

UNITED STATES PATENT OFFICE.

CHS. T. JAMES, OF PROVIDENCE, RHODE ISLAND.

IMPROVEMENT IN PROJECTILES.

Specification forming part of Letters Patent No. 14,315, dated February 26, 1856.

To all whom it may concern:

Be it known that I, CHARLES T. JAMES, of Providence, Rhode Island, have invented a new and useful Improvement in Projectiles, which has not been known or used before my invention thereof, a full and accurate description whereof is herein contained, reference being had to the accompanying drawings, forming a part of this description.

My improvement is in the manner of imparting rotary motion to shot fired from a rifled cannon, and its effect is to give a sufficient degree of rotation to the shot without injuring or clogging the gun, and therein it differs from other devices to accomplish the same object.

The idea of forming the shot of some metal which would yield and expand under the pressure incident to the explosion of the charge of powder is well known, and has long been practiced in small-arms with success. The same principle has been tried in great guns by using soft-metal bands on the shot, distended by loading or firing, and patents have been granted for devices for effecting the distension; but it is found that the great intensity of heat and the great amount of power exerted in a cannon so affect the soft metal that it adheres to or "leads" the gun, thereby destroying the value of that method for cannon. There is no difficulty in expanding the soft metal to fill the scores of the gun by the act of loading or firing; but the difficulty is that when expanded it is deposited upon the interior surface of the gun and adheres to it with great tenacity.

My improvement consists in using fibrous material, instead of a flexible metallic one, and in expanding it into the scores of the gun by the explosive power of the powder when ignited by devices hereinafter described. The best material for this purpose is hemp, spun or woven; but cotton or other fibrous material, or vulcanized india-rubber, or strips of common rubber woven with gum or other fibrous materials, may be substituted with excellent effect. The shot, which is of any of the oblong shapes, is cast with a recess in its cylindrical surface, forming a sort of channel-way around its entire circumference. A hole is left or cored out through the shot concentric with its cylindrical surface, opening toward the breech of the gun and reaching as far as the channel or recess described. Into

this cylindrical hole other perforations are made, opening into the channel way or recess for the packing, and approaching each other as they approach the central bore, so as to form radii to the circle, like spokes of a wheel. By means of this combination there is a direct communication between the chamber of the gun where the powder is exploded and the channel for the packing, so that when the gas is generated in the chamber it would blow through the holes above described into the channel-way for the packing. If, therefore, this channel-way be filled with hemp packing, either in the shape of spun yarn formed into braid and greased or of woven bands of canvas, and the charge be fired, the packing will be distended against the inside surface of the gun, filling the scores, and thereby controlling the motion of the shot when it is projected. A band of hoop-iron, provided with a clip to keep it from turning, may be first sprung into this channel-way, so as to receive the pressure of the gas so as to press out the packing without bringing it into direct contact with the gas itself, and pins may be placed in the holes leading from the channel-way to the center bore of the shot, and a pointed mandrel be left in the center bore, so that when it is driven forward by the explosive power of the gas it will force out the pins, which enter the center bore, and so distend the packing. This mandrel may be made to pass entirely through the shot and have a nut on its front end, which may be screwed down, so as to draw up the mandrel by the rammer, which should be provided with a nut-holder in its bottom end for that purpose.

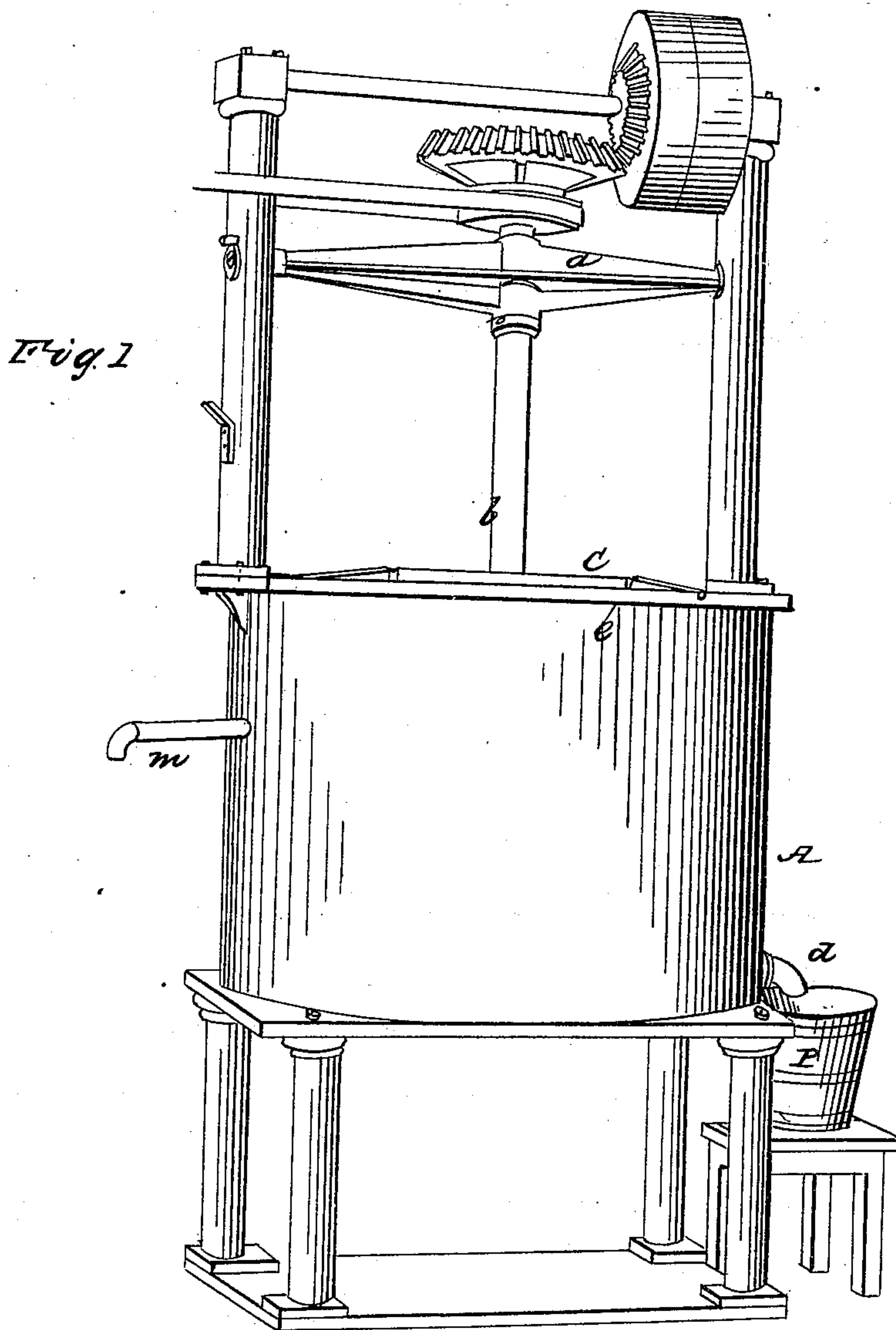
In the accompanying drawings, Figure 1 represents a shot in which only the fibrous packing is used in connection with openings from its interior surface to the chamber of the gun, as shown at letters *a a*. Fig. 2 shows a transverse section through the shot in the plane of the radial holes, and exhibits the manner in which the communication is made between the gas and the packing. Fig. 3 exhibits the same shot as Fig. 1, excepting that the packing-ring of iron is applied under the fibrous packing. Fig. 4 is a section and side view of that ring. Fig. 5 shows the same shot with pins *c c* running from the inside of the packing to the mandrel *b*, which, being pointed, will, when driven

E. N. KENT.
Ore Separator.

2 Sheets—Sheet 1.

No. 14,316.

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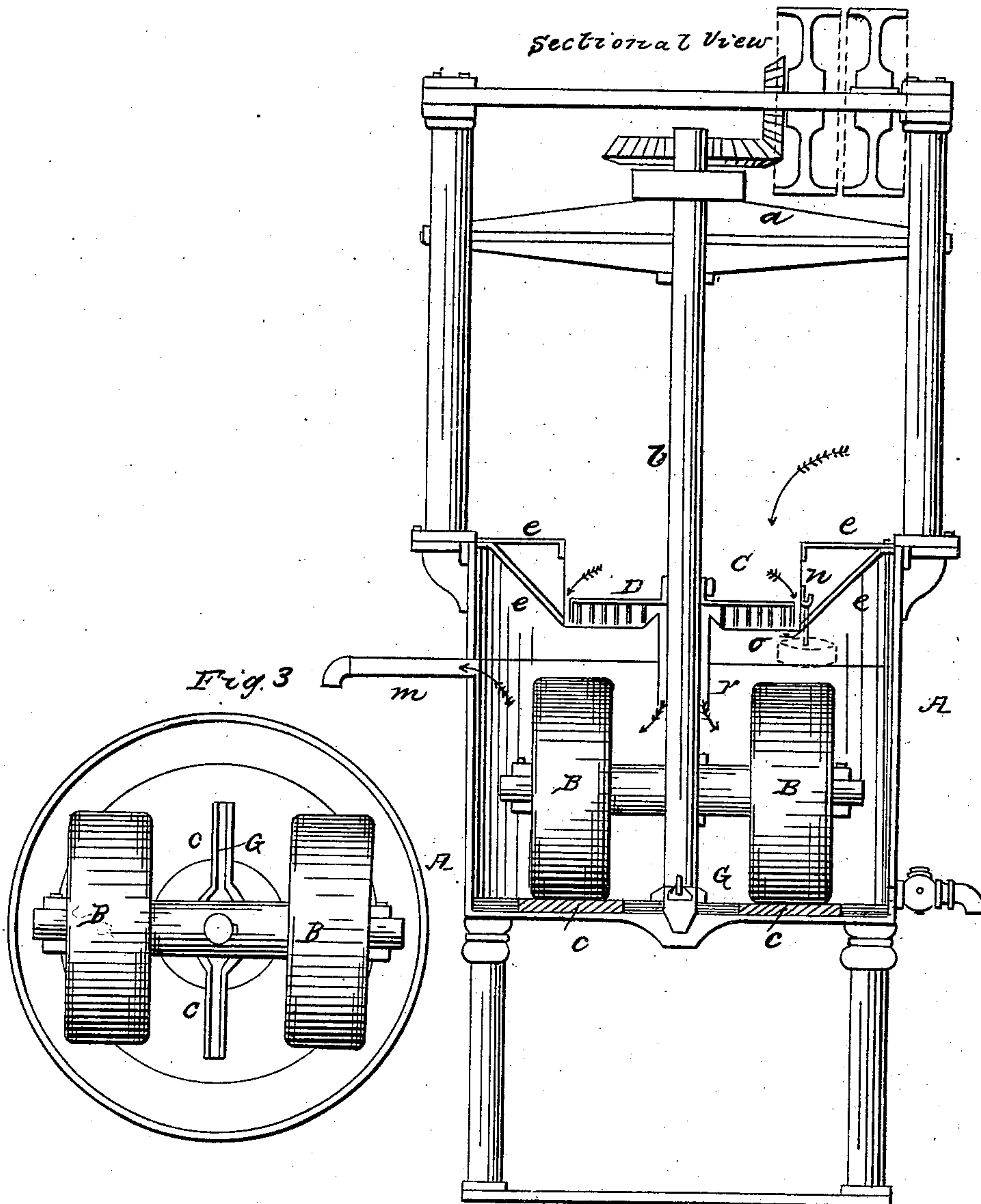
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Fig 2

Sectional View



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UNITED STATES PATENT OFFICE.

EDWARD N. KENT, OF NEW YORK, N. Y.

IMPROVED MACHINE FOR SEPARATING GOLD AND OTHER PRECIOUS METALS FROM FOREIGN SUBSTANCES.

Specification forming part of Letters Patent No. 14,316, dated February 26, 1856.

To all whom it may concern:

Be it known that I, EDWARD N. KENT, of the city of New York, in the county of New York and State of New York, have invented a new and useful Apparatus for Separating Gold and other Precious Metals from Foreign Substances; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figure 1 is a perspective view; Fig. 2, a longitudinal vertical section; and Fig. 3 a horizontal interior view of the bottom of the vessel A, Fig. 2.

The same letters indicate like parts in all the figures.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

Fig. 2 is a vertical section of my apparatus for separating gold and other precious metals as arranged for use and showing all the parts. It consists of a "grain-separator" C for separating gold, silver, &c., from the previously-crushed ores or earthy matters, and a "wet mill" A for grinding the latter under water after the grains of gold or other precious metals have been separated.

A represents a strong iron vessel with a flat bottom and capable of holding a large body of water, with the heavy wheels used for grinding. It is supported at a convenient height by four legs and surmounted by two pillars which support the cross-head *a* and the machinery suitable for giving motion to the shaft *b*.

B B, Figs. 2 and 3, are two solid iron or stone wheels running vertically under water and which revolve on their own axis and around the shaft *b* upon a thick plate of chilled iron *c*, resting upon the bottom of the vessel A. For convenience of removing or changing this iron plate and to prevent waste of iron it is made to correspond in size to the circle formed by the rotation of the wheels around the shaft *b*, and the intermediate spaces are filled with wood or cement to the height of the iron plate, so as to form a surface level with the cock *d*. The axle of these wheels B B is made to fit loosely on the shaft

and keyed, so as to rise up when necessary, and is made to turn with the shaft by means of the key or feather which is firmly attached to the shaft.

C, Fig. 2, is an iron pan or hopper to the mill A and serves to separate the metallic grains from the previously-crushed ore or from the earthy matters which are supplied to the apparatus. This hopper or grain-separator is supported by arms *e*, which rest upon the upper rim of the vessel A and keep the hopper stationary by its own weight. At the bottom of this hopper is a large tube *r*, through which the shaft *b* passes, leaving a space between the tube and shaft for conducting the earthy matters into and a short distance under the surface of the water, and this tube extends above the bottom of the pan, which is inclined upward for a short distance to form the connection with the upper edge of the tube thus elevated above the bottom of the pan.

D is a round iron plate or pan inverted within the hopper C, with a socket and thumb-screw at the top, by which it is attached to and revolves with the shaft *b*, and is supplied with a number of teeth on the lower side nearly touching the bottom of the stationary pan C.

G, Figs. 2 and 3, is a scraper, of wood or iron, fastened to the bottom of the shaft *b*, which serves to keep the center of the mill clear and conduct the earthy matters which fall to the bottom under the wheels B B, and is used also for cleaning the mill by opening the cock *d* while the shaft is in motion.

The apparatus herein described may be used with steam, water, or horse power, which should be applied in such manner as to give the shaft *b* from twenty-five to thirty revolutions per minute to perform the work to the best advantage. In putting it up for use the apparatus should be firmly supported and bolted on solid masonry or timber embedded in the earth, so that when the power is applied it may rest firmly on its foundation.

The crushed ore, earth, or other substance to be washed for gold, silver, or other precious metal should, if necessary, be previously prepared, so as to render it suitable to enter the hopper or grain-separator described above. The mode of preparation necessary to this