No. 620,240. Patented Feb. 28, 1899.

L. C. B. HOLMBOE.

METAL CASTING APPARATUS.

(Application filed Feb. 7, 1898.)

(No Model.) 3 Sheets—Sheet 1.

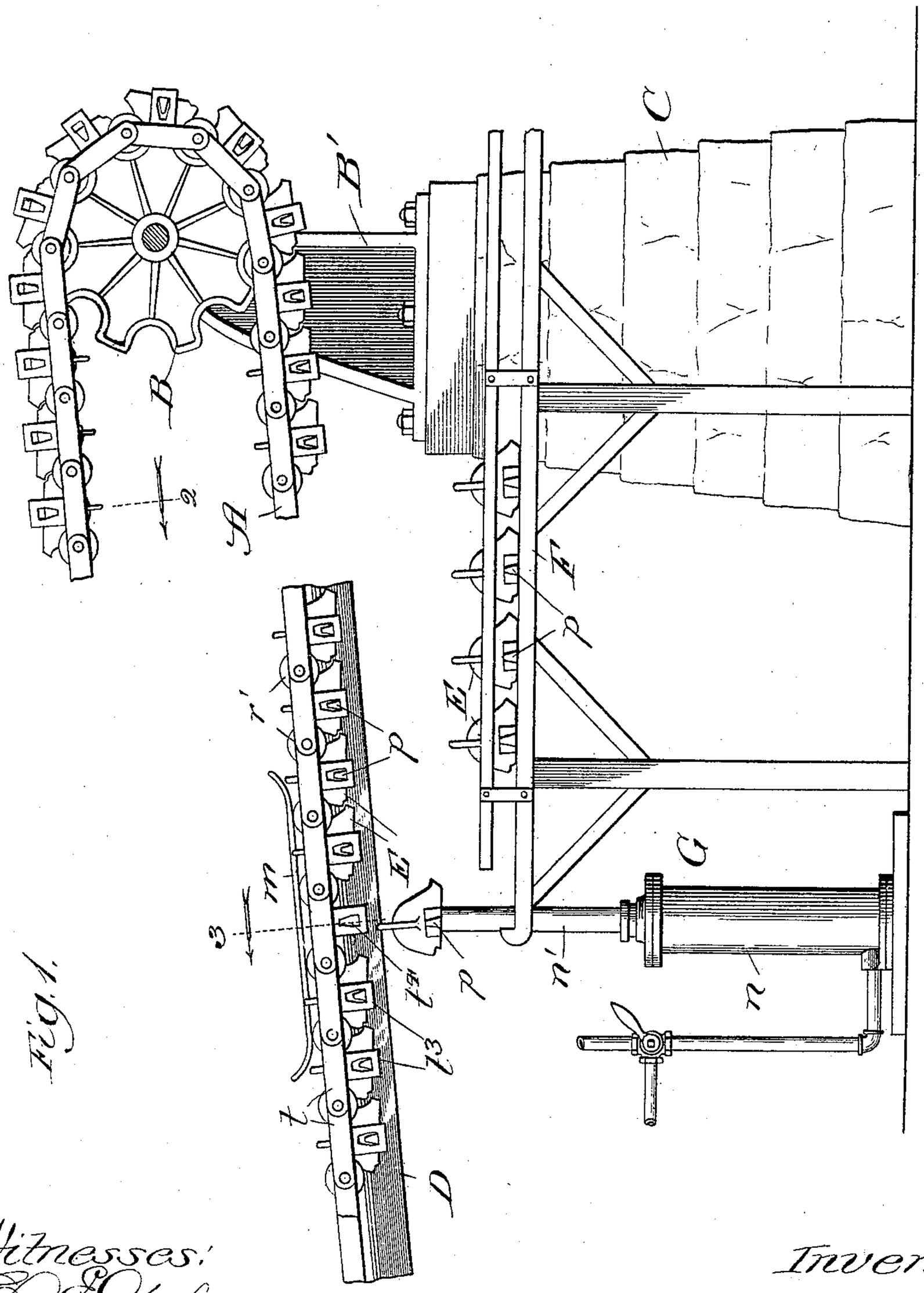

Fig. 1.

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Fig. 2.

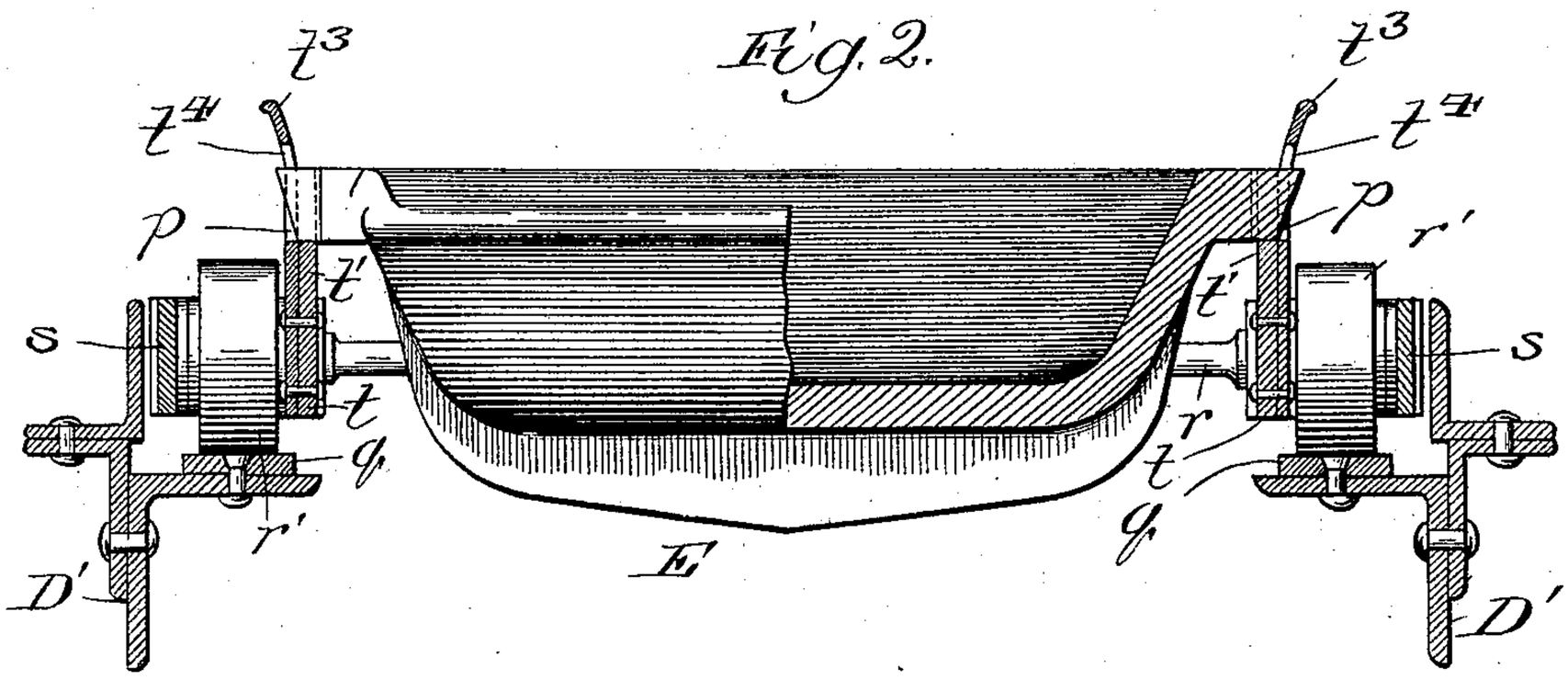

Fig. 3.

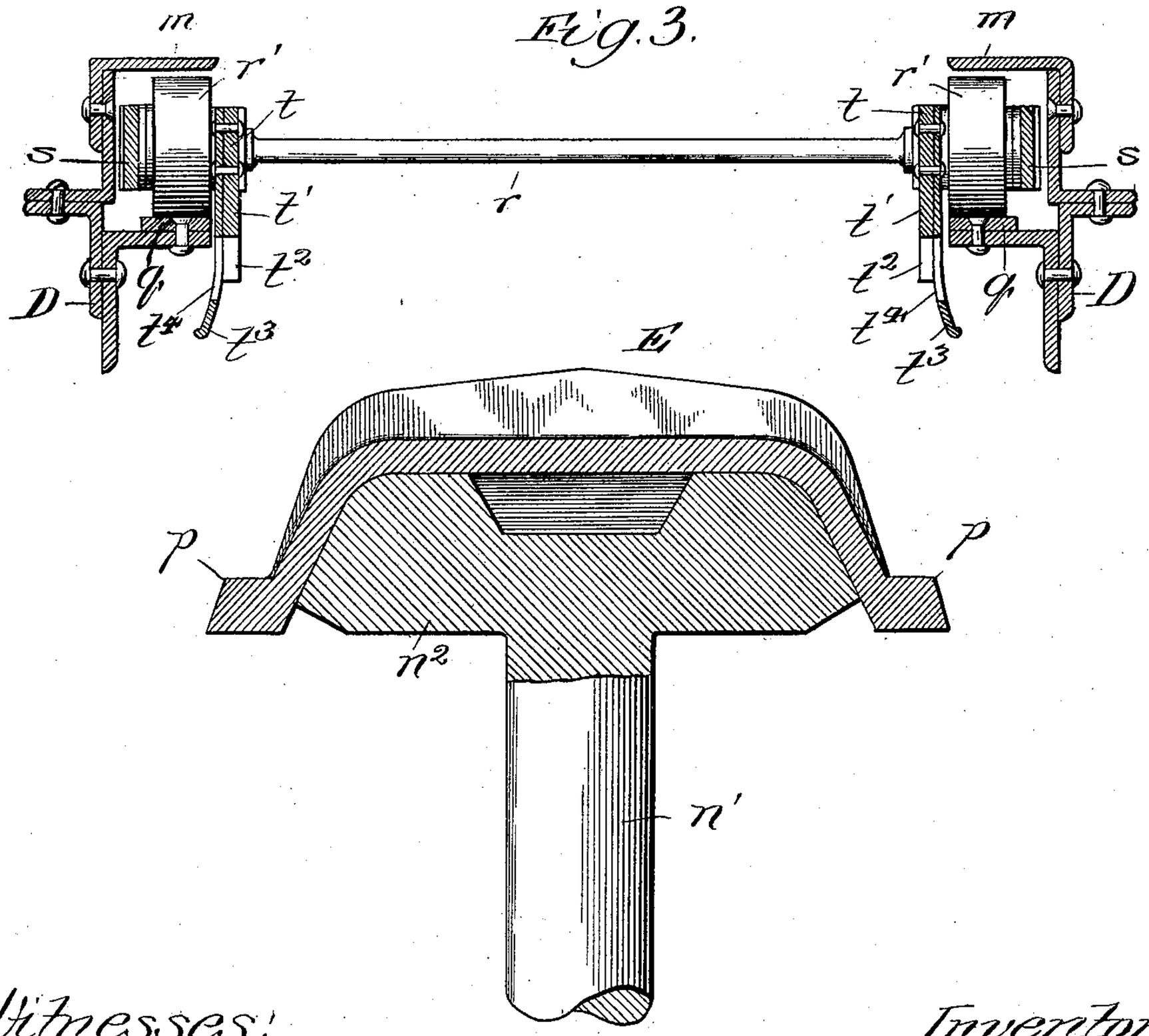

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Fig. 4.

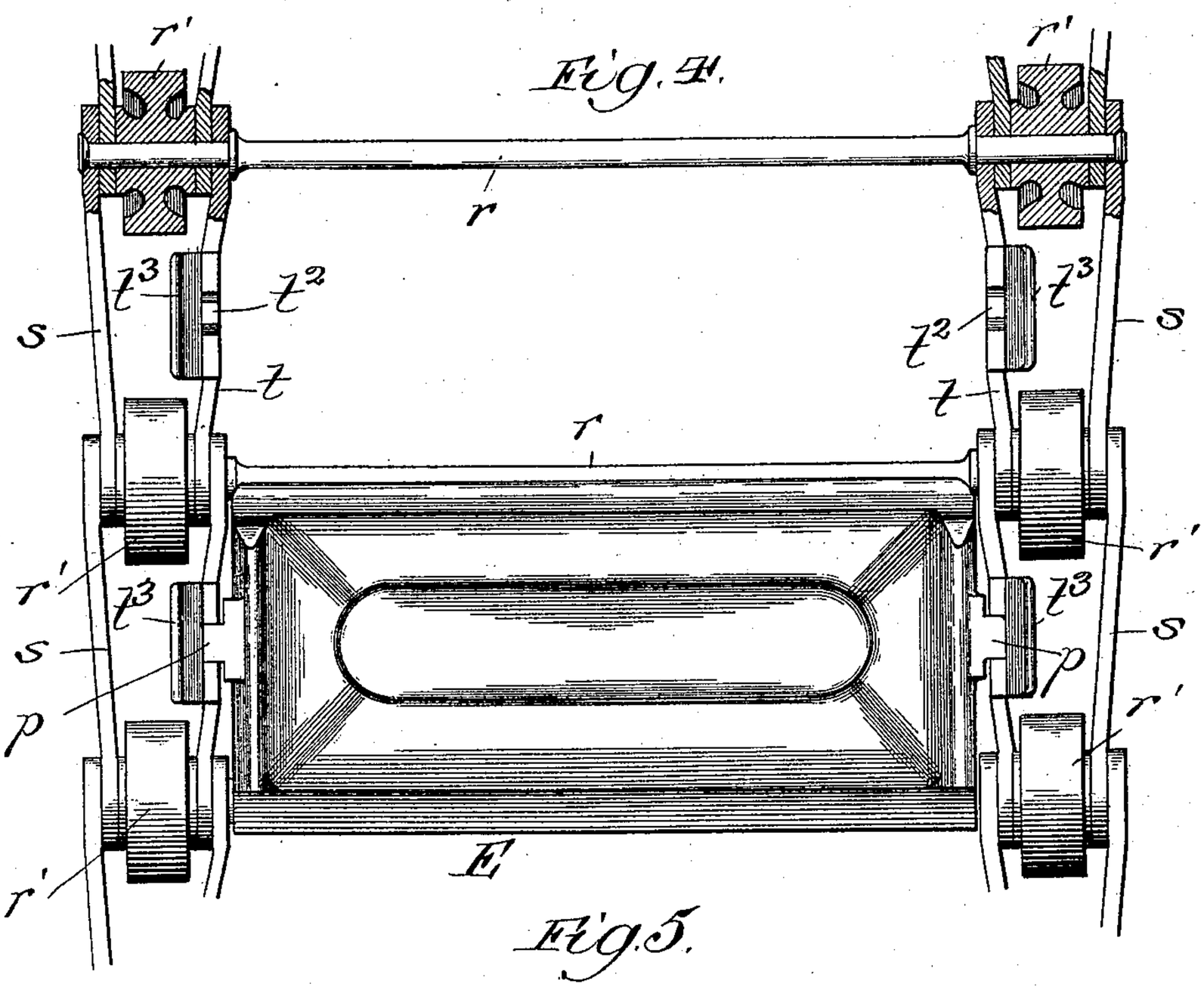
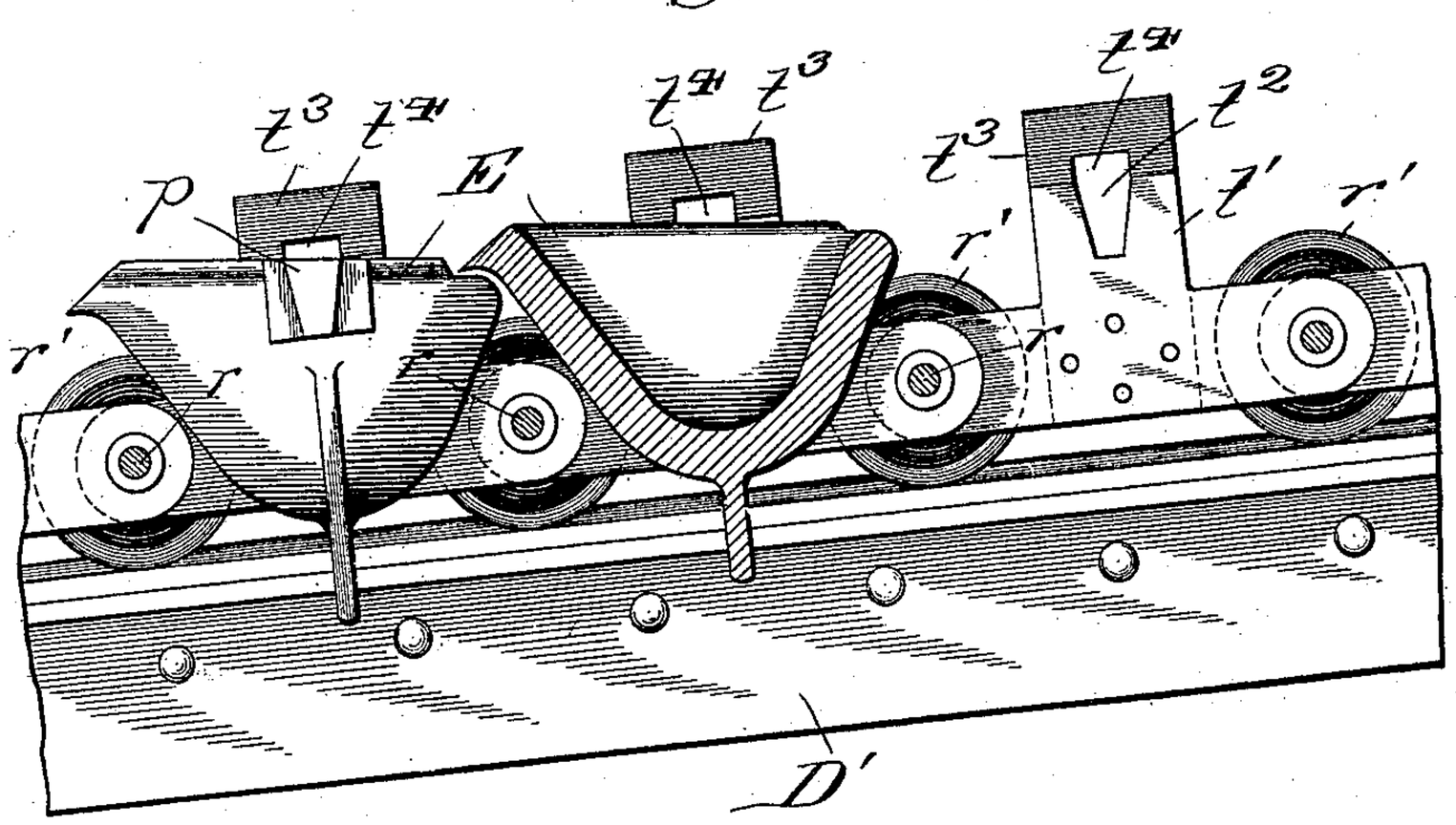


Fig. 5.



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UNITED STATES PATENT OFFICE.

LEONHARD C. B. HOLMBOE, OF CHICAGO, ILLINOIS, ASSIGNOR TO CHARLES H. FOOTE, OF SAME PLACE.

METAL-CASTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 620,240, dated February 28, 1899.

Application filed February 7, 1898. Serial No. 669,418. (No model.)

To all whom it may concern:

Be it known that I, LEONHARD C. B. HOLMBOE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Metal-Casting Apparatus, of which the following is a specification.

My invention relates to improvements in apparatus for casting metal, in which, generally stated, an endless series of molds are mounted in pivotal relation to each other in an endless carrier formed of pivotally-connected links on wheels or rollers and traveling an extended straight-sided and preferably inclined course along upper and lower tracks or supports and over vertical sprocket-wheels or the like at opposite ends of the tracks. The metal to be cast is poured into the molds as they pass from the lower or receiving end of the apparatus along the upper track, the length of the course and the speed of travel being such as to cause the metal poured into the molds to solidify, either with or without artificial cooling means, before it reaches the discharge end of the apparatus. The molds move along the upper track with their open sides upward, and as they descend over the discharge end of the apparatus they upset to discharge the casting, returning in upset condition along the lower track to the receiving end of the apparatus, where in their movement to the upper track they are righted again before reaching the point where the metal is poured.

While the apparatus may be employed in casting various kinds of metal, its more general use hitherto has been in connection with blast-furnaces for casting the iron into pigs. The molds employed for casting pig-iron at blast-furnaces are subject to more or less frequent fracture in use, which makes their removal and replacement with new molds necessary, and as they are necessarily heavy, weighing upward of two hundred pounds each, they are difficult to handle by manual labor alone.

My object is to provide improved means for fastening the molds in the carrier, whereby while held securely against accidental displacement they may be readily removed and replaced, and whereby when upset in their movement over the discharge end of the carrier they drop in their fastenings a limited distance to jar the contained castings and insure the loosening and discharge of the latter from the molds.

My object is further to provide improved means for lifting the replacing-molds quickly and easily into their fastenings on the carrier.

My improvements are especially applicable to blast-furnace casting-machines of the general construction shown and described in Letters Patent No. 548,146, granted to Edward A. Uehling October 15, 1895, to which patent reference may be had for a more detailed description of the apparatus as a whole than is thought necessary in the present application.

Referring to the drawings, Figure 1 is a broken side elevation of the discharge-end portion of a metal-casting apparatus provided with my improvements and with part of the supports and the track on the near side left out; Fig. 2, an enlarged section, taken on line 2 of Fig. 1, showing a mold in upright position, partly in elevation and partly in section; Fig. 3, a broken and enlarged section taken on line 3 of Fig. 1 and illustrating the operation of placing a mold in the carrier; Fig. 4, a broken plan view of the carrier, showing one mold in position; and Fig. 5, a broken view on an irregular line, showing one mold in elevation, another in section, and the fastening means at one side for another mold.

A is the carrier; B, one of a pair of sprocket-wheels at the discharge end, around which the carrier moves; B′, one of the brackets on which the shaft of the sprocket-wheel is journaled, and C the foundation upon which the brackets B′ rest.

D is the lower track, and D′ the upper track, the said tracks being suitably supported in the frame structure of the apparatus.

The carrier A is formed with parallel endless chains, each comprising a series of inner mold-supporting links *t* and outer links *s*, the ends of the links being pivotally joined to cross-shafts *r*, carrying rollers *r′*. The rollers travel upon rails *q* at the upper and lower tracks or supports D D′. The links *t* are formed with central projecting lugs or plates

t, provided in their ends with sockets t^2. Fastened against the outer sides of the links t and extending along and beyond the plate portions t' are mold-engaging latches, comprising arms or plates t^3, provided with openings t^4 through them. The arms t^3 are preferably of springy metal and curved outward at their free ends, as shown.

E E are the molds, provided at opposite ends with comparatively narrow projecting lugs or ear portions p, forming shoulders and of a shape to fit the sockets t^2 in the links t. The body portion of each mold is of a length approximating the distance between a pair of links t at opposite sides, and the ears p extend past the sockets in the links. The ends of the ears or lugs p are preferably inclined to form cams whereby in the operation of placing a mold in position to extend at its ears or lugs p in the sockets t^2 the cam ends of the ears will bear against the surfaces of the spring-arms t^3 and press them apart until the ears pass to the openings t^4 in the spring-arms, when the latter will recoil over the ears, and thus hold the molds in place. The openings t^4 in the spring-arms are somewhat longer than the ears p. Thus when the molds travel in upright position they rest at their ears p in the sockets t^2 of the links, as shown in Fig. 2, and when reversed they drop to the ends of the openings in the spring-arms, as illustrated most plainly in Fig. 1.

In practice the molds in passing over the discharge end of the apparatus may drop an inch, more or less, in order to loosen the contained pig in the event that it should stick in the mold and insure its discharge when the mold has upset. When it is desired to remove a mold from the carrier, one of the spring-arms may be forced outward with a crowbar or other tool to release the ears. The ears p and sockets t^2 are of tapering form and fit each other closely to hold the molds against independent oscillation while traveling along the upper track.

To facilitate the placing of molds in the carrier, I provide a frame or platform F beneath the lower track, preferably near the discharge end of the machine, which frame or platform may be capable of holding several molds. At the end of the frame or platform is a lifting device G, which may be of any desired construction. In Fig. 1 I illustrate a hydraulic lifting device having a piston-cylinder n and a piston-stem n', carrying a head n^2, which conforms in size and outline to the inner face of the mold to hold the same in one position in the lifting operation. The lifting device is located centrally below the carrier and in such position with relation to the platform that when it is down a mold may be slid onto the head with little trouble. When it has been necessary to remove a mold from the carrier, the carrier is moved until the empty links are directly over the lifting device G. A new mold is placed upon the head n^2, and the lifting device is then operated to raise the mold between the links and spread the spring-arms t^3, which when the ears p register with the openings recoil under the ears and sustain the molds, as described. The lifting-head is then caused to descend out of the way. To prevent yielding of the carrier under the pressure of the lifting device when a mold is raised into position, I provide guards or keepers m over the lower track at that point, which hold the rollers r' to the track-rails.

While I prefer to construct my improvements throughout as shown and described, they may be variously modified without departing from the spirit of my invention as defined by the claims.

Hitherto it has been usual to secure the molds to the links with bolts which have to be removed and replaced whenever molds are changed. Whenever it happens that a mold has to be removed and replaced during a run of the machine the saving of time which my improvement effects over the old method in making the change is of great importance, and while I prefer to employ spring-latches, as shown, I do not limit my invention thereto. In fact, any suitable form of latch which may be sprung, turned, or shot into mold-retaining position may be employed.

The dropping of the molds in their fastenings as they turn over the discharge end of the apparatus is a valuable improvement, as it not only makes tapping, which tends to injure the molds, unnecessary, but dispenses with the services of a man hitherto required to do the tapping and is more certain in its operation.

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

1. In a metal-casting machine, the combination of parallel carrier-chains formed with mold-supporting links provided with latches arranged to move into and out of engagement with the molds, and molds removably supported on said links and engaged by said latches, substantially as described.

2. In a metal-casting machine, the combination of parallel carrier-chains formed with mold-supporting links provided with spring-latches, and molds removably supported on said links and engaged by said latches, substantially as described.

3. In a metal-casting machine, molds formed with end projections, parallel carrier-chains formed with links having sockets to receive the said end projections, and latches on the links engaging the said projections, substantially as described.

4. In a metal-casting machine, molds formed with end projections, parallel carrier-chains formed with links having sockets to receive the said end projections, and spring-latches on the links engaging the said projections, substantially as described.

5. In a metal-casting machine, the combination of parallel carrier-chains formed with mold-supporting links, and molds supported

on said links the connection between the molds and links being formed by projections upon the one, and elongated lug-engaging sockets in the other in which the lugs have play to cause the molds to have limited movement on their supports, whereby as the molds are upset in their course, a jarring, casting discharging-drop is imparted to them, substantially as described.

6. In a metal-casting machine, the combination of molds formed with end projections, parallel carrier-chains formed with links having sockets to receive the said end projections, and projecting spring-latches on the sides of the links having openings to receive the said projections, substantially as described.

7. In a metal-casting machine, the combination of molds formed with tapering end projections, parallel carrier-chains formed with links having tapering sockets into which the said end projections fit, and latches on the links engaging the said projections, substantially as described.

8. In a metal-casting machine, the combination of molds E formed with end projections p, parallel carrier-chains formed with links t provided with sockets t^2, and spring-latches t^3 on the links having elongated openings t^4, all constructed and arranged to operate substantially as described.

9. In a metal-casting machine, the combination with the parallel carrier-chains formed with mold-supporting links, of a mold supporting and lifting device beneath the carrier-chains, means for raising said device to lift the molds to the links, and mold-engaging means on the links, substantially as described.

10. In a metal-casting machine, the combination with the parallel carrier-chains formed with mold-supporting links, of a mold supporting and positioning lifting head beneath the carrier-chains, means for raising said head to lift the molds to the links, and mold-engaging means on the links, substantially as described.

11. In a metal-casting machine, the combination with the parallel carrier-chains formed with mold-supporting links, of a mold supporting and lifting device beneath the carrier-chains, means for raising said device to lift the molds to the links, mold-engaging means on the links, and a mold-supporting frame conveniently adjacent to said lifting device, all arranged substantially as and for the purpose set forth.

12. In a metal-casting machine, the combination of the lower track and parallel carrier-chains formed with mold-supporting links provided with mold-engaging latches, of a mold positioning and lifting device beneath the lower track, means for raising said device with a mold to place the mold in the links, and keepers above the lower tracks preventing rise of the links under pressure of the lifting device, substantially as described.

LEONHARD C. B. HOLMBOE.

In presence of—
M. J. FROST,
J. W. DYRENFORTH.