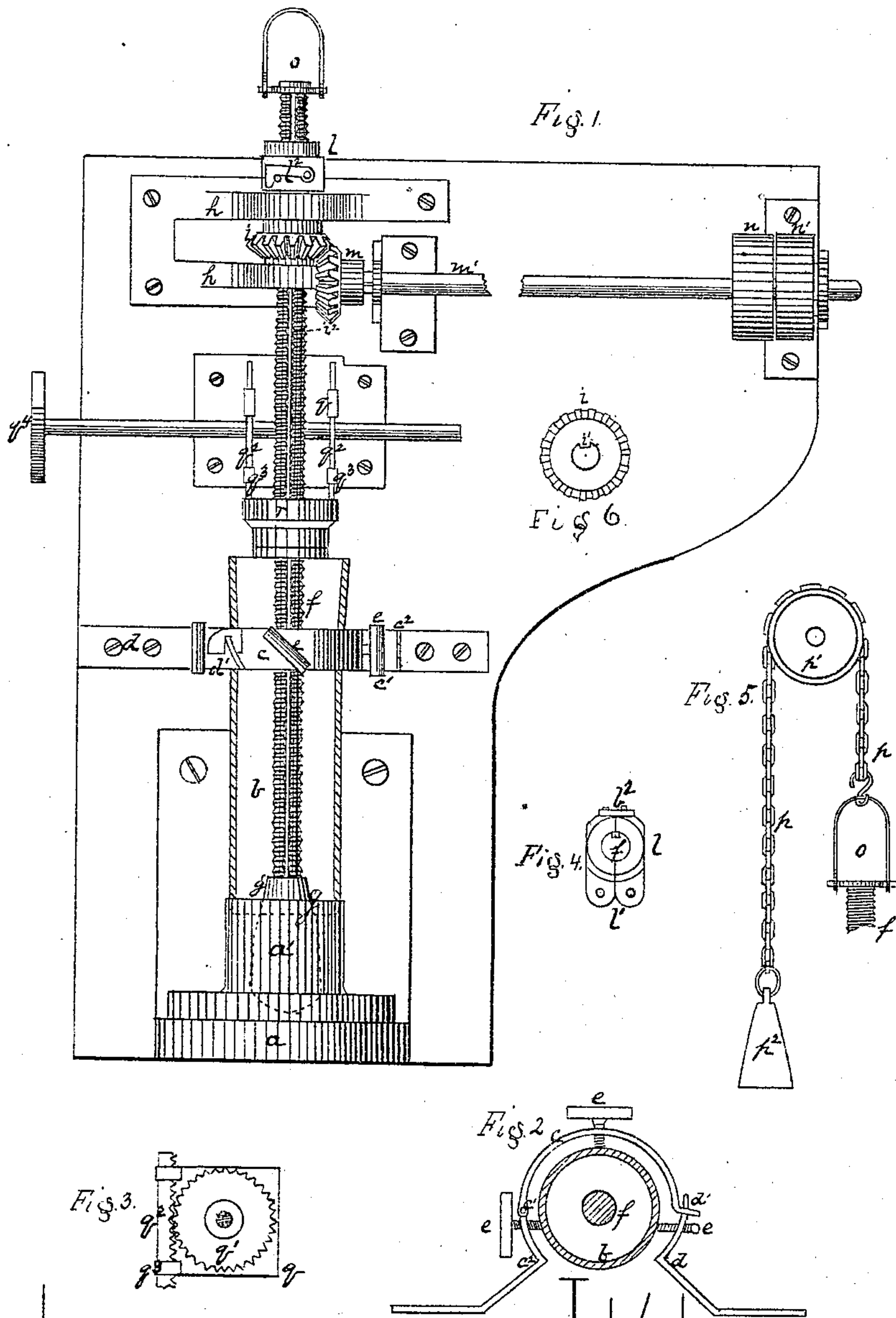


**A. T. BRODIE.**  
**Pipe-Ramming Machines.**

No. 151,681.

Patented June 9, 1874.



WITNESSES  
 James L. Kay  
 Frederick Standish

INVENTOR  
 Anthony T. Brodie  
 by Bakewell & Son Attys.

# UNITED STATES PATENT OFFICE.

ANTHONY T. BRODIE, OF CONNELLSVILLE, PENNSYLVANIA.

## IMPROVEMENT IN PIPE-RAMMING MACHINES.

Specification forming part of Letters Patent No. **151,681**, dated June 9, 1874; application filed April 17, 1874.

*To all whom it may concern:*

Be it known that I, ANTHONY T. BRODIE, of Connellsville, in the county of Fayette and State of Pennsylvania, have invented a new and useful Improvement in Pipe-Ramming Machine; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawing, forming a part of this specification, in which—

Figure 1 is a vertical elevation of my improved pipe-ramming apparatus, the flask being shown in section. Fig. 2 is a view of the centering device. Fig. 3 is a side view of a portion of the apparatus; and Figs. 4, 5, and 6 are detail views.

Like letters of reference indicate like parts in each.

My invention consists in a machine for forming molds for making cast-iron pipe. The distinguishing features of this machine consist, first, in a combination of certain devices for imparting a vertical and rotary motion to the ram, and for releasing the ram, so that it may be raised or lowered by a vertical movement alone, so as to adjust the ram in a quick and easy manner; second, in the arrangement and devices for operating the bowl-pattern, so that the bowl of the pipe may be formed at the same time that the pipe-pattern itself is formed; third, in a device for centering the flask under a ram.

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

Upon a suitable bottom plate, *a*, I secure the flask-stand *a'*. This stand has an internal cavity of sufficient size to receive the ram, and is beveled out at its upper end for the purpose of placing and centering the lower end of the flask. The upper end of the flask is centered so as to bring it into proper position under the ram by means of the band *c*, which is hinged at *c'* to the strap *c''*, and is secured at the other end by a latch, *d'*, on the end of the strap *d*. Projecting through the strap *c''*, band *c*, and strap *d*, are set-screws *e*. These set-screws bear against the flask *b*, and are operative for the purpose of centering it properly under the ram. On the lower end of the threaded spindle *f* is a ram, *g*, having a tapered upper end,

*g'*, a cylindrical body, the diameter of which is equal to the diameter of the pipe to be formed, and round or tapered lower end. The spindle at or near its upper end extends through a double bearing, *h*, and a miter-wheel, *i*, the latter being placed between the two bearings. This miter-wheel is secured to the spindle by means of a tongue, *i'*, extending into a groove, *i''*, which runs along the entire length of the spindle. The miter-wheel is loose upon the spindle, so that the latter may be drawn through it at pleasure. Mounted on the bearing *h* is a two-part nut, *l*, which is hinged at *l'*, so that it may be opened or closed, and when closed is secured around the spindle *f* by means of the hook *l''*. Meshing into the miter-wheel *i* is a second wheel, *m*, which is placed on the end of the shaft *m'*, and is designed for communicating power from the pulley *n* to the spindle *f*. Next to the pulley *n* there is a loose pulley, *n'*. On the upper end of the spindle *f* is a swivel, *o*, which permits the turning of the spindle without moving itself. Extending up from this spindle *o*, over a pulley, *p*<sup>1</sup>, is a chain or line, *p*, to the other end of which is attached a weight or counter-balance, *p*<sup>2</sup>. Arranged just over the upper end of the flask *b* is a frame, *q*, in which are mounted a pair of pinions, *q*<sup>1</sup>, meshing into the racks *q*<sup>2</sup>, which extend through the brackets *q*<sup>3</sup>, and carry the pattern *r*. This pattern *r* is the pattern for the bowl of the pipe. The movement of the rack and pinion is sufficient to insert it the proper distance into the mouth of the flask to form the bowl-mouth of the mold. These pinions are operated by the hand-wheel *q*<sup>4</sup>. The operator's stand is designed to be arranged in such position that he can with ease supply the sand to the flask, operate the hand-wheel *q*<sup>4</sup>, and the nut *l*.

The operation of my improvement is as follows: The ram resting in its stand *a*, the flask *b* is centered by means of the screws *e*. Power is then applied to the pulley *n*, and the nut *l* closed, as shown in Fig. 1. Then the miter-wheel *m*, meshing into the wheel *i*, which is secured to the spindle by the key and groove *i'* and *i''*, as described, causes the spindle to be rotated in the nut *l*. This causes the gradual rise of the ram *g* by a rotary progressive motion through the center of the flask *b*. The



sand, being fed by the operator into the flask in the usual way, is packed by the tapered ram as it rises, so as to form the mold. When the ram reaches the upper end of the flask *b*, the pattern *r* is lowered into position by means of the rack and pinion  $q^1$  and  $q^2$ , and the sand is packed around the outer side of the pattern by the workman at the moment when the ram reaches and enters the pattern *r*. The mold having been completed, the operator opens the two-part nut *l* by throwing back the hook  $l^2$ , so that the spindle may continue to rotate without rising, or he stops its motion by throwing the belt onto the loose pulley. The flask is then freed by opening the band *c* and raising the pattern *r*, and is replaced by an empty flask, which is centered in the manner described. Then, in order to return the ram to the stand *a* without going through the long tedious operation of screwing it back, the nut *l* is opened in the manner described, and the ram, being counter-balanced by the weight  $p^2$ , may be drawn down to place by the workman with ease, the key of the miter-wheel *i* sliding in the groove  $i^2$  permitting this movement. The pinions  $q^2$  may be movable on their arbors to suit different sizes of bowl-patterns. For convenience, the ramming-pit is generally next to the oven, so

that the flasks when filled may be hoisted directly by means of the crane.

Power may be applied to the shaft *m'* in any other known or desirable way. The spindle *f* may be turned by a worm meshing into a square pinion, instead of the miter-wheel.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The threaded grooved spindle *f*, carrying the ram *g*, in combination with the pinion *i* and the divided nut *l*, substantially as and for the purpose specified.

2. The bowl-pattern *r*, mounted in the bracket  $q^3$ , in combination with the racks  $q^2$  and pinions  $q^1$ , substantially as and for the purposes described.

3. The centering apparatus, consisting of the band *c*, straps  $c^2$  *d*, and screws *e*, substantially as described.

4. In the centering apparatus of a pipe-ramming machine, the hinged band *c*, having a catch,  $d'$ , in combination with the straps  $c^2$  *d*, substantially as and for the purpose specified.

In testimony whereof I, the said ANTHONY T. BRODIE, have hereunto set my hand.

Witnesses: ANTHONY T. BRODIE.

T. B. KERR,

E. C. FITLER.