. Longitudinally and centrally located within this hopper 6 is arranged a rock-shaft 7, having its bearings in each end of the hopper. This rock-shaft is provided with three rows of fingers 8, arranged therein and projecting therefrom at equidistant points along its surface. Two of the rows oscillate in a horizontal plane and the third row in a vertical plane, or toward the point of separation between the rolls. One end of this rock-shaft 7 projects a short distance outside of the hopper 6, and is fitted with a projecting arm 9, rigidly secured thereto. To the extreme end of this arm 9 is attached a link 10, connecting the same to a wrist-pin 11, made fast to the hub 12 of one of the gear-wheels on the axis of one of the crushing-rolls, and so set with relation thereto as to act with a crank-like motion and impart a partial revolution, first in one direction and then the other, to said rock-shaft 7, producing a requisite movement of the several fingers thereon to effectuate a stirring and forcing downward toward the rolls of such clay as may be placed within the hopper. The opposite projecting journal of the roll is provided with a pulley 13, whereby power may be applied to the same through the instrumentality of a belt or other means. Its companion roll at the same end of the machine has attached thereto a large toothed wheel 14, meshing into a smaller wheel 15 on the end of a projecting shaft 16, that extends lengthwise of the machine, the opposite end of the shaft 16 being also provided with a miter-wheel 17, the teeth of which are adapted to mesh into a similar but smaller wheel 18 on the end of a crank-shaft 19, arranged at right angles to the axis of the rolls. This crank-shaft 19 is supported in suitable bearings 20, having between them two cranks so arranged with respect to each other as to work in opposite directions. Connected to each crank 21 by means of a suitable yoke 22 is a horizontally-arranged bar 23, extending underneath the rolls, so as to move parallel to each other, but at a little distance apart, and the inner faces of these bars 23 are provided, respectively, with a series of fingers 25, or short projecting rods, the series of fingers on one bar being so arranged as to pass freely between the fingers of the opposite bar without touching them. A rapid rectilinear reciprocating action is imparted to the bars 23 by means of the cranks 21 aforesaid, to which they are connected. The large gear-wheel 14, on one of the rolls outside of its supporting-frame 1, also meshes into a second or smaller wheel 26, and this in turn with a still smaller toothed wheel 27 on the projecting end or shaft of a spiral conveyor 28, that has its rotation in a semicir-

cular trough 29, underneath the aforesaid reciprocating bars 23, which semicircular trough 29 is open at its opposite end, and by a downwardly-inclined projection constitutes a spout 30 for delivery of the clay.

Operation: My improved clay-mill having been constructed as described and connected by a belt or other means to a steam-engine or other source of power, clay in its crude or unpulverized condition is to be shoveled or otherwise placed in the hopper. The action of the fingered rock-shaft therein is such as to agitate and forcibly feed the clay downward between the converging grinding-surfaces of the large rolls, between which it is drawn downward and delivered below them in the form of an attenuated sheet that is received, disintegrated, and torn into fragments by the action of the fingers on the rapidly-reciprocating bars and delivered to the spiral screw conveyor in the semicircular trough beneath, and from thence by the action of said conveyor delivered into the inclined spout as a conglomerate mass of finely-ground clay suitable for immediate molding into the form of brick or other purposes.

Having thus described my invention, what I claim is—

1. In a clay-mill, the combination, with a pair of grinding-rolls, of a hopper provided with a longitudinal rock-shaft therein and a series of fingers projecting outward from the surface of said rock-shaft, so as to engage the clay and by positive movement feed it to and between the rolls, a projecting arm on one end of said rock-shaft, and a link connecting the same to a crank-pin or wrist attached to one of said rolls, whereby a proper rocking movement of the shaft and fingers is brought about during the action of the machine.

2. A pair of parallel grinding-rolls, a hopper arranged above them, and beneath said rolls one or more rectilinear reciprocating bars armed with projecting teeth, cranks for operating said reciprocating bars, and suitable gearing whereby they are connected to the crushing-rolls and receive action therefrom.

3. A pair of parallel grinding-rolls, a hopper arranged above the same, a rock-shaft armed with projecting fingers within said hopper, a pair of reciprocating bars provided with projecting fingers on their adjacent faces beneath the rolls, a trough and a spiral conveyor therein, the said several moving parts being connected to the rolls by suitable gearing by which each part is given a requisite degree of speed.

In testimony whereof I have hereunto set my hand this 4th day of February, A. D. 1890.

HEZEKIAH E. LONG.

Witnesses:

A. C. JOHNSTON,
WM. METCHEN.