

No. 618,389.

Patented Jan. 31, 1899.

R. J. BEHRINGER.

MACHINE FOR COOLING, SCOURING, AND CLEANING MALT OR GRAIN.

(No Model.)

(Application filed June 26, 1897.)

3 Sheets—Sheet 1.

Fig. 9.

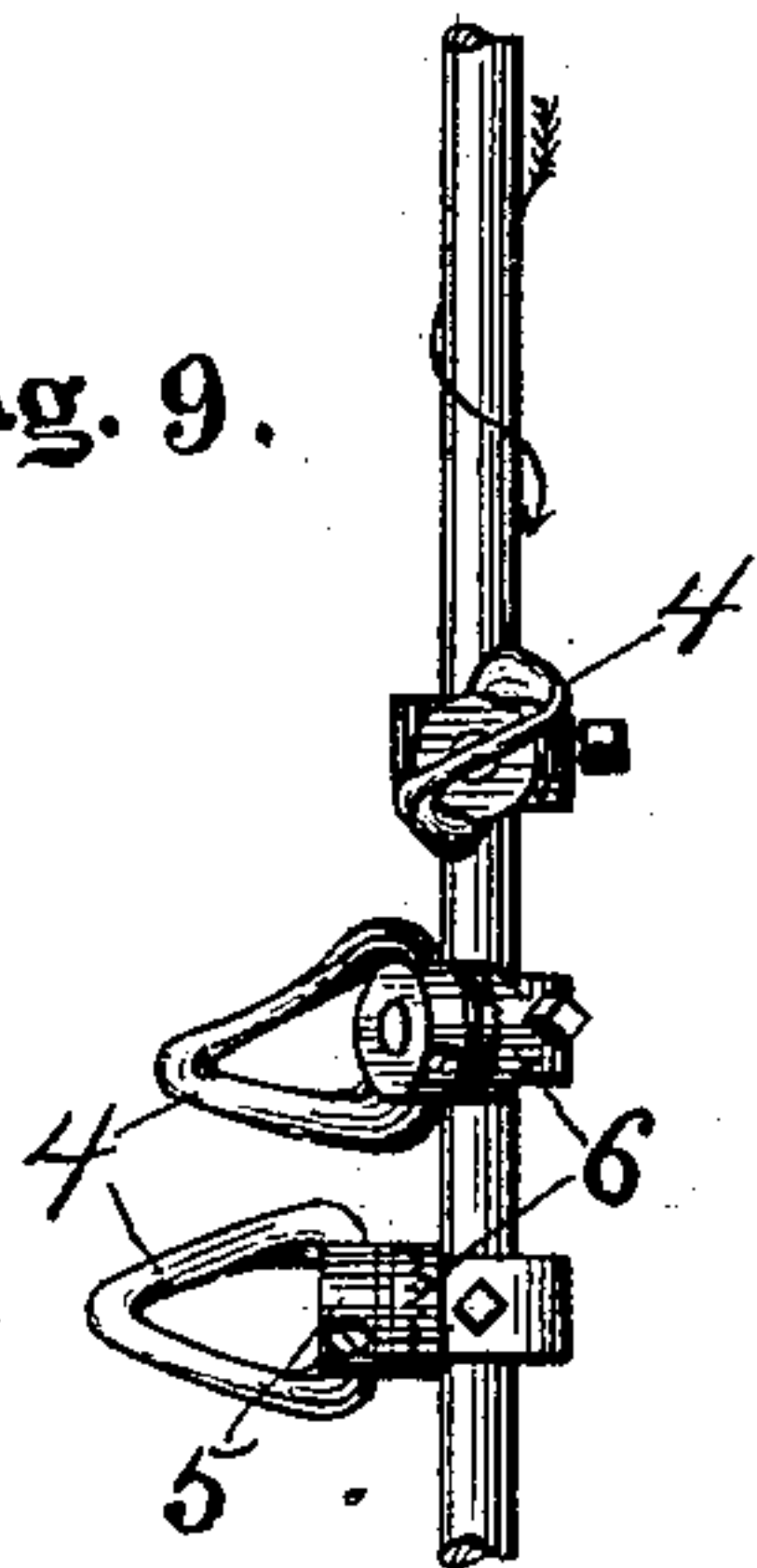


Fig. 7.

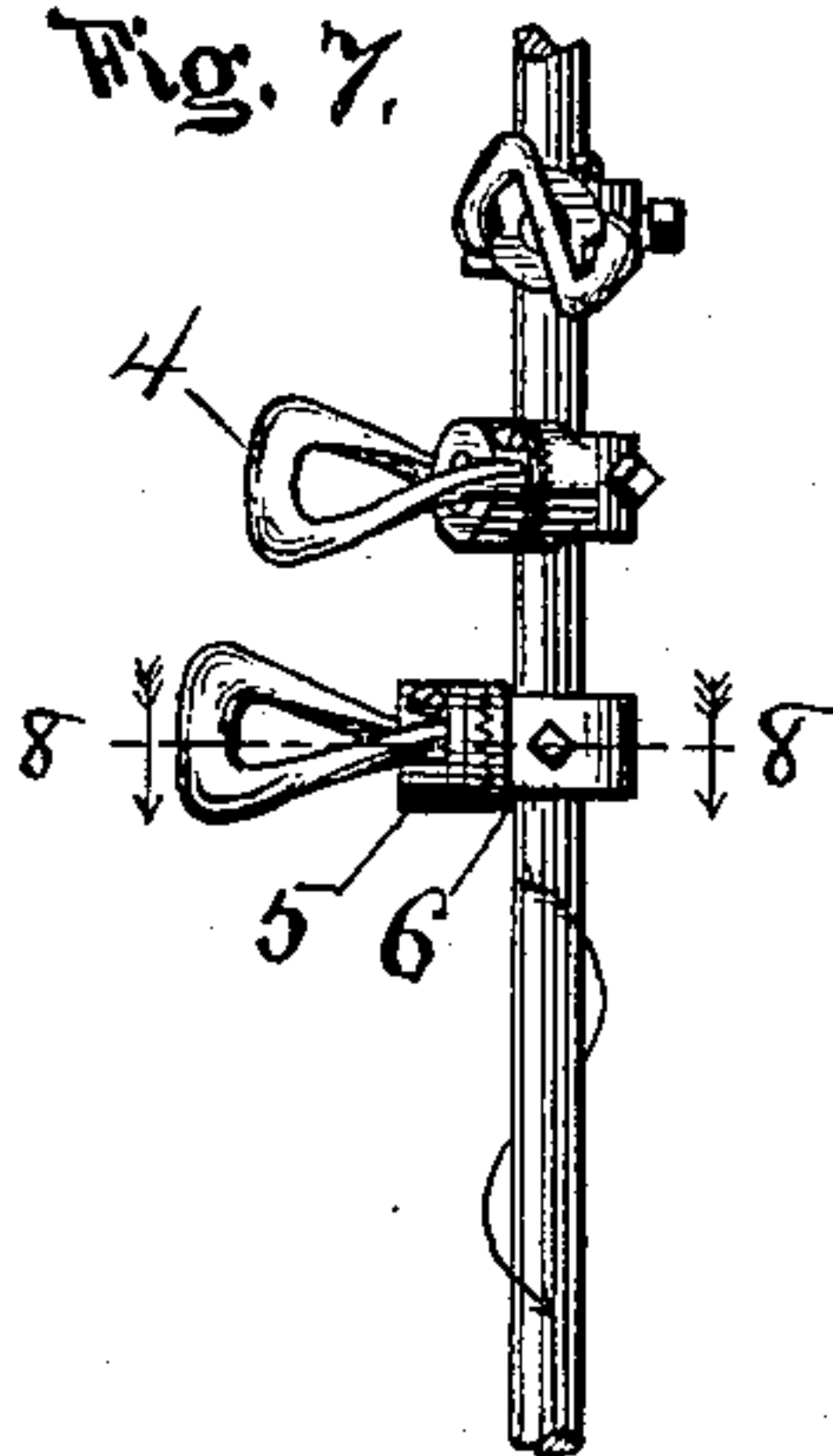
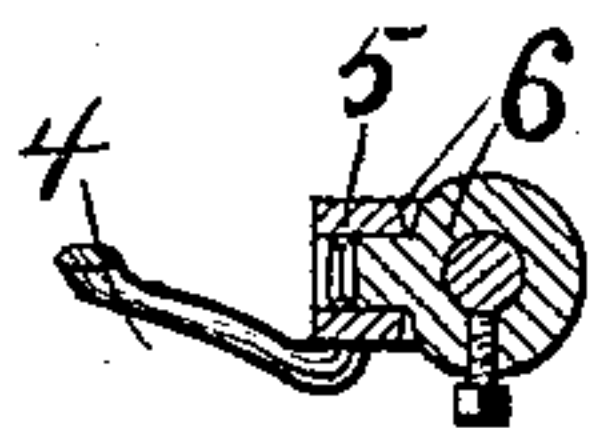


Fig. 8.



Witnesses:

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Fig. 1.

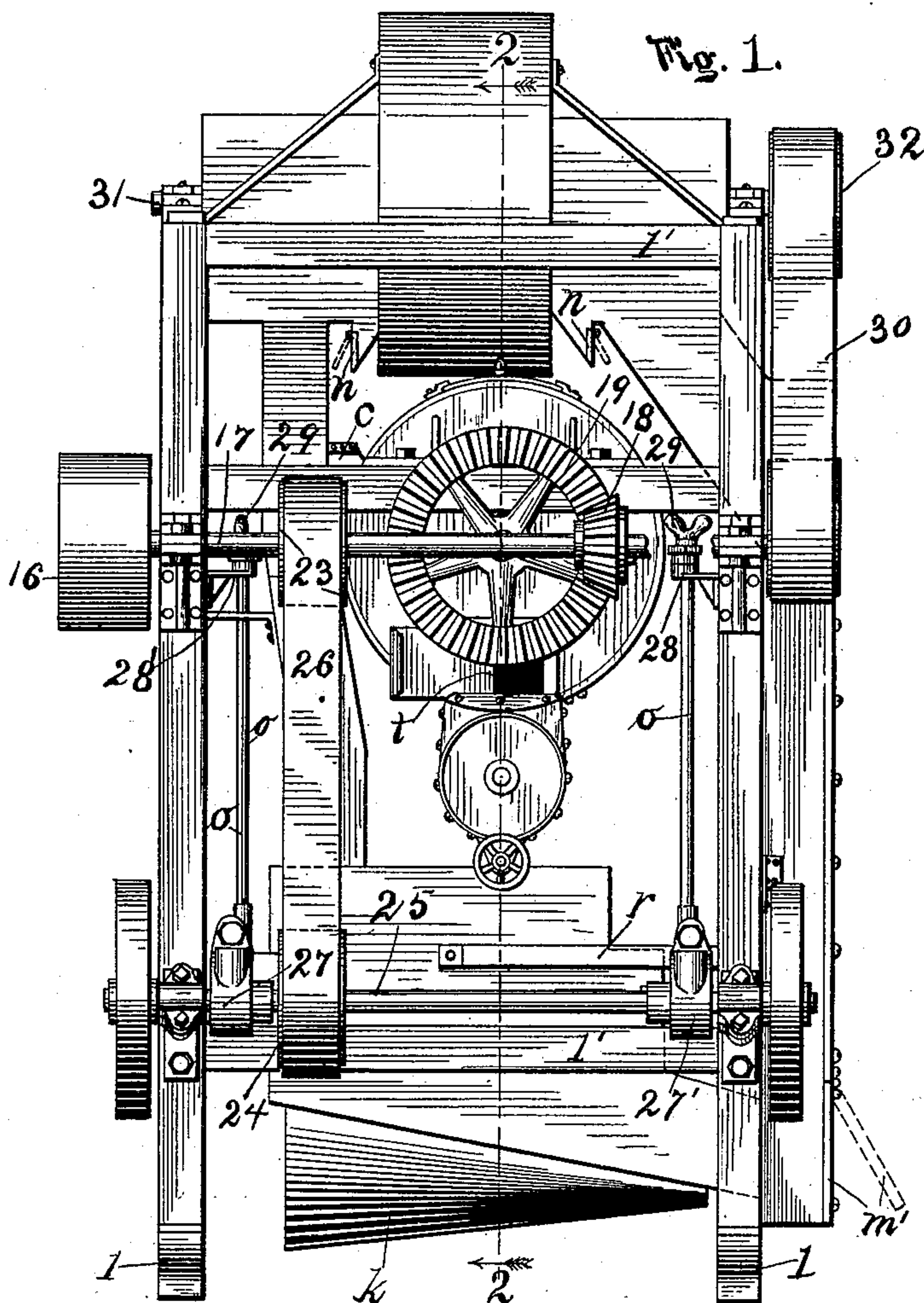
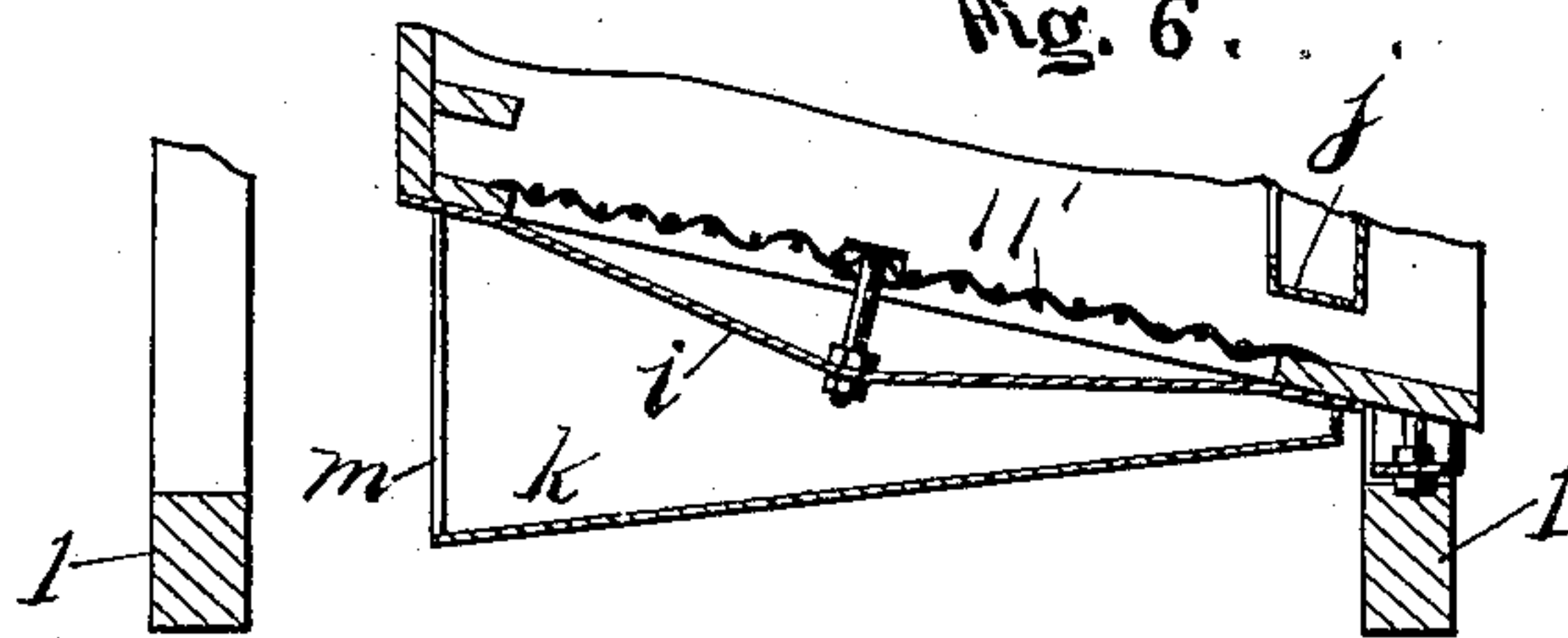


Fig. 6.



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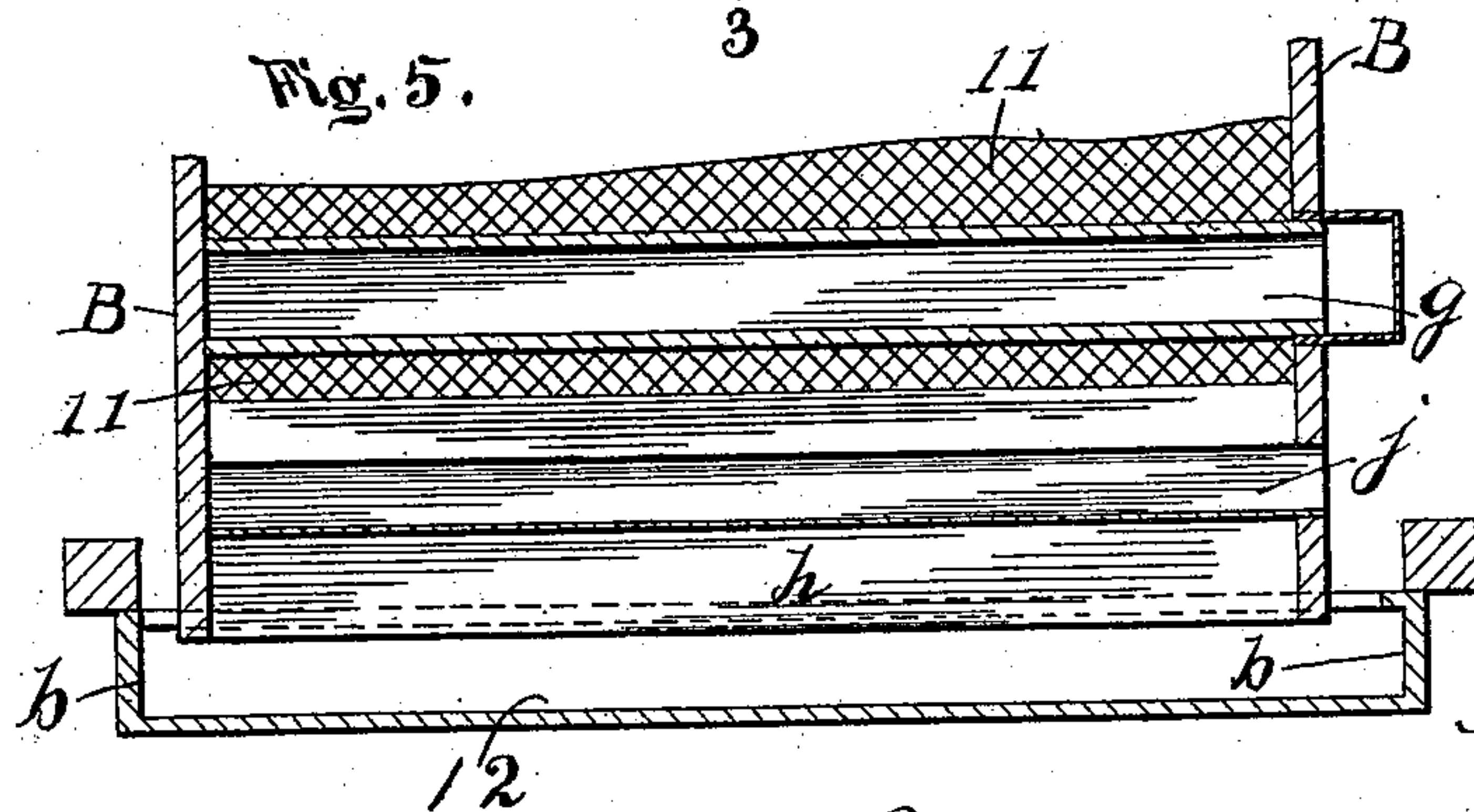
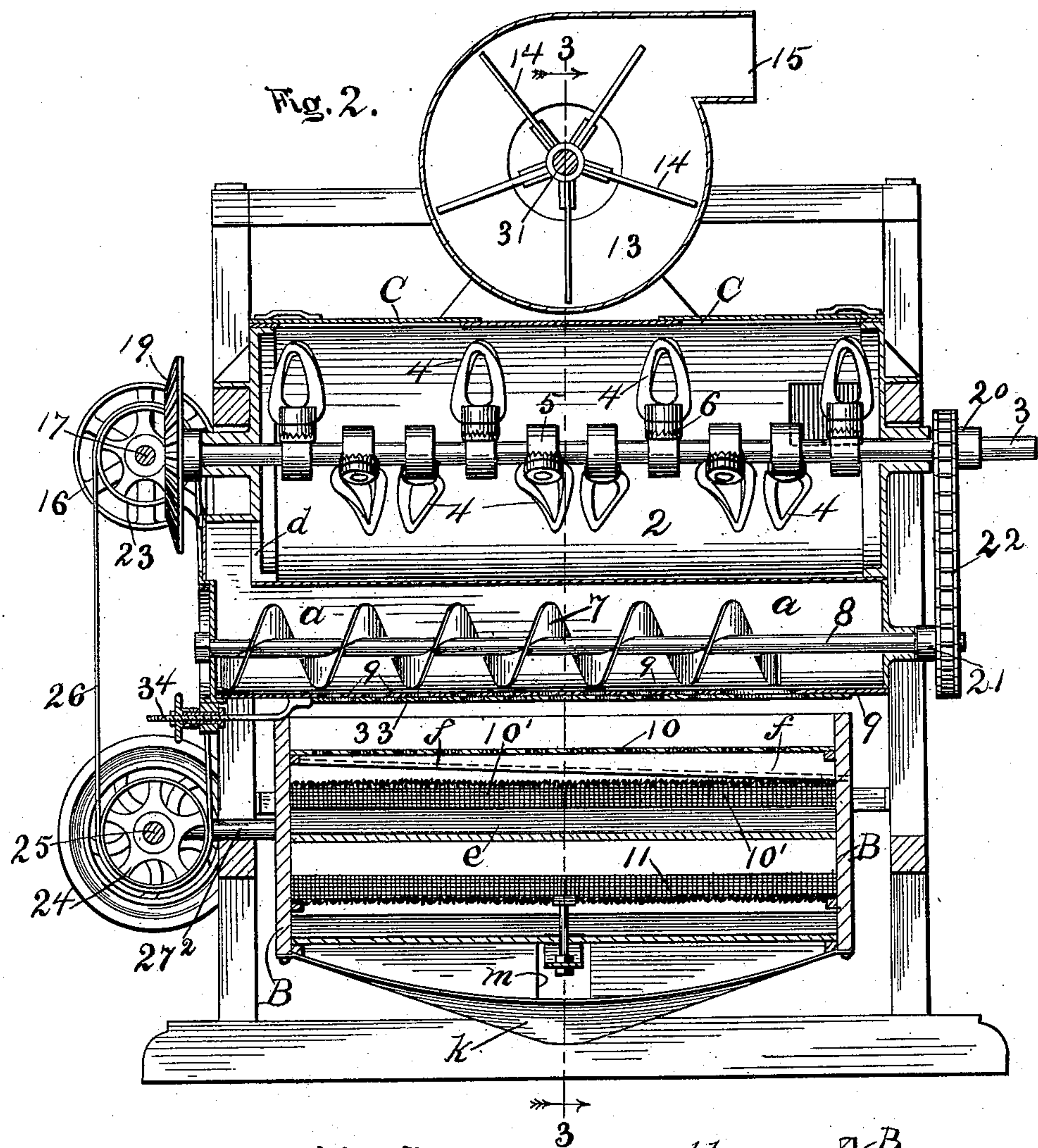
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(Application filed June 26, 1897.)

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3 Sheets—Sheet 2.



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Patented Jan. 31, 1899.

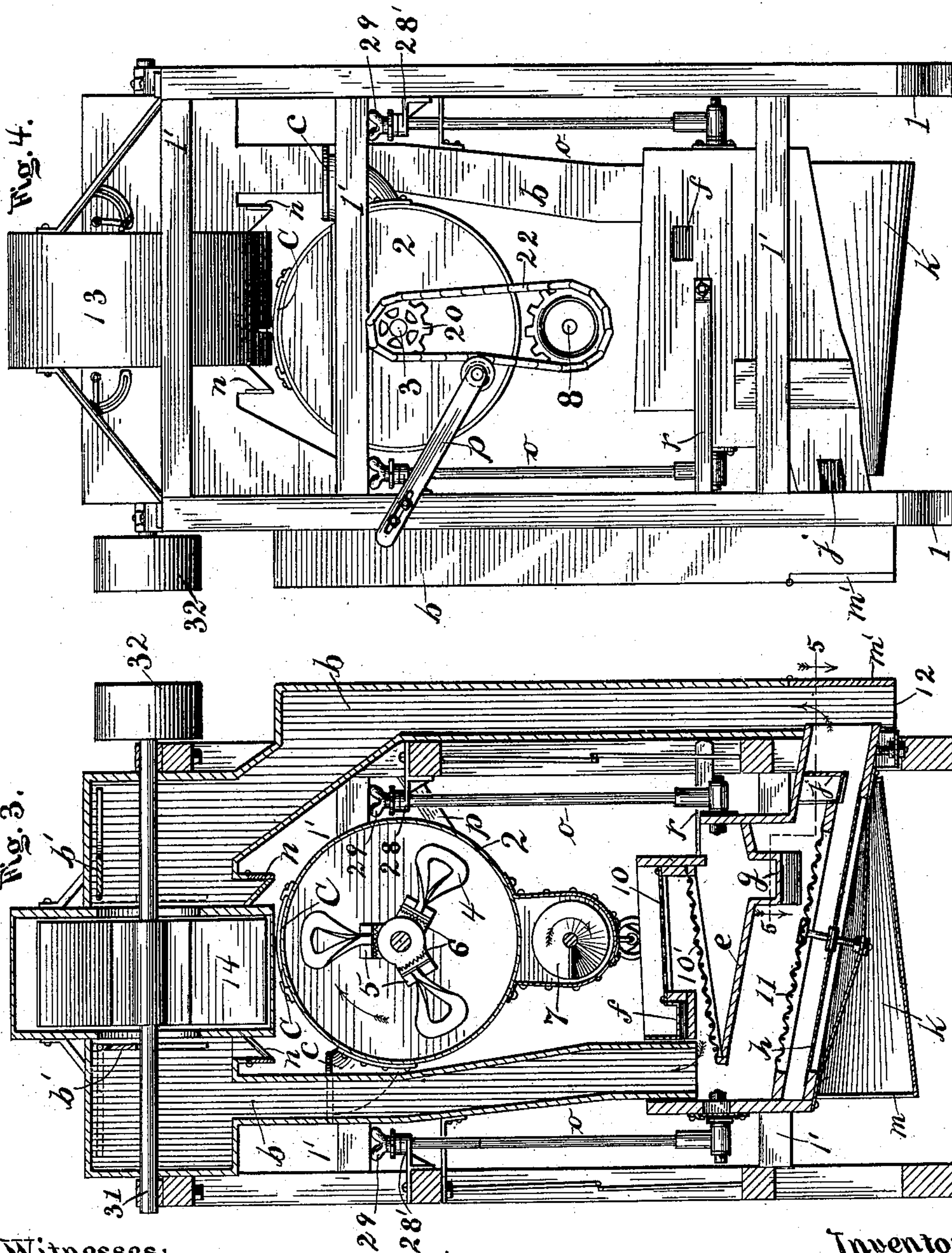
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MACHINE FOR COOLING, SCOURING, AND CLEANING MALT OR GRAIN.

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3 Sheets—Sheet 3.



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UNITED STATES PATENT OFFICE.

RUDOLPH J. BEHRINGER, OF CHICAGO, ILLINOIS.

MACHINE FOR COOLING, SCOURING, AND CLEANING MALT OR GRAIN.

SPECIFICATION forming part of Letters Patent No. 618,389, dated January 31, 1899.

Application filed June 26, 1897. Serial No. 642,505. (No model.)

To all whom it may concern:

Be it known that I, RUDOLPH J. BEHRINGER, a citizen of the United States, residing in the city of Chicago, county of Cook, and State of Illinois, have invented a new and useful Improvement in Machines for Cooling, Scouring, and Cleaning Malt or Grain, of which the following is a specification.

The objects of my machine are to clean and scour malt after it leaves the drying-kiln and grain after storing, remove all foreign matter clinging to it, and in the process of scouring incidentally also to cool it, so that it may be safely placed in the storage-chamber for use as it may be required.

My invention is illustrated in the accompanying drawings, in which—

Figure 1 is a front elevation of the machine. Fig. 2 is a longitudinal section on line 2 2, Fig. 1. Fig. 3 is a transverse vertical section on line 3 3, Fig. 2. Fig. 4 is a rear elevation of the machine. Fig. 5 is a sectional view on line 5 5, Fig. 3. Fig. 6 is a view showing a modification, substituting a screen for blank plate, as used for cleaning barley. Figs. 7, 8, and 9 are detailed views of the scouring device.

Similar letters and numerals refer to similar parts throughout the several views.

In the construction of my machine I erect a framework consisting of four upright posts (marked with the numeral 1) and cross-bars, (marked 1',) properly secured together, with corresponding side pieces. In the middle of the upper portion of the frame, rigidly supported by the middle cross-bars 1', is placed the horizontal cylinder 2, extending the length of the machine from front to rear and is provided with a feeding-hopper *c*, Fig. 4.

On a shaft 3, passing through the cylinder 2 and journaled in the centers of the heads of the cylinder, are attached by adjustable collars a series of open lugs or ears 4 4, having a link shape. The ears 4 4 are attached to the collars by a swivel 5, each of which has a base 6 with teeth, into which it is rigidly held by a screw after being adjusted to form a right or left handed conveyer or partly right or left, conveying the grain from the middle to the ends of the cylinder, and vice versa, and easily adjustable in its alinement on the shaft. In arranging the ears 4 4

on the shaft I prefer to have them face each other in sets and yet in their alinement on the shaft be spiral in form, looking from the front of the machine toward the rear, the object being to propel the grain in the cylinder from the hopper during the process of agitation and scouring to the discharge-opening *d*, Fig. 2, where it falls into the secondary cylinder or chamber *a*, where the scouring process is continued by the spiral blade 7 on the rotary shaft 8, journaled in the ends of the chamber *a*. This spiral blade 7 propels the grain toward the closed end of the chamber, conveys the grain over the perforated bottom 9 9, dropping it upon the screen 10 below, from there it is shaken upon the inclined screen 10', and thence down the second inclined screen 11 and discharged at the opening 12 on the floor below.

Upon the top of the frame is placed a blower 13, containing a fan 14, having a discharge-pipe 15, Fig. 2. By the operation of the fan 14 an upward draft is created, and by means of the circulating air chambers and flues *b b*, which communicate with the blower 14, all the light material—as chaff, straw, dust, &c.—is liberated by the agitation of the grain, is carried up the flues, and discharged at the mouth of the blower-pipe 15. Motion is obtained by means of the pulley 16 (connected with the line-shaft, not shown here) on the end of the horizontal shaft 17, carrying a rawhide pinion 18, engaging with the bevel gear-wheel 19 on the exterior end of the horizontal shaft 3, passing through the cylinder 2, and carrying at its opposite end, also outside the cylinder, a sprocket-wheel 20, Fig. 4, engaging with the sprocket-chain 22 on the larger sprocket-wheel 21, transmitting motion to the horizontal shaft 8 in the second cylinder. A pulley 23 on the shaft 17 gives motion to the shaft 25, which carries another pulley 24, driven by the belt 26.

The eccentrics 27 and 27' and rods 27'' on the shaft 25 provide the oscillating motion for the frame B, carrying the screens in the lower portion of the machine, which is hung on the rods *o o* on the brackets 28 and 28', Fig. 1, attached to the frame 1 1 of the machine. These rods, by means of a nut and screw-head 29, resting on a rocker convex on its under surface in a concave bed on the

bracket, permit the rods to swing, thereby accommodating the vibrations of the frame B by the eccentrics on the shaft 25. A spring-rod *r*, Fig. 4, prevents the frame moving sidewise and steadies it. A belt 30 connects the shaft 31, carrying the fan 14, in the blower by means of the pulley-wheel 32 and gives the fan motion.

The secondary cylinder or chamber has its bottom wall perforated to allow the grain to fall through into the lower compartment containing the screens; but as the feeding of the grain into the machine is somewhat irregular at times the discharge of grain from the cylinder *a* may be regulated as required by means of a second perforated plate 33, slidingly attached to the bottom underneath the cylinder *a*, and by means of a screw-bolt 34, attached to the end, the perforations in the bottom of the cylinder may be wholly or partially closed, as may be desired, for the purpose.

The vibrating frame B is arranged to carry three screens 10, 10', and 11. The first, or 10, is nearly horizontal and serves to gather the coarse refuse into the trough *f*. The grain is passed to the second inclined screen 10', which carries underneath a blank plate *e*, into which the finer particles of dirt are collected and carried to the trough *g*, and thence the grain goes to the third screen 11 upon a second blank 11' and is discharged at 12. The frame B communicates with the air chambers or flues to permit the currents of air to pass through it to carry off the lighter particles of refuse.

The screens in the frame B are removable by means of a hinged door *m'* and may be changed as the work may require a coarse or fine mesh or for different grains. In the operation of the machine the grain is fed into the larger or upper cylinder 2 and the machine set in motion. The shaft 3, carrying the open ears, agitates the grain and scours it, discharging it into the cylinder or chamber *a* below, where it again undergoes similar treatment by means of the spiral blade 7 on the rotary shaft 8. The grain passes through the perforations in the bottom of cylinder *a* and falls into the oscillating frame containing the screens, whereby the vibration of the grain moves from one screen to another, the motion releasing the lighter substances, which are carried upward through the flues *b b* by the currents of air generated by the fan, carrying all the chaff, dust, and light particles and discharging them through the pipe 15, while the grain is carried by the blank *h* to the opening 12 below at the side of the machine, and the sand and other heavy refuse matter are carried to the chute *k* and there discharged at *m*. As in the machines when in operation the load of grain upon the screens is quite heavy and causes them to sag, I have rigged a truss-rod *i*, Fig. 3, to aid in sustaining the weight of the grain and prevent the screens from sagging.

During the operation of the machine the blower carries up the flues some of the lighter grains, which are deposited in pockets or lower portion of the blower 13. For the purpose of returning this grain to the screens I place on each side of the blower and opening into it two small chutes *n n*, which by means of sliding doors therein may carry this grain back at intervals by simply opening the slides.

In cleaning barley I place at the bottom of the vibrating frame a dust or dirt catch pan *k*, inclined so as to discharge its contents at *m*, Fig. 6.

At the sides of the blower 13 are placed dampers *b' b'* for the purpose of regulating the currents through the air-flues according to the requirements of the malt or grain in the process. The conditions of the malt not being always the same as to moisture, certain conditions require more draft than others.

A rod *p*, carrying a small wheel, is rigged on the frame to serve in regulating the speed and tension of the sprocket-chain 22.

The cylinder 2 is provided with a manhole C C for the purpose of permitting access to the beaters or scouring apparatus within, while in the end of the cylinder is another opening provided with a slide *t*, through which the heavy or bulky foreign matter which may collect in the end of the cylinder may be removed.

It will be noticed that by this arrangement the grain is not only scoured and all foreign substances removed, but by means of the fan and the circulating currents of air through the flues and over the screens the grain is cooled, as well as scoured and cleaned, when discharged from the machine.

In practice I prefer to set the beater arms or devices spirally on the shaft, and when thus set they serve to convey the grain from one end of the cylinder to the other. I also set them so that the twisted portions stand at angles of forty-five degrees to vertical planes, intersecting said shaft at an angle of ninety degrees thereto, the result of which is that in revolving said arms will throw approximately two-thirds of the grain in one direction and one-third thereof in the opposite direction, thus thoroughly beating and agitating it. The angle at which said twisted portions are set, however, is governed by the condition of the grain. If it be filthy and sprouty, the angle must be more acute than with clean grain, as greater friction is required to secure the necessary cleaning. I am aware that beater-arms composed of open links adapted to be spirally mounted on a shaft are not new, and I do not claim such. By the peculiar construction of the beater-arm which I employ I am able to control the rapidity with which the grain shall be conveyed through the cylinder, the extent of the agitation, and the amount of cleaning, all important factors in treating the different kinds of grain and grain of different conditions as to cleanliness and moisture.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a machine of the kind specified, a device comprising a collar adapted to be adjustably mounted upon a shaft, a pin on said collar, an open link mounted on said pin and adjustably secured thereto, said link being twisted so that its ends stand at an angle of about ninety degrees to each other and at an angle to the plane of the longitudinal axis of said collar, substantially as described.

2. In a machine of the kind specified, a grain-cylinder, a shaft mounted therein, a

plurality of beater and conveyer arms adjustably secured on said shaft, and each comprising a collar, an open link secured to and axially adjustable on said collar, said link being twisted so that its ends stand at an angle of about ninety degrees to each other, and at an angle to the plane of the longitudinal axis of said collar, substantially as set forth.

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

RUDOLPH J. BEHRINGER.

Witnesses:

L. HANKE,

J. BUEHLER.