(No Model.) 2 Sheets—Sheet 1.

J. W. DUNBAR.

MACHINE FOR MAKING COMPOSITION TARGETS.

No. 486,396. Patented Nov. 15, 1892.

Fig. 1.

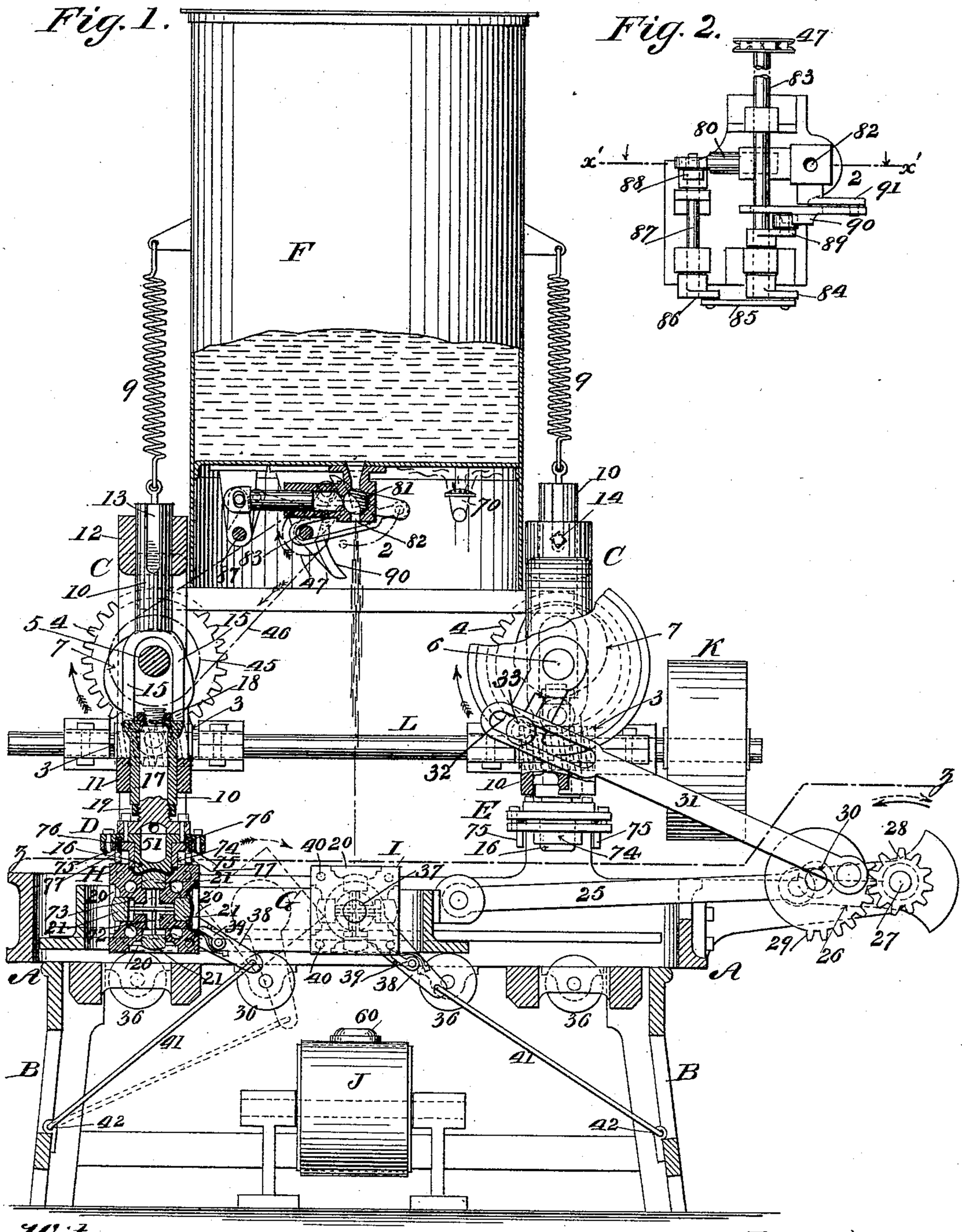

Fig. 2.

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Fig. 5.

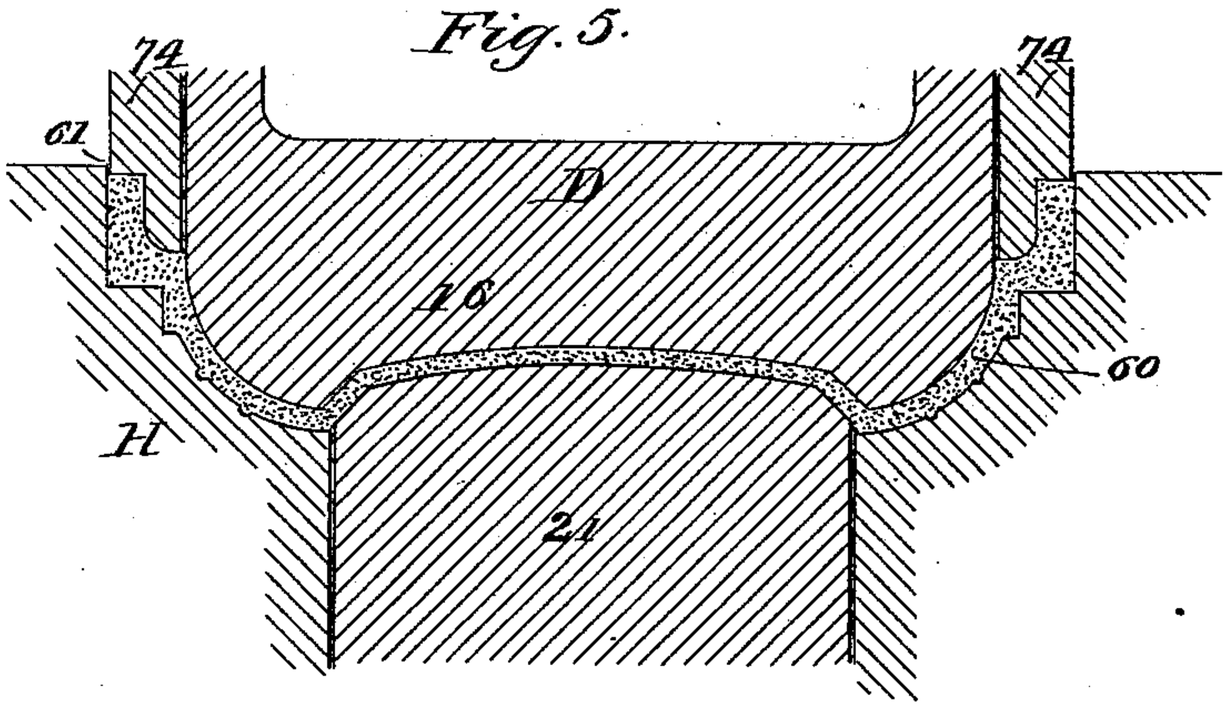


Fig. 3.

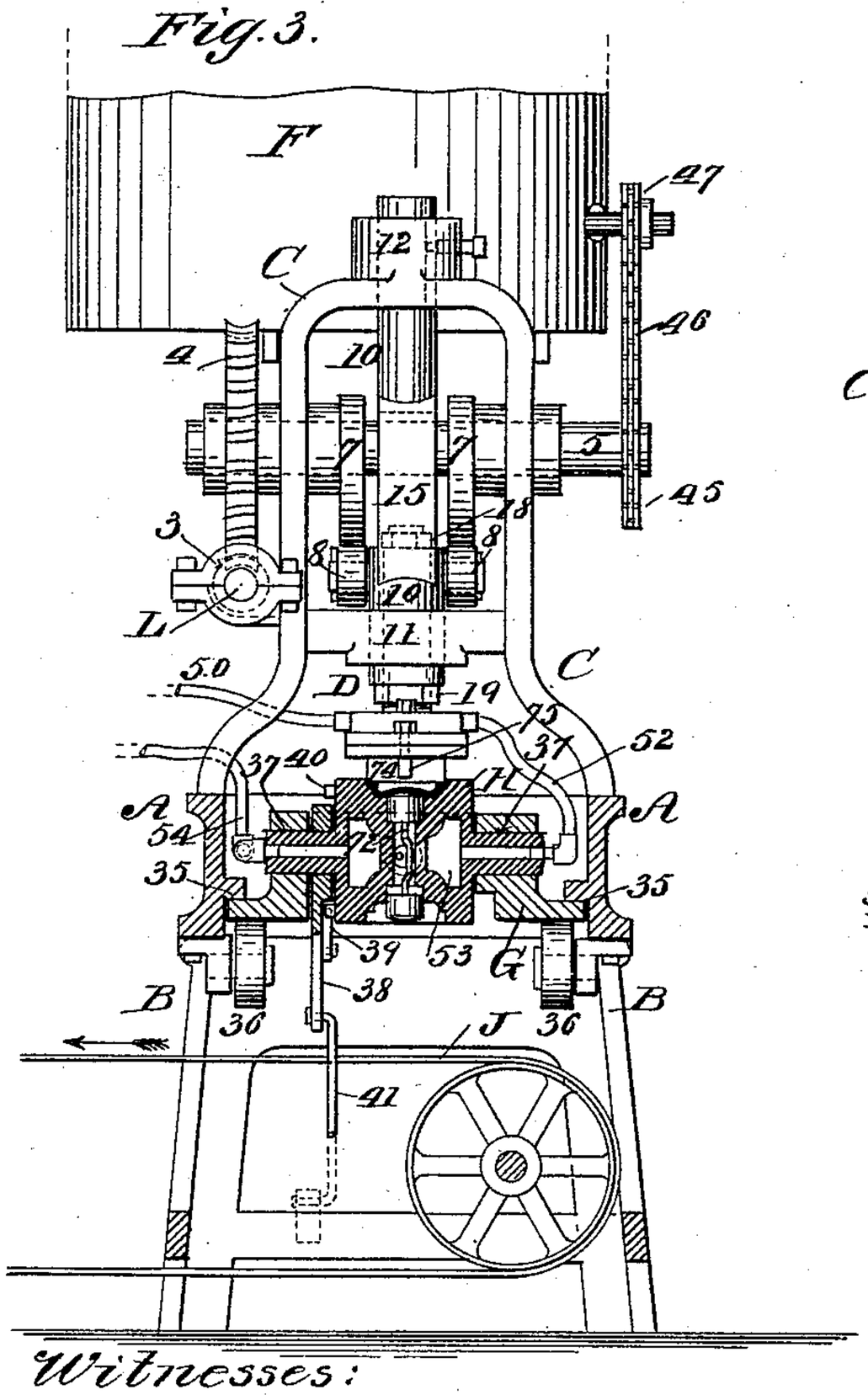
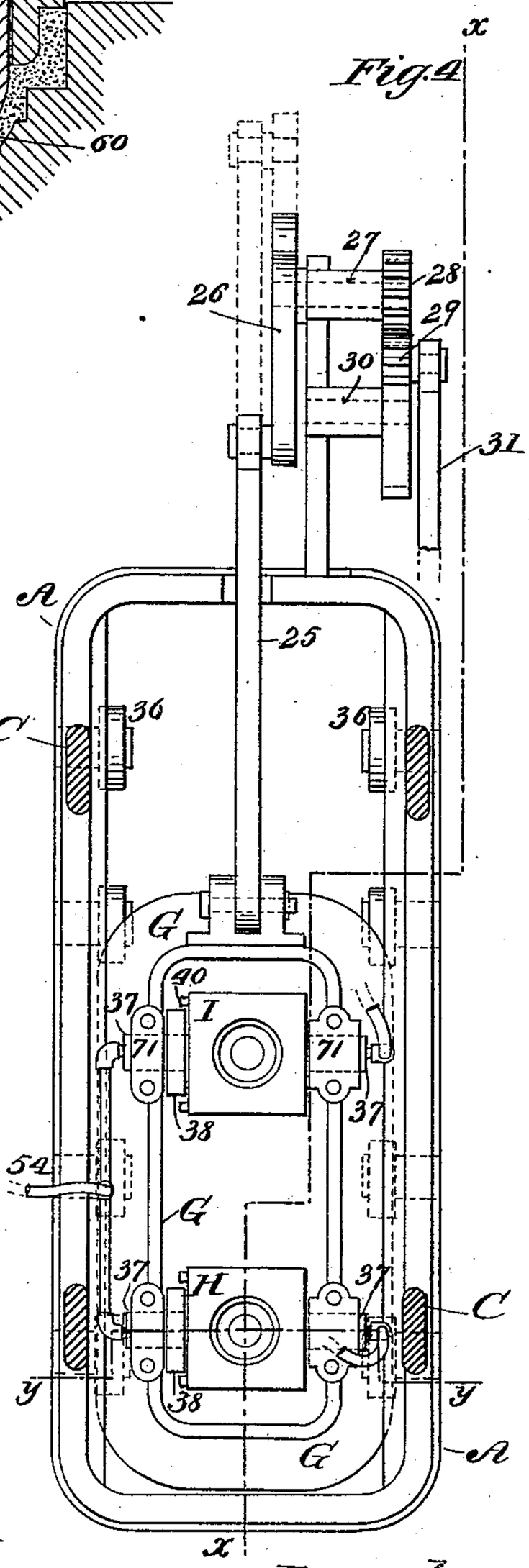


Fig. 4.



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UNITED STATES PATENT OFFICE.

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MACHINE FOR MAKING COMPOSITION TARGETS.

SPECIFICATION forming part of Letters Patent No. 486,396, dated November 15, 1892.

Application filed August 26, 1892. Serial No. 444,169. (No model.)

To all whom it may concern:

Be it known that I, JOHN W. DUNBAR, a citizen of the United States, residing at the city and county of New London, State of Connecticut, have invented certain new and useful Improvements in Machines for Making Composition Targets, of which the following is a specification.

My invention may be used in the manufacture of various articles, but particularly relates to the manufacture of "clay pigeons" or sportsmen's flying targets composed of a brittle composition so formed as to resist breakage in packing and transportation, while adapted for easy disintegration by the shot. It is of importance that such targets shall be molded with perfect uniformity of contour and thickness at all corresponding circular portions thereof, in order that the brittle material shall have the required sustaining quality, and also in order to promote even flight when the target is thrown from the trap. It is desirable, also, to impart a smooth finish to the goods in order to render them marketable.

It is the object of my invention in accomplishing these ends to promote accuracy of compression in shaping the material and rapid automatic action of the machine consistently with the necessary ranges of motion given to the molds to fill them and carry them under the rams and with the allowance of sufficient time for the material to cool in the molds after compression before it is ejected.

My invention consists in the conjunction, with a vertically-moving ram and a device for gravitating the heated liquid composition, of a trunnioned mold-block bearing a plurality of molds and means for intermittently rotating them one after another in a substantially-vertical plane of rotation into positions for filling, compressing, cooling, and ejecting the material; also, in conjunction with the mold-block, a reciprocating carriage for moving it laterally into alternate vertical alignment with the gravity-filling device and the ram; also, the conjunction, with the filling device and two rams on opposite sides thereof, of a reciprocating carriage and two rotary mold-blocks mounted therein, adapted in two different positions for simultaneous coincidence with the said filling device and one of the rams.

The invention also comprises certain various novel details of construction hereinafter described and claimed.

Referring to the accompanying drawings, in which similar characters of reference indicate corresponding parts throughout the several views, Figure 1 is a sectional elevation of the machine, partly appearing in side view on the line *x x*, Fig. 4, the device for supplying the composition being shown on the line *x' x'*, Fig. 2; Fig. 2, an inverted plan view showing in further detail the device for supplying the composition; Fig. 3, an end view of the machine, taken partly in cross-section on the line *y y*, Fig. 4; and Fig. 4, a horizontal sectional view of the machine, taken on the line *z z*, Fig. 1. Fig. 5 is an enlarged sectional view showing the contour of the finished article in full size and the relative position of the mold and the ram at the termination of the compressing-stroke of the latter.

A A is the bed-frame of the machine; B B, a suitable supporting-frame for the bed, and C C, the vertical standards having guides 11 12, wherein the rams D and E vertically reciprocate. The tank F, mounted on standards C C, contains the composition of coal-tar and clay or other suitable substances maintained in a liquid consistency by heat applied by means of several gasoline or other burners, one of which is indicated at 70, Fig. 1. The liquid composition is fed at proper intervals by means of an automatic feeding device 2, hereinafter more fully described.

H I are the mold-blocks, which are mounted by means of their trunnions 37, Figs. 3 and 4, in the reciprocating carriage G, which is moved at proper intervals, so as to bring the two blocks simultaneously into vertical coincidence one with the feeding device 2 and the other with one of the rams at each extreme position of said carriage.

J represents a conveying-belt beneath the machine for removing the targets when they are deposited thereon from beneath each block as it becomes inverted on approach to the center of the machine.

L is the driving-shaft, from which all parts

of the machine are operated by a belt applied to pulley K. The driving-shaft L bears two worms 3 3, engaging with worm-gears 4 4, mounted on the shafts 5 6 for operating the rams. Said shafts 5 6 bear cams 7 7, which act on the rollers 8 8 of the rams to force the latter downward. The cams 7 7 are so contoured as to produce a rapid descending motion of the ram during the early part of its stroke and a gradual motion upon entering the mold and then a prolonged dwell of sufficient duration for the mass of composition to congeal and settle in the mold, producing a smooth finish. The cams 7 are adjusted upon the shafts 5 6, so as to advance the rams D E in alternate succession. The rams are elevated by springs 9 9, or, if desired, the same may be lifted by elevating-cams in lieu of said springs.

The plungers 10 of the rams are cylindrically fitted within the bearings 11 12 and prevented from turning out of place by means of slots 13 therein and guide-stud bolts 14, inserted into said slots, as seen in Figs. 1 and 3. The plungers 10 are provided with yokes 15, which straddle the shafts 5 6, and into the lower ends of said plungers the ram-heads 16 are secured by means of shanks 17, having screw-threaded nuts 18 19, which render them accurately adjustable.

The head 16 of each ram is provided with a movable stripping-collar 74, which forms a part of the upper section of the mold or die for shaping the target, as more clearly seen in Fig. 5. The collar 74 is guided by means of pins 75, projecting through its flanges, and said collar is forced toward the face of the ram by means of springs 76 when the ram is raised so as to strip the work therefrom and leave it in the concave mold. Pins 77 are rigidly fixed (screw-threaded) into the flange of the movable collar 74 and serve when the ram approaches the mold-block to determine the position of the collar. The springs 76 are incidentally illustrated as confined by the ends of the fixed pins 77.

Four molds 20 20, &c., are employed in each block H I and are provided with movable cores 21, forming a part of the contouring-surface thereof and which act as ejectors by gravitation as each mold becomes inverted in its turn. The cores 21 are connected in pairs, as illustrated, by connecting-stems 72, the descent of each core as it becomes lowermost being limited by the abutment of the upper core connected thereto upon stop-shoulders 73 in the block. The mold-blocks H I and rams D E are kept cool by water-circulation, which is introduced into the cavities thereof by suitable connections. In Fig. 2 the connection of a flexible water-pipe 50 to the ram D is indicated. The ram is chambered at 51 for the passage of the water and at its opposite side it is connected by another flexible pipe 52 to one trunnion of the mold-block H. The block H is also hollow, as indicated at 53, the chambers on each side thereof being connected, and a pipe 54, connecting to the other trunnion, discharges the water, establishing the necessary circulation.

The carriage G is reciprocated by means of the connecting-rod 25, which is attached to the rock-arm 26 on the shaft 27. The rock-arm 26 is caused to sweep through a half-circle at each interval following the compressing-strokes of the rams, the said arm 26 having an upward throw. The shaft 27 is operated in reversed directions by means of a pinion 28, mounted thereon, and a toothed segment 29 upon the shaft 30, which receives an oscillatory motion of a quarter-revolution. The segment 29, having twice the radius of the pinion 28, actuates the latter to the extent of a half-revolution at each intermittent motion. The segment 29 is oscillated by means of the continuously-rotating crank 33 on shaft 6, the pin of which engages at separate intervals with the respective ends of the slot 32 within the connecting-rod 31, connected, as indicated, to said segment. The filling and molding operations occur during the travels of the crank-pin 33 from one end to the other of the slot 32, and the connecting-rod 31 is then moved a sufficient distance to operate the segment and pinion 29 28, as described, and throw the carriage G from one extreme position to the other. The rock-arm 26 at such extreme positions having its radius in alignment with the connecting-rod 25, serves to lock the carriage G at the precise position required for coincidence between the mold and the one or the other ram. The carriage G is guided in suitable guideways 35 in the bed-frame A and rides on a series of rollers 36. The mold-blocks H I are intermittently rotated in the carriage G when moving from their respective rams D or E toward the filling-point at the center of the machine. Such rotation is imparted by means of the rock-arms 38 on the trunnions of the blocks, connected at their free ends by rods 41 to the frame B of the machine. The rock-arms 38 bear spring-pawls 39, which engage with successive pins 40 on the mold-blocks, rotating one block a quarter-turn at each stroke of the carriage G. The finished work from the ram is thereby thrown into a position lateral to the block and an empty mold presented beneath the filling device 2 when either block is moved from extremity to center of the machine. The feeding device 2 for discharging the liquid composition (shown in Figs. 1 and 2) is operated by a sprocket-wheel 45 on the shaft 5, a chain-belt 46, and a sprocket-wheel 47, said parts being removed in Fig. 1, but indicated by broken lines. The wheels 45 and 47 are proportioned two to one, respectively, so that the feed occurs twice during each rotation of the shaft 5, corresponding with the stroke of each ram.

The feeding device consists in a plunger 80 and a three-way valve 81, relatively operated so that during the retraction of the said plunger the same communicates with the tank F,

and during its advancement it forces the material through the discharge-outlet 82, from whence it gravitates into the mold beneath in an accurately-measured quantity. The plunger 80 is reciprocated by means of the rotary shaft 83, crank 84, connecting-rod 85, rock-arm 86, rock-shaft 87, and rock-arm 88. The valve 81 is oscillated by means of the rotary shaft 83, roller-crank 89, tappet-arm 90, and rock-arm 91.

In operation the carriage G remains in the position illustrated in Fig. 1 a sufficient time to allow of the prolonged dwell of the ram D upon the compressed material in the block H and the gravitation of the composition from the feeder 2 into the mold of block I. The ram D is then lifted and the carriage rapidly shifted to its opposite position, throwing the block H a quarter-turn, leaving the compressed work in a lateral mold 20, where it cools while a new mold is being filled in said block H and a new target compressed in block I beneath the ram E. The said quarter-revolution of the block H also causes the discharge of a target previously occupying a lateral position therein, such discharge being effected by the ejector 21 gravitating after the block has arrived above the conveying-belt J. The target now occupying a lateral position upon block H will so remain until the carriage G has been again moved to the position illustrated in Fig. 1 and a second time returned to the position described with with the block H above the conveying-belt J. Sufficient time is thus afforded for the composition to solidify before its ejection from the mold.

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

1. In a machine for making composition targets, the combination of a ram, a device for feeding the composition, a carriage, a rotary mold-block trunnioned therein, and mechanism for moving said carriage and locking the same into positions wherein the said mold-block coincides with the said ram and the said feed device alternately, substantially as described.

2. In a machine for making composition targets, the combination of a ram, a composition-feeding device, a rotary mold-block bearing a series of molds, a reciprocating carriage for carrying the mold-block into alternate coincidence with the ram and feeding device, and mechanism for intermittently revolving the mold-block in one direction when moving from the ram toward the feed.

3. In a machine for making composition targets, the combination of two rams, a central feed, two mold-blocks adapted to coincide with one ram and the feed simultaneously, and a carriage for moving said mold-blocks into alternate coincidence with the rams.

4. In a machine for making composition targets, the combination of two rams, a central feed, two rotary mold-blocks containing series of molds revolving in vertical planes, a mechanism for intermittently rotating said blocks into positions for feeding, compressing, cooling, and dropping the work, and a conveyer beneath the blocks for receiving the work.

5. The combination of the rams D E and tank F, the feeding device 2, the mold-blocks H I, the carriage G, and the reversible rock-arm 26 for moving the carriage, and means for reversing said arm, substantially as described.

6. The combination of the rams D E, the mold-blocks H I, and means for feeding the material and operating said blocks, substantially as described, and the driving-shaft L, worms 3 3, gears 4 4, and cams 7 7, arranged as specified.

7. The combination of the rams D E, the tank and supply device 2, the carriage G and means for reciprocating it, the rotary mold-blocks H I, trunnioned in said carriage, the rock-arms 38, connected at their free ends to the frame of the machine, and pawls mounted on the rock-arms, engaging with said mold-blocks to revolve them in one direction at each stroke of the carriage, substantially as described.

8. In a machine for making composition targets, the combination of a ram, a mold-block and means for moving the mold-block into and out of coincidence with the ram, and an automatic composition-feeding device having coincidence with the mold-block when it is out of coincidence with the ram, the same consisting in a plunger, a valve for alternately establishing communication of the plunger with the tank and the outlet, and mechanism for moving the valve and the plunger automatically corresponding to the movements of the said mold-block.

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