

(No Model.)

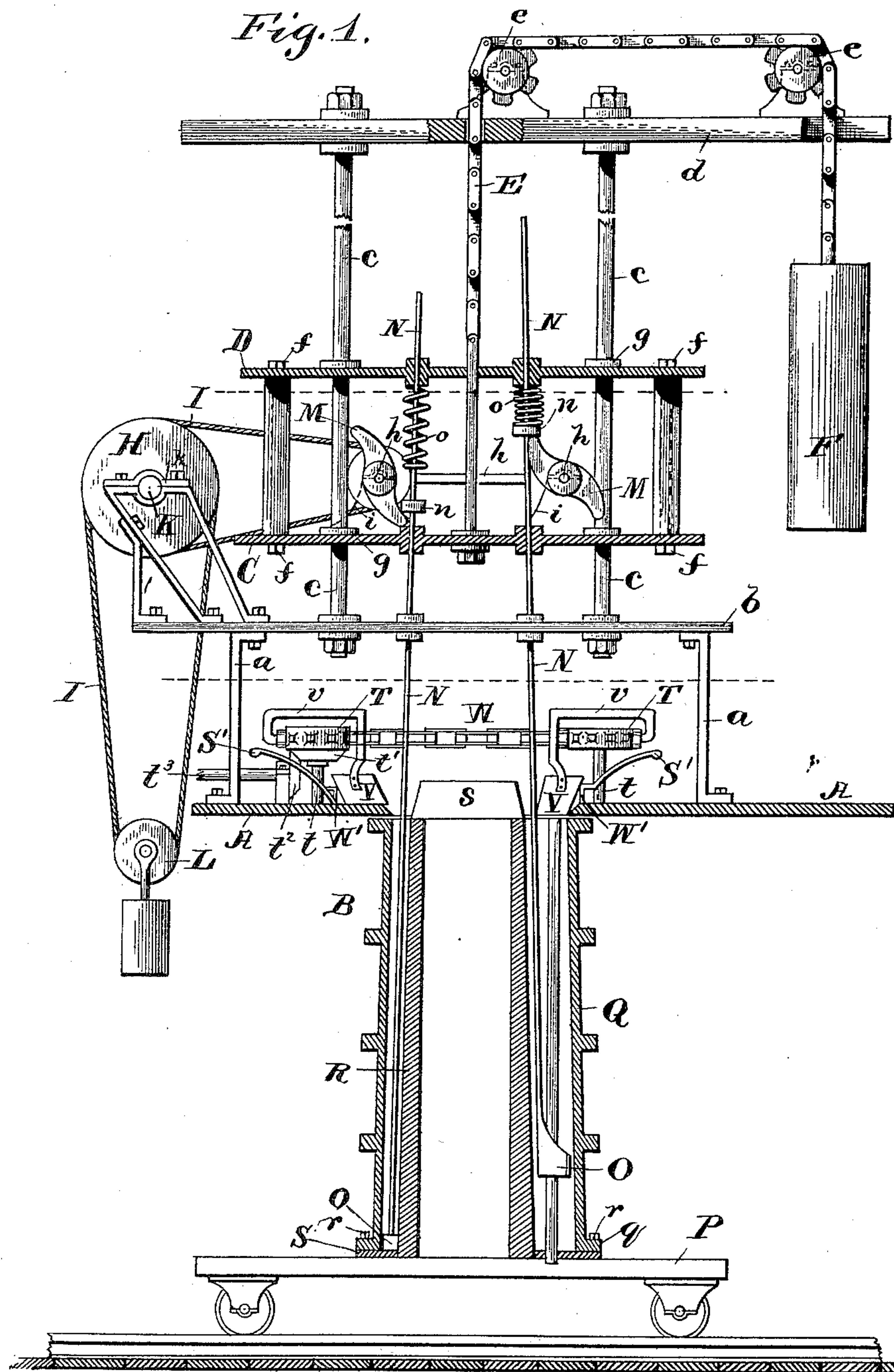
3 Sheets—Sheet 1.

W. B. STERRIT.

APPARATUS FOR FORMING SAND MOLDS.

No. 424,831.

Patented Apr. 1, 1890.



Witnesses:  
J. B. McGinn  
W. Clabaugh

Inventor:  
William B. Sterrit  
by Connelly Bros. Attys

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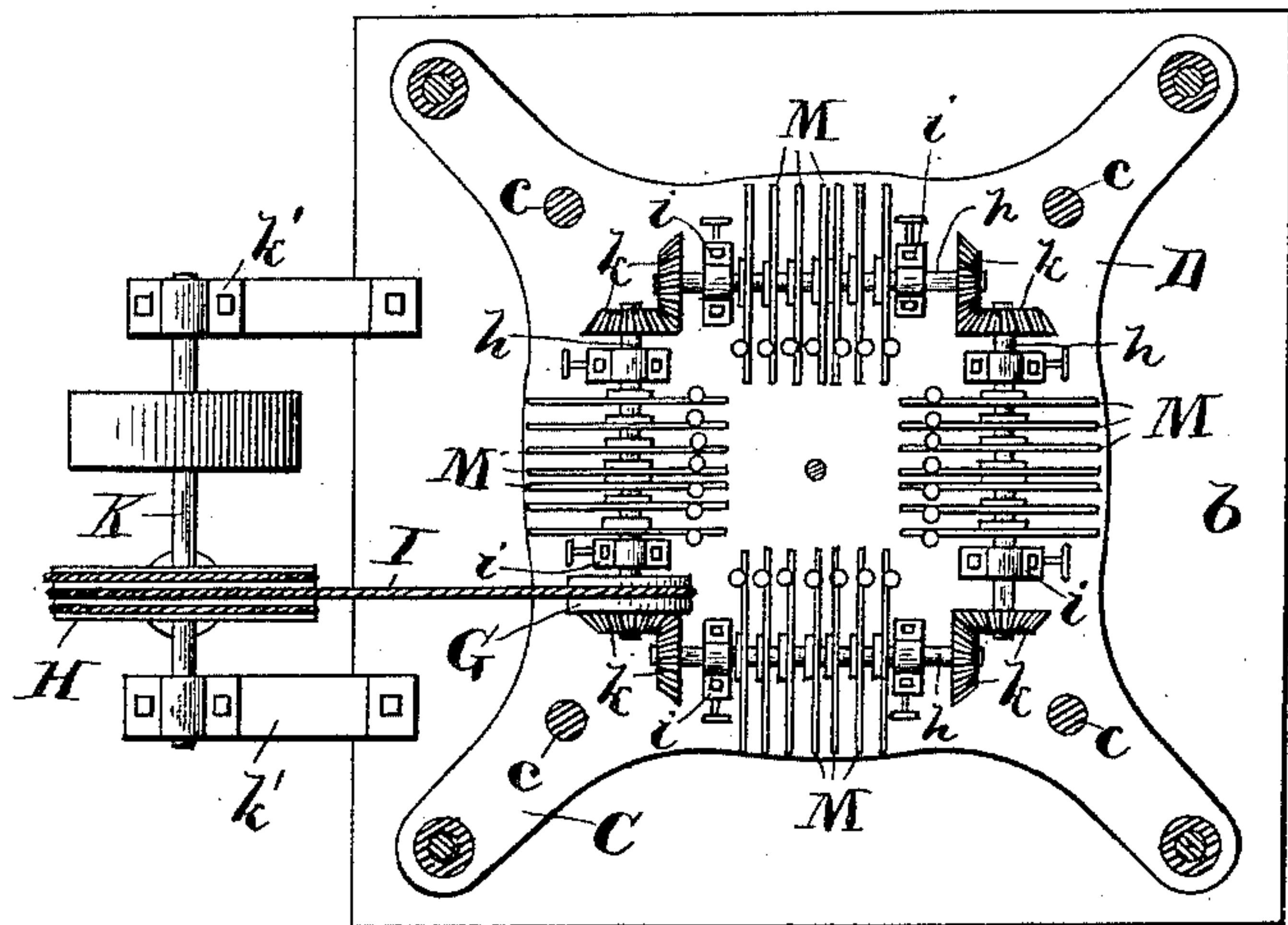


Fig. 2.

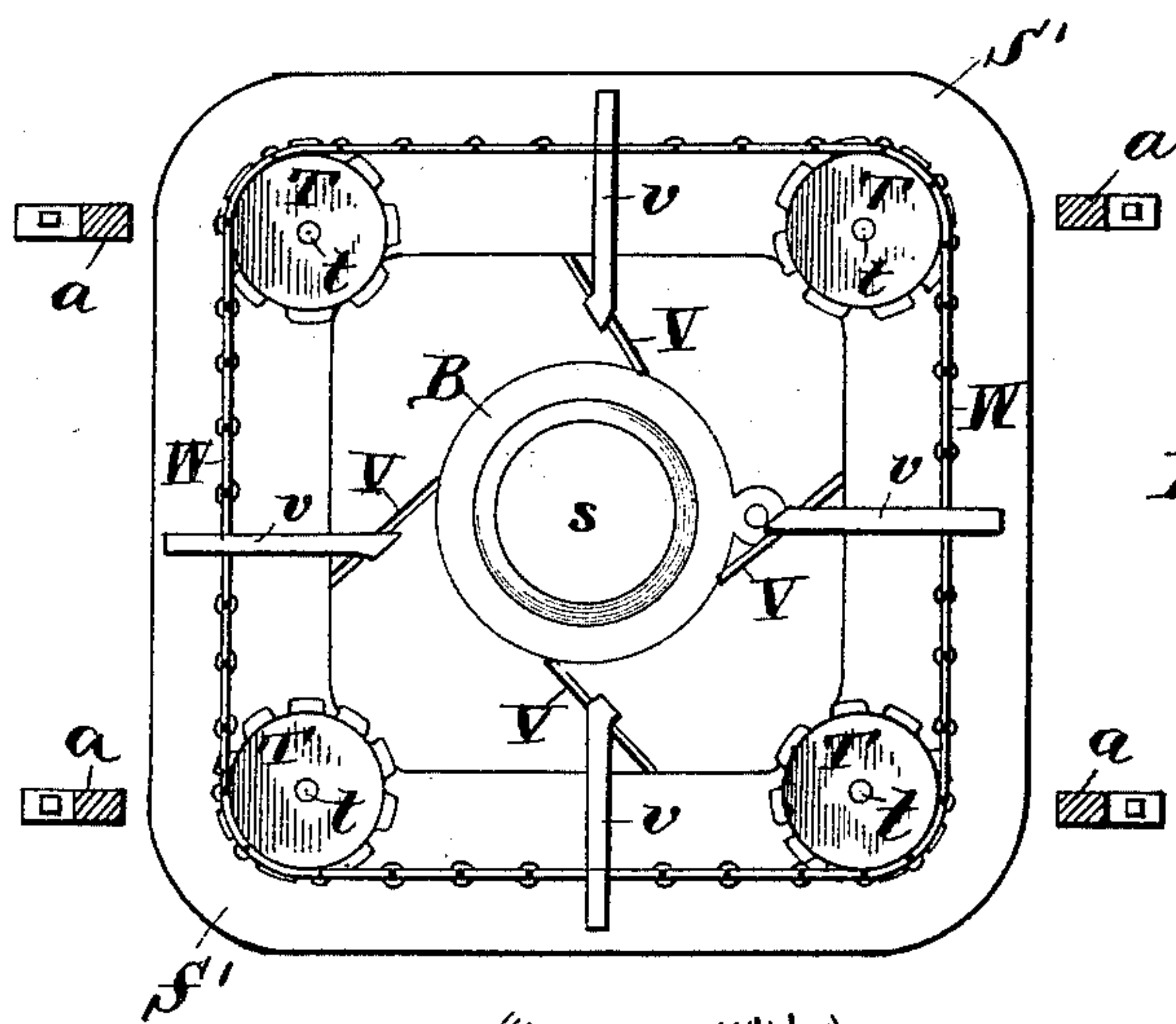


Fig. 3.

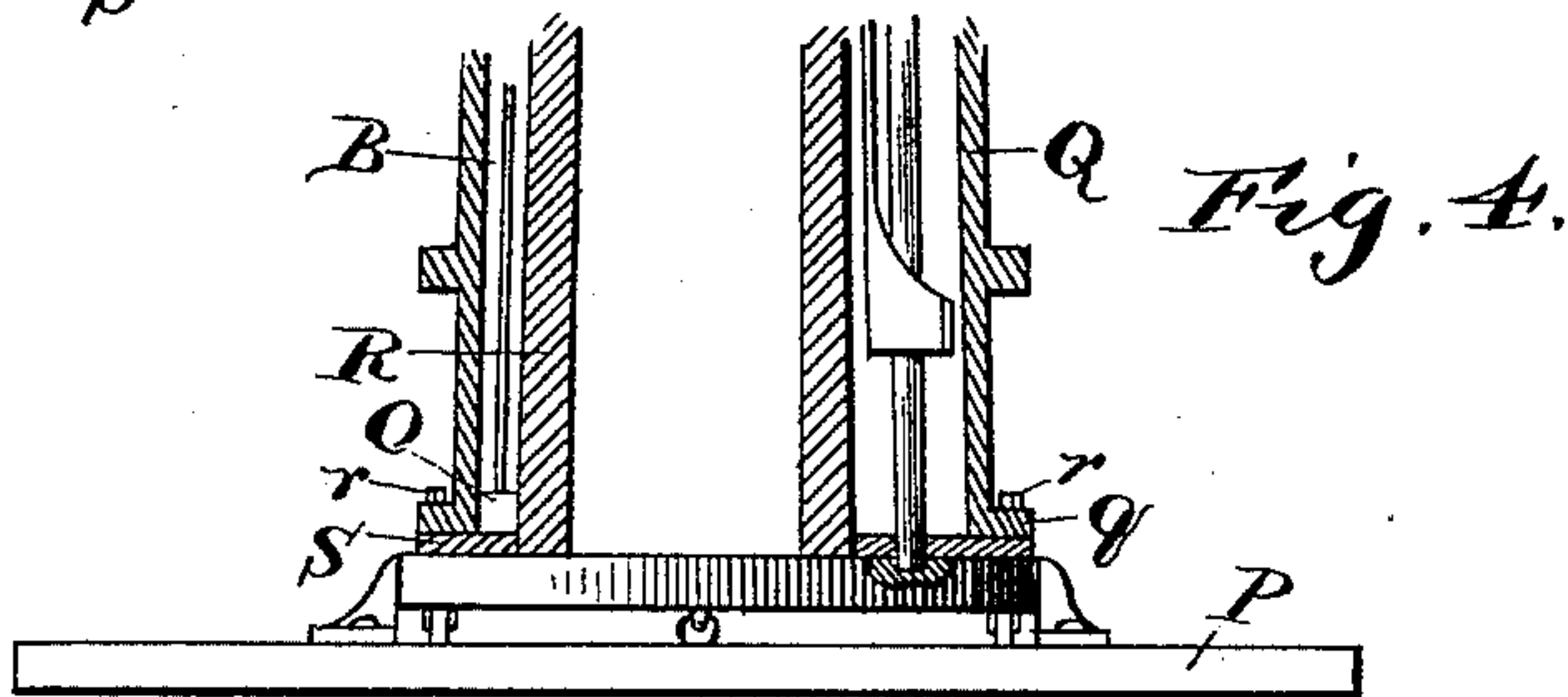


Fig. 4.

Witnesses  
J. B. McGinn.  
Wm. Clabaugh

Inventor:  
William B. Sterrit  
by Connolly Bros Attys

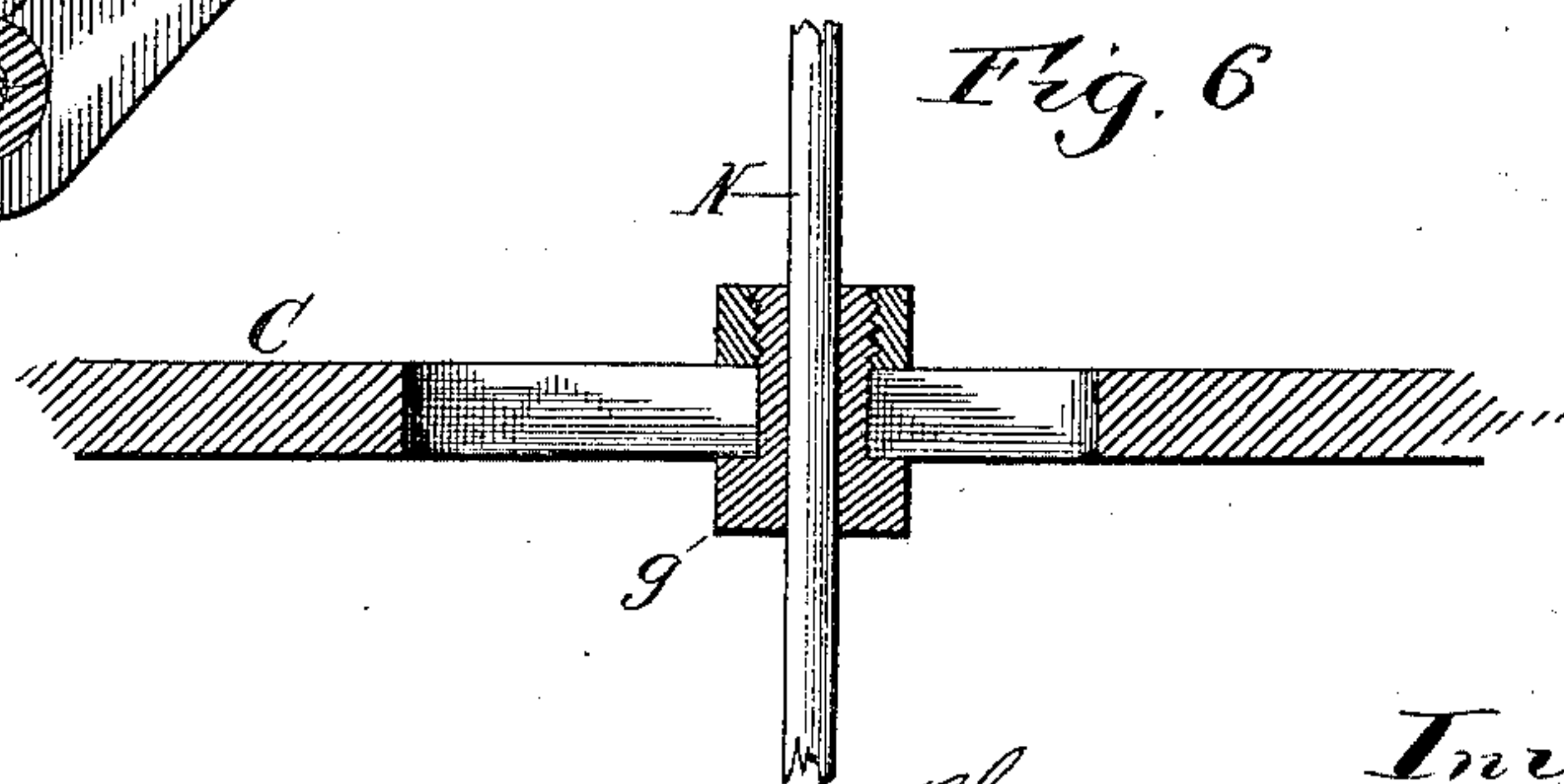
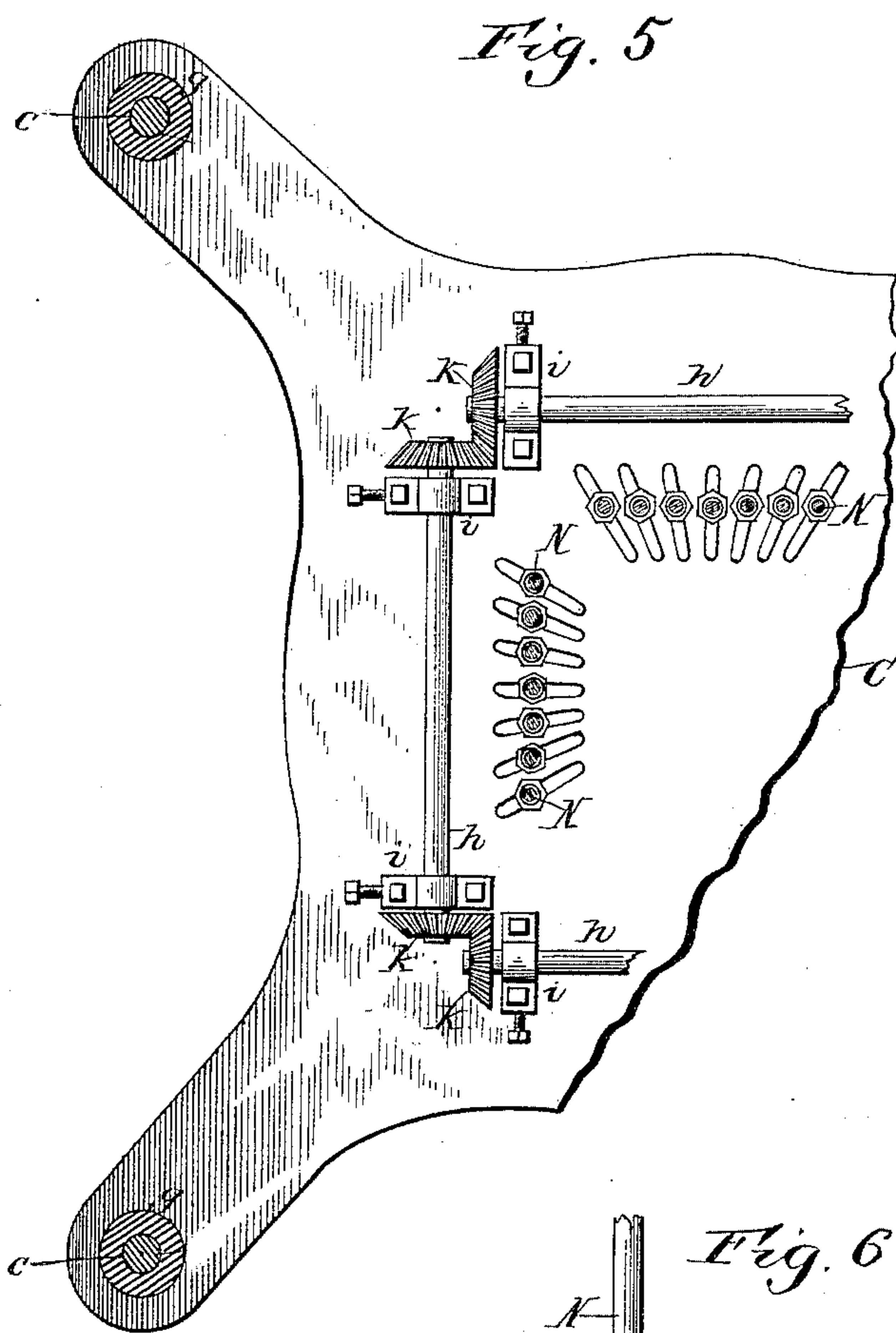
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3 Sheets—Sheet 3.

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Witnesses:  
J. B. McGinn.  
H. C. Court.

Inventor:  
William B. Sterrit  
by Connolly Bros.  
Attys



# UNITED STATES PATENT OFFICE.

WILLIAM B. STERRIT, OF PITTSBURG, PENNSYLVANIA.

## APPARATUS FOR FORMING SAND MOLDS.

SPECIFICATION forming part of Letters Patent No. 424,831, dated April 1, 1890.

Application filed November 25, 1889. Serial No. 331,488. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM B. STERRIT, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Apparatus for Forming Sand Molds; and I do hereby declare the following to be a full, clear, and exact description of the invention, reference being had to the accompanying drawings, which form part of this specification.

This invention has relation to apparatus for forming sand molds for ingot-molds, ingot-mold cores, water or gas pipes, or such other large castings as are usually made on end in dry sand; and my invention has for its further object the provision of a novel apparatus adapted and designed to ram and pack the sand used in forming such molds and to be operated by steam or other available power.

Heretofore in the formation of cores such as are above mentioned it has been customary to ram and pack the sand by means of hand-tools, and the operation is one involving great labor and considerable skill and time, thus rendering the operation very expensive, owing to the necessity of employing skilled labor and the length of time required to properly prepare each mold.

In carrying my invention into effect I provide a series of vertically-reciprocating rammers or packing-tools attached to a balanced frame and operated by means of cams upon horizontal shafts journaled in the balanced frame and receiving motion from a power-shaft through suitably-arranged gearing or belts or the equivalent. In connection with these automatically-operated and power-driven rammers I provide suitable power-driven devices for supplying and distributing the sand to the mold as required, such devices comprising an annular hopper of a shape adapted to the particular form of mold which is being constructed, an endless belt or chain traveling above such hopper, and scrapers or distributors attached to said belt or chain and arranged to travel over the upper end of the flask in which the mold is being formed and to evenly feed and distribute the sand into the mold-cavity accordingly as it is required.

My invention consists in the novel construction, combinations, and arrangements of parts, hereinafter described and specifically claimed.

Referring to the accompanying drawings, wherein I have illustrated my invention as adapted to form the sand molds in which to cast ingot-molds of the ordinary form, Figure 1 is a vertical transverse section. Fig. 2 is a top view; Fig. 3, a horizontal section on the line *xx* of Fig. 1; Fig. 4, a modification. Fig. 5 is a plan view, and Fig. 6 a sectional view, of a portion of the apparatus.

The line *A A* indicates the foundry-floor, and *B* the "pit" or cavity in the floor in which the molds are formed. Above the pit *B* is arranged a strongly-constructed stationary frame-work consisting of the legs *a a* and the table *b*, bolted or otherwise firmly secured upon said legs. Projecting upwardly from the table *b* are heavy guide rods or standards *c c*, and across the tops of these standards is a beam *d*, upon which are journaled sheaves *e e*, that serve to carry the rope or chain which is secured the movable frame and the rammers, as will be presently described. The movable cage or frame which carries the rammers, their operating-cams, and other appurtenant parts consists of two annular disks or plates *C* and *D*, firmly secured together by means of bolts *f f* and sliding freely upon the upright rods or standards *c c*, said rods passing through boxes *g g* on said disks or plates. A chain *E* is attached to the movable frame or cage, and, passing over the sheaves *e e*, has attached to its other end a weight *F*, that balances the weight of the cage. Upon the top of the lower plate or disk *C* of the frame are journaled four horizontal shafts *h h h h* in suitable bearings *i i*, and motion is communicated from one to the other of these horizontal shafts by means of bevel-gears *k k k k* on the other ends of the shafts. A pulley or sheave *G* is set fast upon one of the shafts *h*, and motion is communicated to said pulley through the medium of an endless slack belt or rope *I* from a similar pulley or sheave *H* upon a power-shaft *K*, journaled in bearings *k k* upon the main frame *A*. A weighted idler *L* is hung upon the slack side of rope *I* and serves to main-



tain a sufficient degree of strain upon said rope to cause it to drive the shafts *h h h h*, while allowing the frame upon which said shafts are journaled a sufficient amount of movement for the purpose and in the manner hereinafter described. Upon each of the shafts *h h h h* are secured a number of cams *M M* equal to the number of rammers employed, and said cams work against steps or collars *n n* upon the rammer-rods *N N*. Said rammer-rods pass through the annular plates or disks *C D*, and are of a length sufficient to reach to the bottom of the mold-flask, while projecting some little distance above the upper disk or plate *D* of the movable cage, and they are of sufficient weight to properly ram and pack the sand when raised and allowed to drop by the cams *M M*. The lower ends of rods *N N* carry the ramming-tools *O O*, and said tools, being of the ordinary or any desired shape, need not be particularly described. One of said tools is of annular shape and is shown at the right-hand side of Fig. 1 of the drawings, being so shaped to allow it to pass over and pack the sand around the sprue or upright rod that forms the gate of the mold.

Spiral springs *o o* surround the rammer-rod *N N* between the collars *n n* and the upper plate or disk *D* of the movable cage, the purpose of said springs being to assist the starting of the said rods upon their downward stroke and prevent them from lagging by reason of any slight friction on the rods. Within the pit *B* is a truck *P*, upon which is mounted the flask-mold *Q* and the pattern *R*. An annular plate *S* is secured to a flange *q* on the bottom of the flask-mold *Q* by bolts *r r*, and serves to support the sand when the flask or box is raised off the pattern. Upon the foundry-floor above the flask-mold *Q* is arranged the hopper for the reception of the sand that is to form the mold, and said hopper consists of a flaring or bell-mouthed exterior casing *S* and a cap or box *s*, that rests upon top of the pattern *R*, the two forming an annular space above the top of the cavity between the pattern and the flask or flask-mold. At each corner of the annular casing *S* is arranged a sheave *T* upon a vertical shaft *t*, one of said shafts having a beveled gear-wheel *t'*, that meshes with a similar wheel *t''* upon a power-shaft *t''*. An endless chain *W* passes around the wheels or sheaves *T*, and scrapers *V V* are attached to said chain by bent arms *v v* and are guided in their travel by a guide-rail *W'*, that runs around at the bottom of the outer casing *S* of the hopper. The sand employed is shoveled in over the edge of the casing *S* and is evenly distributed and directed into the flask by the scrapers *V V*.

Operation: The apparatus being constructed and arranged as above described, operates in the following manner: Motion being communicated to the main shaft from any suitable source of power is in turn com-

municated to the several horizontal shafts by the rope and the intermeshing beveled gears, which, revolving, cause the cams *M M* to contact with the collars *n n* on the rammer-rods *N*, thereby raising the rods against the pressure of the springs *o o* and allowing them to fall in rapid succession upon the sand which in the meantime has been fed into the cavity between the flask *Q* and the pattern *R*. As the sand fills up, the movable cage or frame being relieved of the weight of the rammer-rods is raised by the counterbalance-weight *F*, and this raising of the movable frame continues until the mold is completed by the filling up of the flask. The idler *L* upon the rope *I* keeps the latter taut to the requisite degree, while allowing of the upward movement of the cage. When the flask has been filled up, the truck is drawn away and another placed in position, and the operation of filling up and ramming proceeds as before. As the manipulation of the flask and its contained mold subsequent to the removal of the same from the ramming apparatus forms no part of my present invention, I need not particularly describe the same. The sand core, which is placed in the interior of the mold prior to the casting, may be rammed and packed by another apparatus similar in all respects to the one above described, except that the area of the hopper and the space covered by the rammer-rods are less than in the apparatus for forming the said mold as above described.

In the drawings I have shown an apparatus for making a mold suitable for casting iron ingot-molds, and such mold being approximately square the rammer-rods and the hopper are arranged according to the shape; but it will be understood that each machine should be constructed according to the peculiar form of the mold to be produced. Thus, for example, the rammer-rods can be arranged to form a square, round, octagonal, or other shaped mold.

In forming a round mold it may be advisable to have a number, as two or more, of rammer-rods arranged around a center, and to place the flask and pattern on a turn-table on the truck, with a view to turning the flask as the mold is being formed.

When it is desired to employ an apparatus such as above described for making molds of different sizes, but of the same or substantially the same configuration, a limited amount of adjustment of the rammers and appurtenant parts may be obtained in the following manner:

In order to make the mold smaller or larger, as the case may be, the holes in the plates *C D*, in which are fitted the boxes *g g*, through which the rammer-rods pass, are made oblong, their greatest length being on radial lines drawn from the center of the series of rammers, as shown in Fig. 5, and the boxes *g g* are formed in two sections, as shown in the detail section, Fig. 6, one section screwing onto the other, which passes through the slots,



so that by loosening the upper section of the boxes they may be adjusted to any desired position in their slots and there fastened by screwing up the upper section. In this case, too, the bearings of the cam-shafts are made adjustable transversely to the direction of the lengths of the shafts and the beveled gears on the same shaft are moved along to suit the changed positions of the shafts.

10 Having described my invention, I claim—

1. In an apparatus for forming sand molds, the combination, with a frame or cage movable in a suitable stationary frame and a series of rammer-rods mounted in said cage and adjustable toward and from the center of the same, of a series of power-driven cams mounted in groups on laterally-adjustable shafts and adapted to contact with and raise said rammer-rods, substantially as described.

20 2. In an apparatus for forming sand molds, the combination, with a frame and a movable cage mounted thereon, of plates forming a portion of said cage and slotted toward a center, and a series of power-driven rammer-rods passing through boxes adjustably arranged in said slots, whereby the rammer-rods may be adjusted so as to work in flask-molds of different size or shape, substantially as described.

30 3. In an apparatus for forming sand molds, the combination of a stationary frame, a movable cage on said frame, rammer-rods guided in said cage, shafts journaled on said cage and carrying cams engaging with said rammer-rods, with a stationary power-shaft, a slack rope or belt communicating motion from said power-shaft to said cam-shafts, and a weighted idler bearing on said rope or belt, substantially as described.

40 4. In an apparatus for forming sand molds, the combination, with the stationary frame, comprising the legs *a a*, the table *b*, the stand-

ards *c c*, and beam *d*, of the movable cage consisting of the annular plates or disks *C D*, secured together and sliding on said standards, 45 the rammer-rods *N N*, vertically movable in said annular plates and provided with fixed collars *n n*, the spiral springs *o o*, surrounding said rammer-rods above said collars, the shafts *h h*, journaled on the plate *C* and receiving motion from a power-shaft, the inter- 50 meshing beveled gears *k k* on said shafts, and the cams *M M*, arranged on said shafts *h h* and adapted to contact with the collars *n n* and raise said rammer-rods, all constructed 55 and arranged substantially as described.

5. In an apparatus for forming sand molds, the combination, with a series of vertically-reciprocating power-operated rammer-rods, of a sand-hopper, an endless chain traveling 60 around said hopper, and scrapers or distributors attached to said chain and projecting into said hopper, substantially as described.

6. In an apparatus for forming sand molds of annular configuration, the combination, 65 with a series of vertically-reciprocating rammer-rods arranged in such order as to correspond to the configuration of the mold, and a sand-hopper also corresponding to the shape of the mold, of an endless chain carried 70 around the edges of said hopper, scrapers or distributors attached to said chain, and a guide-rail fixed within the hopper and by means of which said scrapers are caused to follow the outline of the mold, substantially 75 as described.

In testimony that I claim the foregoing I have hereunto set my hand this 12th day of November, 1889.

WILLIAM B. STERRIT.

Witnesses:

HENRY C. EVERT,  
W. M. MILLER.