No. 675,932. Patented June 11, 1901.

L. CHAMBON.

MACHINE FOR CHARGING CARTRIDGES.

(Application filed Mar. 16, 1900.)

(No Model.) 8 Sheets—Sheet 1.

Fig. 1

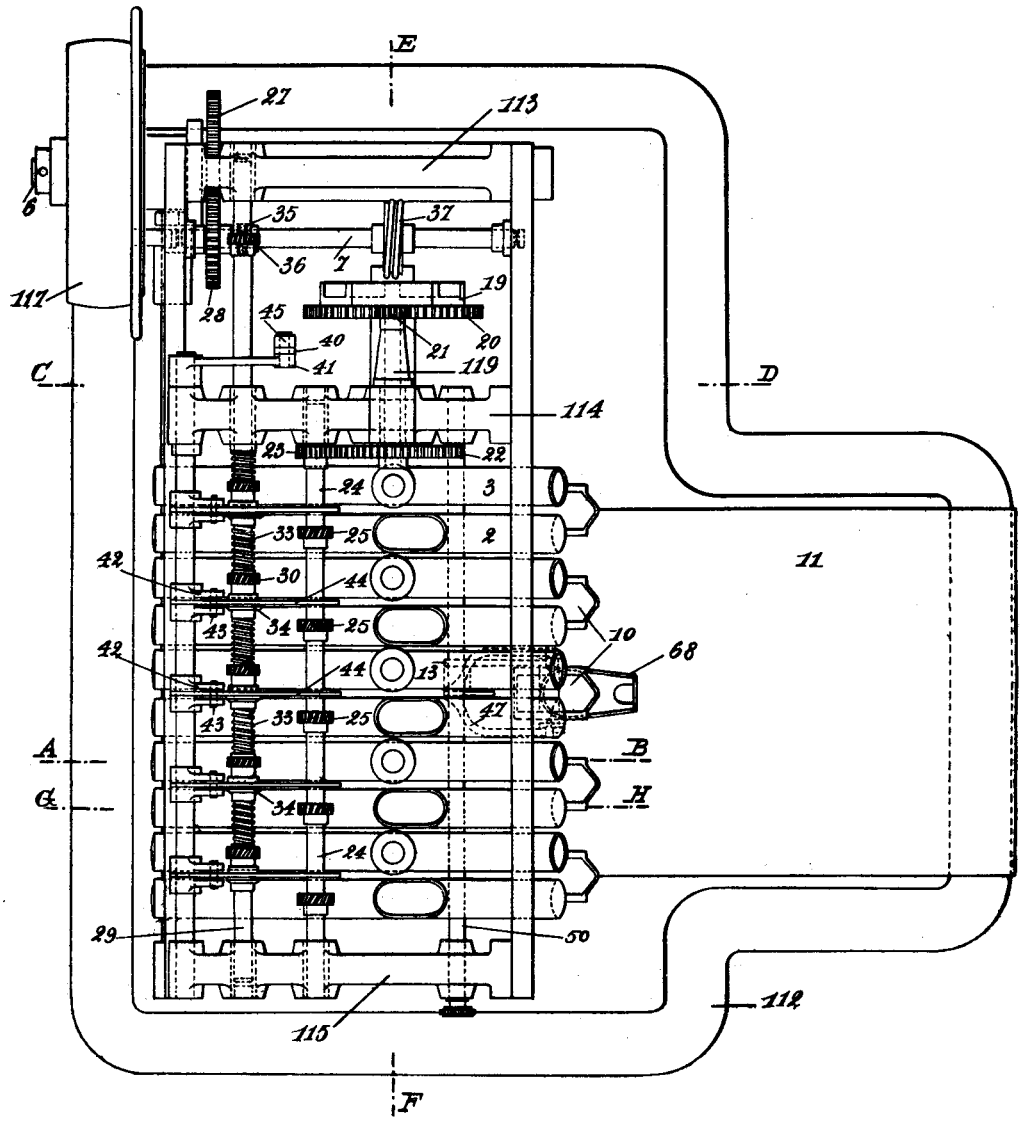

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Fig. 9

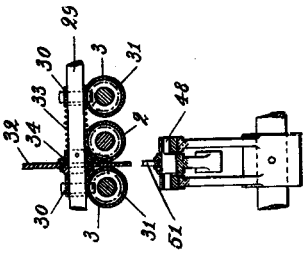

Fig. 3

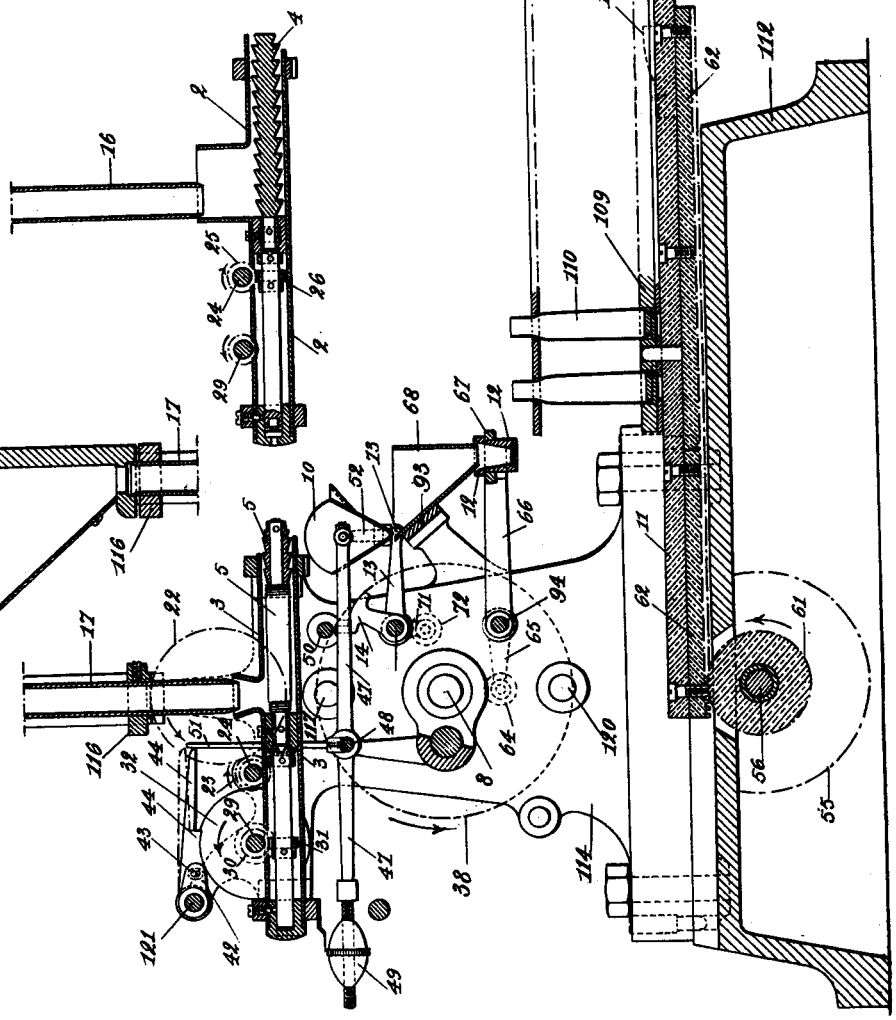

Fig. 2

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Fig. 4

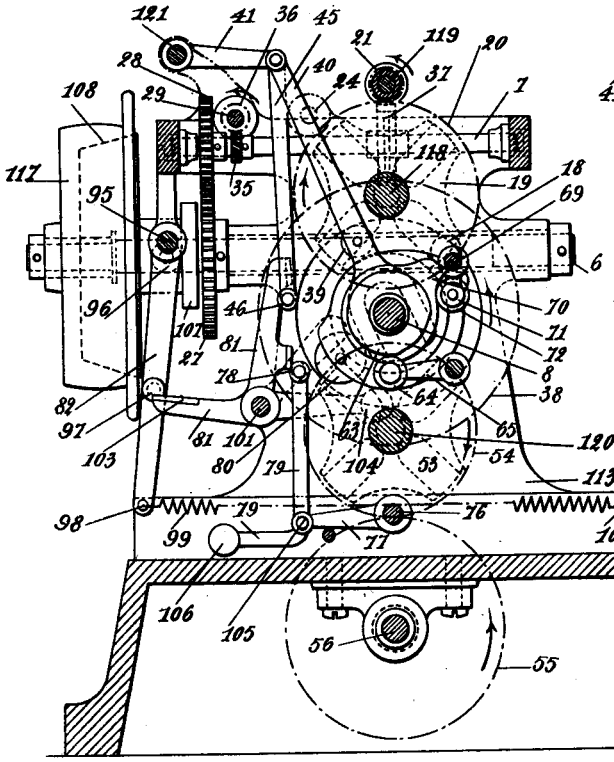
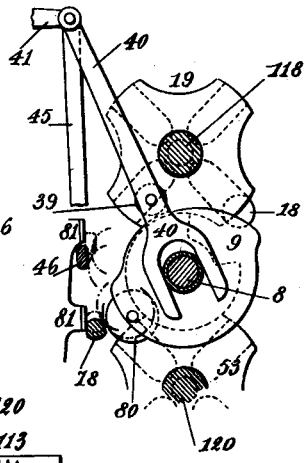


Fig. 5



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MACHINE FOR CHARGING CARTRIDGES.

(No Model.) (Application filed Mar. 16, 1900.) 8 Sheets—Sheet 4.

Fig. 7

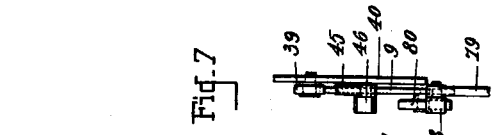
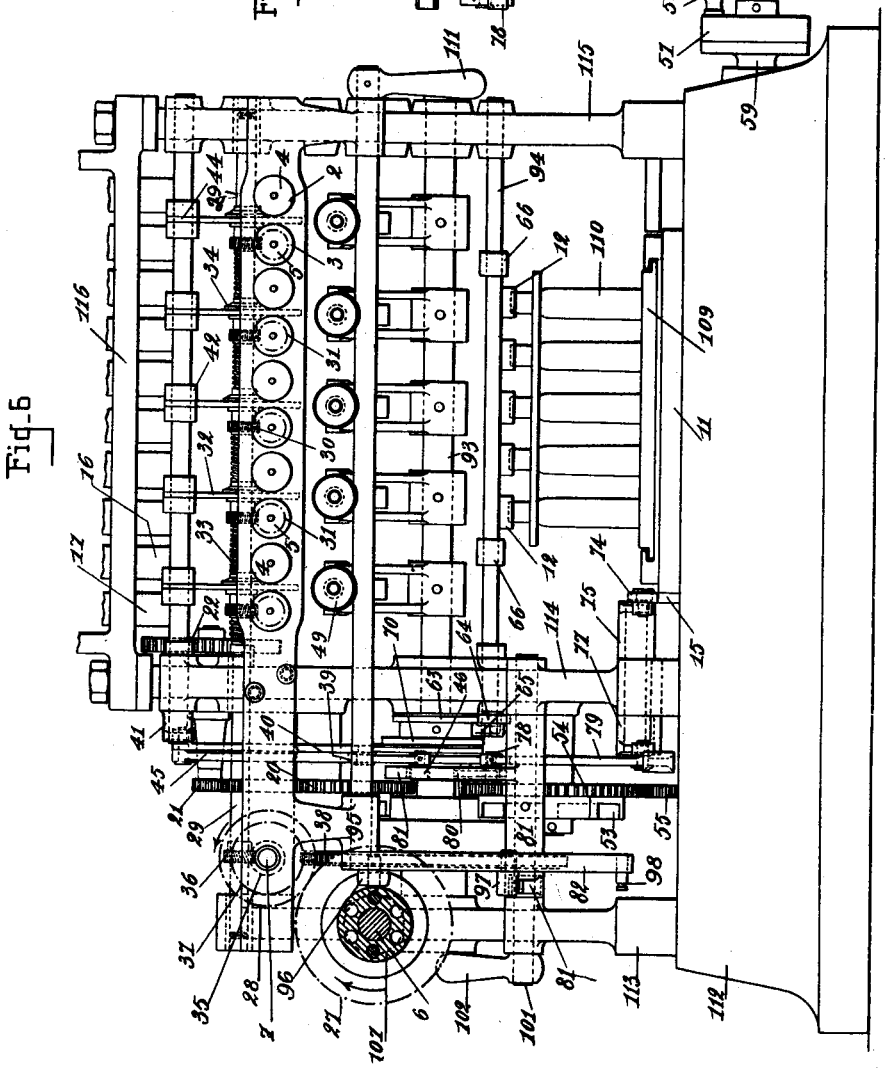


Fig. 6



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MACHINE FOR CHARGING CARTRIDGES.

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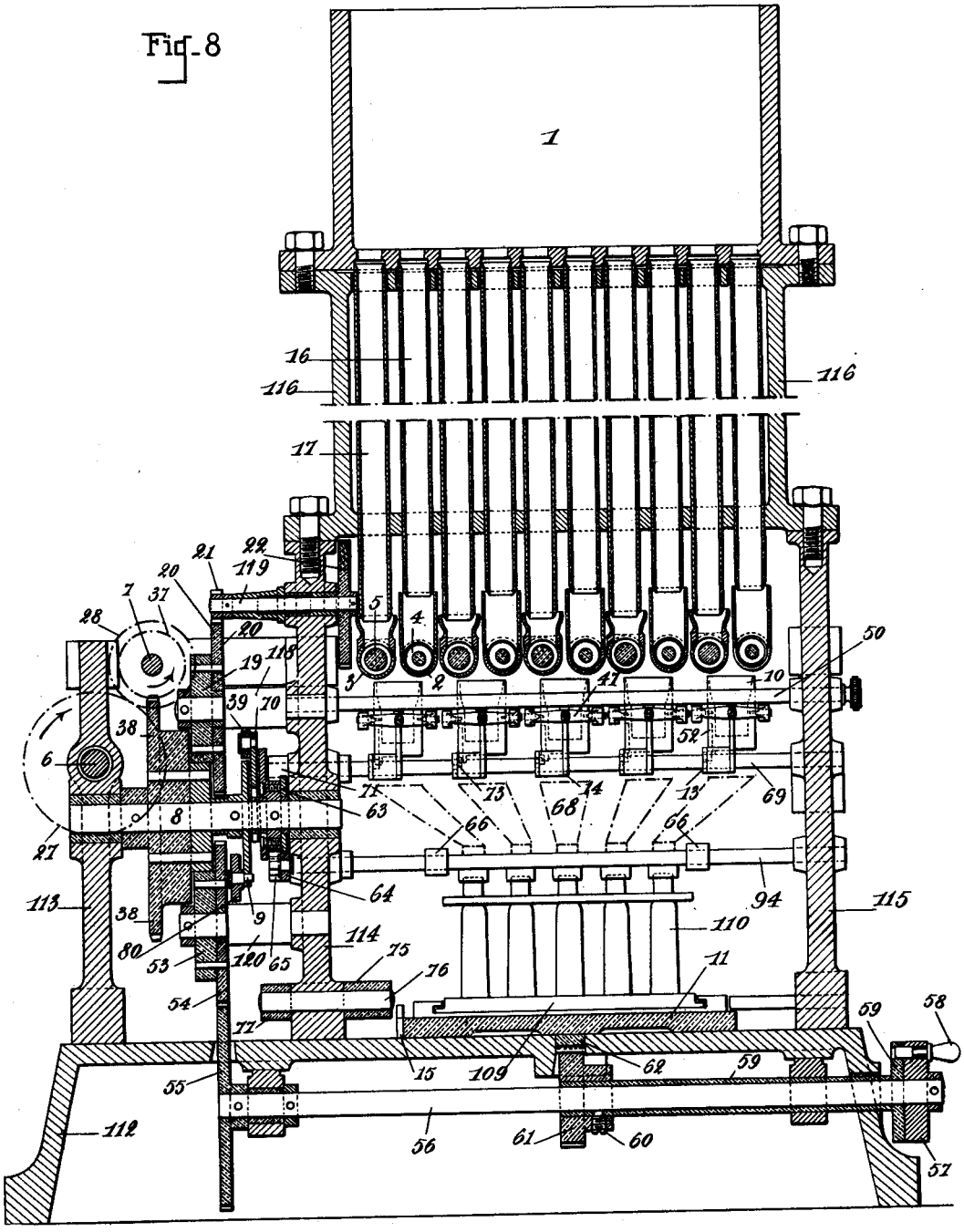
Fig. 8



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MACHINE FOR CHARGING CARTRIDGES.

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Fig. 13

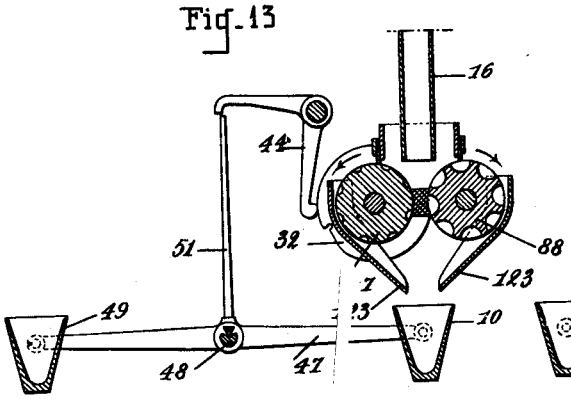

Fig. 14

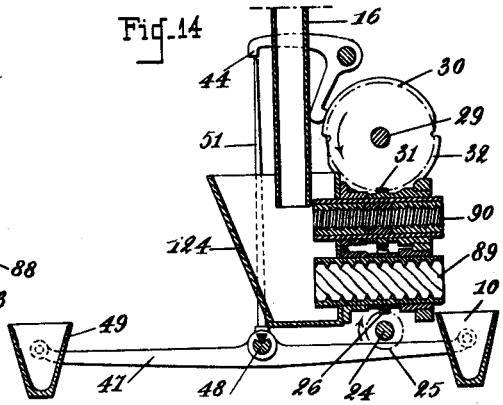

Fig. 10

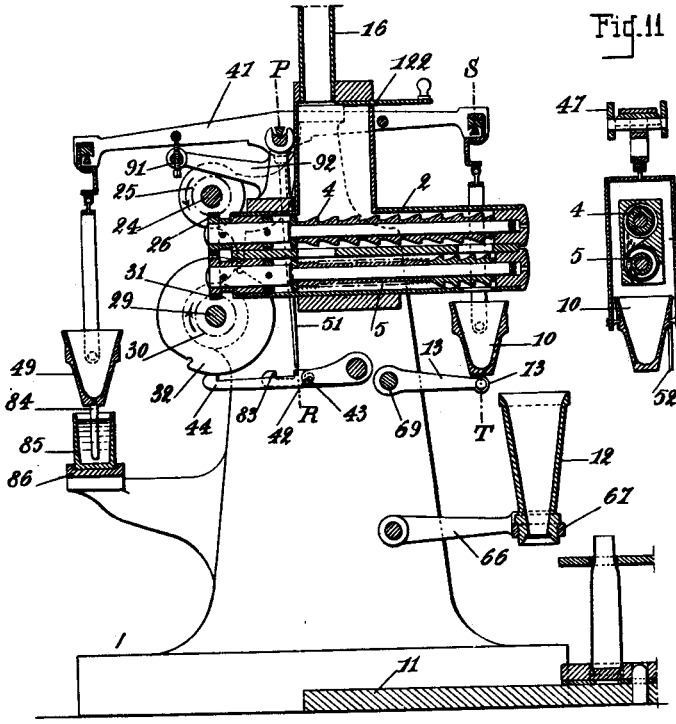

Fig. 11

Fig. 12

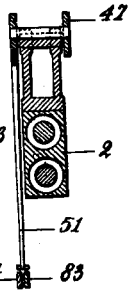

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Fig. 15

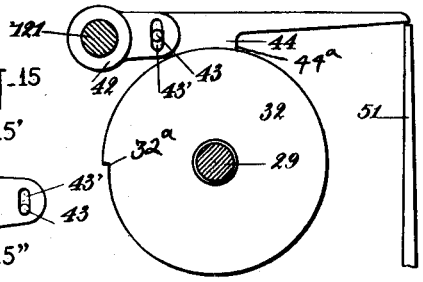


Fig. 15'

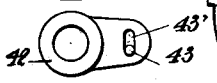


Fig. 15"

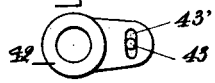


Fig. 16

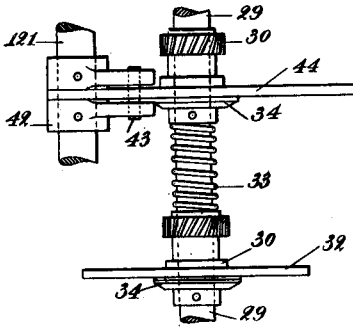


Fig. 17

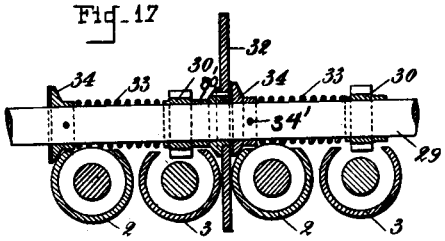


Fig. 18

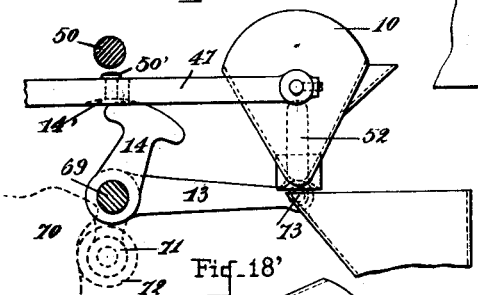


Fig. 18'

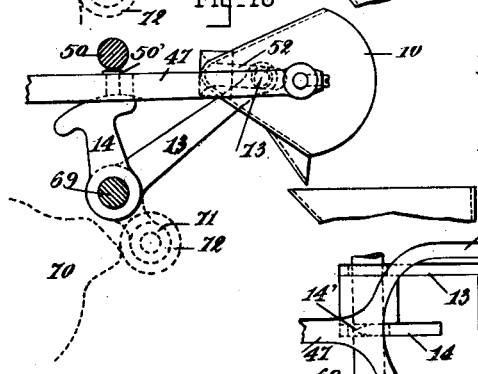


Fig. 19

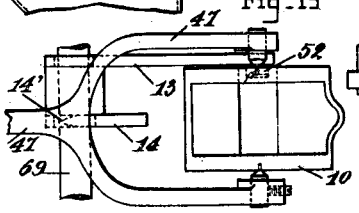


Fig. 20

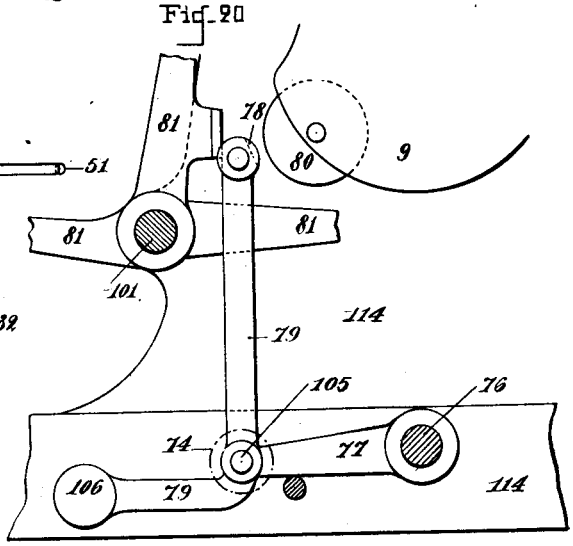
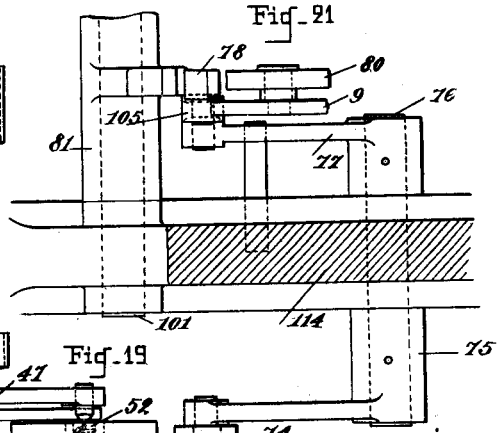


Fig. 21



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No. 675,932. Patented June 11, 1901.

L. CHAMBON.

MACHINE FOR CHARGING CARTRIDGES.

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Fig. 22

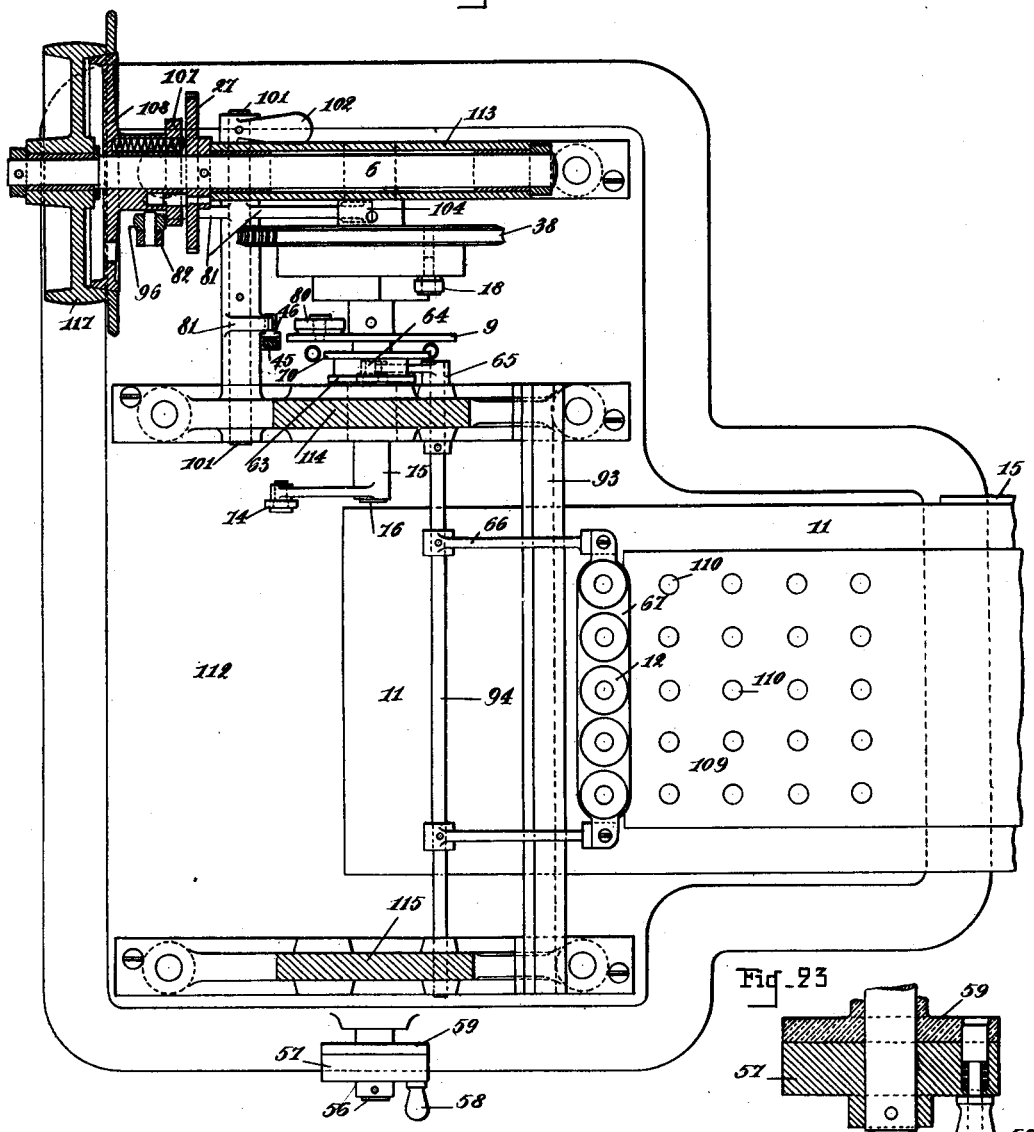

Fig. 23

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ATTORNEYS

UNITED STATES PATENT OFFICE.

LOUIS CHAMBON, OF PARIS, FRANCE.

MACHINE FOR CHARGING CARTRIDGES.

SPECIFICATION forming part of Letters Patent No. 675,932, dated June 11, 1901.

Application filed March 16, 1900. Serial No. 8,954. (No model.)

To all whom it may concern:

Be it known that I, LOUIS CHAMBON, a citizen of the French Republic, and a resident of Paris, France, have invented certain new and useful Improvements in Machines for Charging Cartridges, of which the following is a specification.

My invention relates to a machine for charging cartridges characterized by a combination of mechanical organs or elements for automatically effecting, on the one hand, absolutely exact and always strictly the same charges of explosive that are to be introduced in the cartridges, and, on the other hand, the introduction of the weighed charges into the cartridges, the machine being automatically stopped either while going when the weight of a charge is not attained or at the end of the operation when a certain number of cartridges have been charged.

The machine according to my invention comprises the following elements: a hopper charged with the powder to be introduced into the cartridges and communicating by a set of vertical tubes (one or two for each cartridge to be charged) with two horizontal tubes which distribute the powder by means of two worm conveyers, one in each of these tubes. One of these worms with rapid pitch passes at constant speed of rotation a weight somewhat less than that required, but as nearly as possible equal to it. The other worm of slow pitch at each revolution passes a small quantity of powder, sufficient to make up the weight, which when attained causes this worm to stop and so interrupts the distribution. This takes place in a receptacle forming part of a very sensitive balance having two arms, the one carrying the said receptacle, the other a counterweight adjustable as desired, and a needle which as it inclines disengages a lever that stops a cam and so stops the distribution. Hence it results that the error produced can only be that of the quantity passed by a revolution of the worm, even admitting, as is the case with the machine, that a revolution of the second distributing-worm corresponds to a revolution of the cam.

It may be readily understood that the simple elements above described may be repeated as many times as desired.

In the machine which I am about to describe there are five pairs of tubes—that is to say, five cartridges can be simultaneously charged—and as the machine can make ten successive operations without stopping it follows that thus fifty cartridges can be charged without stopping the machine, except in case of accidental interruptions, as above mentioned.

In order to facilitate explanation, I refer to the annexed drawings, which show by way of example a machine according to my invention capable of automatically charging with powder a plate containing fifty cartridge-cases.

In the drawings, Figure 1 is a plan of the whole machine, the plate carrying the cartridge-cases being supposed to be removed. Fig. 2 is a transverse section on the line A B of Fig. 1, the tube which brings the powder being supposed to be cut and the hopper shown on the right on account of the height of the drawing. Fig. 3 is a part section on the line G H of Fig. 1. Fig. 4 is a transverse section on the line C D of Fig. 1. Fig. 5 is a part view of some details. Fig. 6 is a back elevation of the machine, taken on the left of Figs. 1 and 2, the powder-tubes and hopper being supposed to be removed. Fig. 7 shows a detail of the automatic disengaging-gear. Fig. 8 is a longitudinal section on the line E F of Fig. 1. Fig. 9 is a part view of the gear for the worm that completes the weight. Fig. 10 is a transverse section corresponding with Fig. 2, showing a modification of the machine based on the same data for the same purpose. Fig. 11 is a section of this modification on the line S T of Fig. 10. Fig. 12 is another section on the line P R of Fig. 10. Figs. 13 and 14 show two other modifications in which the distribution is effected by somewhat different means. Fig. 15 is an enlarged detail of the cam 32, arm 44, and finger 51 in elevation. Figs 15′ and 15″ are detached details of arm 42. Fig. 16 is a detail plan view of the parts shown in Fig. 15 and some others. Fig. 17 is a vertical sectional view along shaft 29, the shaft being shown in elevation. Figs. 18 and 18′ are detail views showing the powder-pot 10 in two different positions. Fig. 19 is a plan view of the same. Fig. 20 is an enlarged detail view of three-armed lever 81 and adjoin-

ing parts. Fig. 21 is a detail plan view of the same. Fig. 22 is a sectional plan of the whole apparatus, and Fig. 23 is a sectional detail.

The same reference-numerals denote like parts in the several figures.

The machine comprises a base 112, on which are fixed three standards 113, 114, and 115, carrying the various parts of the machine, Figs. 1, 2, 4, 6, and 8. On the upper parts of the standards 114 and 115 is fixed a rectangular frame 116, carrying a set of vertical tubes 16 17, and at its top a hopper 1, having its bottom pierced with holes for the vertical tubes, Fig. 8. The standard 113, Figs. 8 and 4, carries the main shaft 6, which is provided with a pulley 117, with friction-clutch 108, and which by gears 27 and 28 drives another shaft 7, parallel to 6 and provided with a skew-wheel 35 and a worm 37. The wheel 35 by means of the wheel 36 drives a shaft 29, on which 36 is fixed and which extends at right angles to the line of the standards the whole length of the machine. Upon this shaft are loosely or rotatably mounted sleeves 30', (see Figs. 16 and 17,) carrying skew-gears 30 and cam-disks 32, designed to coact with arm 44 and finger 51 to stop the power-feed in the manner hereinafter described. Friction-disks 34 are secured to the shaft in any suitable manner, as by pins 34', and springs 33, encircling the shaft, press the disks 32 against the disks 34, producing sufficient frictional contact to cause the cam-disks and gears 30 to rotate with the shaft 29, and thus drive the respective worms, unless the cam is held against movement by the arm 44, as hereinafter described. Between the standards 113 and 114, Fig. 8, and carried by them is a shaft 8, carrying a worm-wheel 38, provided with a roller 18, Figs. 4 and 5, a cam 9, having roller 80, and cams 63 and 70. On the standard 114 is fixed an axle 120, on which is a Maltese cross 53 and a cog-wheel 54, and an axle 118, on which is a Maltese cross 19, and a cog-wheel 20, Figs. 4, 5, and 8.

In the upper part of the standard 114 can revolve a small shaft 119, having on it a pinion 21 and wheel 22, the pinion 21 gearing with the wheel 20 on the shaft 118. Parallel to the shaft 119 and driven by its wheel 22, gearing with a wheel 23, is a shaft 24, carried on the standards 114 and 115 and carrying skew-wheels 25, Figs. 1 and 2. At the lower ends of the vertical tubes 16 and 17 are horizontal tubes 2 and 3, containing distributing-worms 4 and 5. The worms 4 are given an intermittent or step-by-step rotation, and the threads thereon are of rather quick pitch. Each has on it a skew-wheel 26, gearing with one, 25, on the shaft 24. Each worm 5 of slower pitch has on it a skew-wheel 31, gearing with wheel 30 on the shaft 29, Figs. 2 and 3.

Below and between each pair of tubes 2 and 3 is located a very sensitive balance comprising a lever 47, pivoted at 48 and carrying a vertically-extending pin or finger 51. (See Figs. 2 and 18.) A threaded counterweight 49 is adjustably mounted on the rear end of the lever 47 and is designed to counterbalance the bucket 10, which is pivotally supported on the forward end of said lever. The bucket is provided with a groove 52 in one end face, which is designed to be engaged by a finger 73, carried on a lever 13, for the purpose of tilting the bucket, as shown in Fig. 18', for the purpose of emptying the powder therefrom, as hereinafter described. The lever or arm 13 is carried, preferably, by a collar secured to shaft 69. The shaft 69 has an arm 71, carrying a roller 72, designed to be operated by a cam 70 on the shaft 8. An arm 14, rigidly connected to the collar of arm 13, has a segment-shaped head adapted to engage a corresponding recess or groove in the under side of the lever 47. This arm 14 has the left part of its curved head lower than the right-hand part, and this left-hand part is also made thinner along its edge, as shown in Fig. 19, so as not to impede its movement. The arms 14 thus hold the levers 47 against lateral movement and serve when operated to press them up against rod 50 and hold them rigid during the emptying of the buckets 10. A contact button or piece is preferably provided on lever 47 at the contact-point. On the upper part of each needle 51 rests a lever-arm 44 of a shaft 121, which has bearings in the standards 113 and 114. Each lever 44 has a finger 43, which can act on a lever 42, Figs. 2, 15, and 16, at its end. The cams 32 are for the major part concentric, but have reduced portions, terminating in shoulders 32^a. While the concentric portions of the cams are in contact with the under side of levers 44 the levers will be held somewhat above the pins or fingers 51, as indicated in Fig. 15 and in dotted lines in Fig. 2. When any bucket has received sufficient material to tilt the balance-lever, the corresponding finger 51 is removed from under the end of arm or lever 44, which permits said arm to drop onto the reduced portion of the cam as it rotates until shoulder 32^a of the cam contacts with shoulder 44^a and holds the cam against movement, its frictional driving connection before described permitting this. The effect of this is to stop the feed of the corresponding screw and hence the delivery of any more powder into the bucket. The shaft 121 carries a lever 41, to which is jointed a rod 45, having a finger 46, Fig. 5, on which the roller 80, carried by cam 9 on shaft 8, can act. Another lever 40, carrying a roller 39, is jointed to the lever 41. Its lower end is forked, embracing the shaft 8. A long rod 50, passing through the standards 114 and 115, bears on the beams 47. Under each pot 10 is a hopper 68, fixed on a bar 93, carried on the standards 114 and 115, and under the hoppers 68 are funnels 12, held in holes of a plate 67, carried by arms 66, Fig. 2, of a shaft 94, which at its end has fixed on it an arm 65, carrying a roller 64, moved by the cam 63, carried by shaft 8. An unclutching-lever 82 is rigidly connected to

a shaft 95, which is extended to the standard 115 and has on its end a handle 111. The lever 82 carries a roller 96 and a finger 97 and a pin 98, to which is fastened one end of a spring 99, the other end of which is attached to a fixed pin 100. The roller 96 in unclutching bears against a spring-box 107, carrying a cone 108, which bears against the coned interior surface of the pulley 117. Between the standards 113 and 114 can rock a small shaft 101, having on it an unclutching-handle 102 and a three-armed lever 81. The arm next the pulley can act on the lever 82 by means of its finger 103, the vertical arm has sloping faces of special shape, and the third arm carries a counterweight 104. At the lower part of the standard 114 is mounted a shaft 76, having at one end an arm 77 and a counterweight 106 and having at the other end an arm 75 and roller 74, Figs. 4 and 6. On the upper part of the base 112 can move a carriage 11, on which is placed the plate 109, which carries the cartridges 110, and has on its under part a rack 62. Within the base 112 can revolve a shaft 56, having at one end a wheel 55, gearing with the wheel 54, mounted on shaft 120. The wheel 54 is mounted on the spring-stop 53, which carries it along, by means of the pins shown in Fig. 8, while the two pieces turn on the fixed axle 20 when the roller 18 enters into one of the grooves of this spring-stop. At the other end of shaft 56 is a disk 57, provided with a spring-handle 58, and it has a sleeve 59, terminating in a boss, on which is fixed the wheel 61 by a screw 60, which thus rigidly connects the wheel 61, the sleeve 59, and the shaft 56, Figs. 2, 5, and 8. The handle 58 is actuated by the spring 58′, which presses on the bottom of the hole in the plate 57 and pushes back the part 58″ of the rod, on which the handle is fixed, so that this handle presses constantly against the exterior surface of the plate 57.

On the side of the carriage 11 is located a cam or incline 15, which can act on roller 74.

Figs. 10, 11, and 12 show a modification of the machine above described. The worms 4 and 5 instead of being arranged side by side are arranged the one above the other. The balances 47 are independent of the mechanism. The needles 51 extend under the beams 47, which bear on stops 91, carried on supports 92. The weight which balances the powder charge and the pot 10 is a pot 49, having at its lower part a stem 84, dipping in liquid contained in a vessel 85, carried on bar 86. Each pot 10 has a grooved piece 52 and is carried by a stirrup 123. The lever 83 has a notch in which the end of the needle 51 can oscillate. The lower end of each vertical tube 16 is furnished with a slide-valve 122.

The beam 47 shown in Fig. 10 shows a great advantage over the one shown in Fig. 2. It can be more readily unmounted, as when the bar into which the tubes 16 and the plate 122 are held are raised these beams are free and all that is necessary then is to remove the supports 92, so as to be able to withdraw the parts constituting the scale proper—that is, the arms 47 and the suspensions of the pots 10 and 49. This ease of taking out the scales enables me to regulate them outside of the machine and to replace them when they are perfectly adjusted.

Figs. 13 and 14 represent as an illustration arrangements which can be mounted on the machine. In Fig. 13 the screw 4 is substituted by a wheel with cavities 88, which distributes in an intermittent manner a quantity of powder, coming as near as possible to the required weight. This powder falls into the pot 10. The wheel with small cavities 87 takes the place of the screw 5 and also distributes the filling in the required weight. When the weight is obtained, the arm 47 inclines and the needle 51 releases the lever 44, which stops the cam 32 and arrests the motion of the wheel with cavities 87. The pot 49 may either receive marked weights equivalent to the charge called for or a charge of powder equal to the one desired to distribute in the shells. In Fig. 14 the screw 4 is substituted by the helicoidal conduit with wide thread 89, which distributes intermittently a quantity of powder, being as nearly as possible of the required weight, and by a second helicoidal conduit 90, with much smaller thread, which, while taking the place of the screw 5, distributes also the complement of the charge. As in Fig. 13, when the weight is attained, the arm 47 goes down and the displacement of the needle 51 brings about the fall of the lever 44, which stops the cam 32, and thereby the distribution of powder. In these two figures all other elements specified in the preceding figures may serve to bring about the operation of the machine.

The machine operates as follows: The machine moved by the pulley 117 is started by raising the handle 111, causing the lever 82 to withdraw the roller 96 from the spring-box 107, which owing to the springs which it contains pushes the cone 108 into the pulley 117, mounted on the shaft 6, which drives the machine. By the counterweight 104 the finger 103 is pressed forcibly against the finger 97, keeping the lever 82 in its position. When the plate 103 presses on the finger 97, the spring 99 is neutralized by the fact that this spring, which is stronger than the four lodged in the cone 108, holds the lever 82 permanently drawn up against the lever 81. When the spring 99 is out of action and the roller 96 is disengaged from the cone 108, the springs lodged in said cone press against the gear 27 and keep the conical parts of the pieces 108 and 117 in contact. Powder contained in the hopper 1 is conducted by the vertical tubes 16 and 17 into the horizontal tubes 2 and 3, in which the distributing-worms 4 and 5 revolve, causing the powder to move toward the pots 10. The worms 4 are rotated as follows: The rotation of shaft 6 is transmitted to shaft 7 through the gearing 27 and 28 and from shaft

7 to shaft 8 by means of the worm 37 and worm-wheel 38. The roller 18 on wheel 38 produces the step-by-step rotation of the Maltese cross 19, mounted on the shaft 118, which is transmitted to the shaft 119 through gearing 20 21, to shaft 24 by gearing 22 on shaft 119 and 23, and finally to the worms 4 by skew-gear 25 and 26. These worms 4 of quick pitch cause on each step of their rotation the advance of a quantity of powder as near as possible to the charge required. The rotation of the worms 5 (which is continuous until the full charge is fed) is produced as follows: The shaft 7, driven as described, transmits rotation to shaft 29 by the skew-gear 35 and 36, and shaft 29 drives the worm by skew-gear 30 and 31. These worms, of slower pitch than the worms 4, distribute by very small portions the quantities required to complete the charge. The powder thus falls into the pots 10, carried by the beams 47, which are all kept horizontal by the rod 50, the counterweight 49 balancing the pot 10 and the charge of one case. The balance is overcome as soon as the charge is reached. At this moment the needles 51 of the balances incline. The levers 44, which were kept up by the cams 32, mounted on shaft 29, and rested on the needles 51 only during the momentary passage of the stop-shoulders under these levers, fall in front of the shoulders of the cams 32 and stop them, and consequently stop the gears 30, frictionally driven by the effect of the springs 33, which press them against the disks 34, that are fixed on the shaft. Under these conditions the rotation of the worms 5, produced by shaft 7 passing through the intermediate organs described, and consequently the feed of the powder, ceases. At this moment the carriage 11, carrying the cartridges 110, is advanced by Maltese cross 53, gearing 54 55, shaft 56, gear 61, and rack 62, bringing a row of cartridges under the funnels 12. These carried by the levers 66 and raised during the movement of the carriage by the action of cam 63, acting on the roller 64 on the arm 65, come down upon the cases when the carriage stops. The arms 13, moved by the cam 70, arm 71, and roller 72, push their fingers 73 into the groove 52 of the pots 10, whereby the powder contained in the pots 10 is poured into the hoppers 68, funnels 12, and finally into the cases 110. If after the time allowed for the worms 5 to complete the feed supplied by the worms 4 the charge is not obtained in any of the pots 10, the lever 44 has not been released by the needle 51 on which it rests and the finger 43 keeps the arms 42, 41, and 40 raised, and consequently the rod 45, carried by arm 41. The finger 46 on the rod 45 occupies the position indicated in Fig. 5 just above the potion shown in section, the roller 80 comes against it and pushes aside the lever 81, the finger 103 leaves the lever 82, which, drawn by spring 99, acts by the roller 96 on the spring-box 107 and disengages the friction-cone 108 from the pulley 117, and thus the machine is automatically stopped. When the machine is thus stopped on account of insufficiency of weight of powder in one of the pots, the operative in charge of the machine adds by hand the quantity of powder necessary to complete the charge and starts the machine again by moving the handle 111. The unclutching of the machine may also be effected by hand by depressing the handle 102, mounted on axle 101, whereby the fingers 103 and 97 are disengaged, and the lever 82 is then drawn by the spring, the unclutching being effected as before. When all goes regularly on, the weights being complete in the five pots, the rod 45 is lowered and the finger 46 is in a lower position, (indicated in section in Fig. 5,) such that the roller 80 passes without touching it.

The operations above mentioned—that is to say, the distribution of the powder, its weighing, (with stoppage of the machine if the weight in one of the pots is insufficient and with the fresh start after adding by hand to the contents which are deficient,) the advance of the carriage, the lowering of the funnels on the cases, the emptying of the pots, and delivery of the powder into the cartridges—recur in the same order for each row of cases. After the powder is poured into the cases the recommencement of distribution is owing to the fact that the cams 9, acting on the roller 39, raise the arms 40 41 42, the latter acting on the fingers 43 on the arms 44, which are then raised from the notch of the cams 32, allowing them to revolve. The last movement of the carriage by means of cam 15 causes the roller 74 to be raised. The finger 78 then occupies the upper position, (above that shown in section in Fig. 5.) The roller 80, coming against 78, pushes the lever 81 and causes stoppage of the machine.

When all the cases have been filled, the carriage is at the end of its stroke. In order to bring it back, it is only necessary to withdraw the handle 58 from the disk 59 and to draw back the carriage by hand. The handle then resumes its place in the disk, the carriage being then in position for recommencing, the cartridges are removed, and fresh empty cases put on the carriage.

In the modification shown in Figs. 10, 11, and 12 the powder advanced by the worms falls into the pots 10. The movements of the beams are regulated and limited by the movements of the stem 84 in the liquid in vessel 85. When the weight of powder is attained, the beam inclines on the side of the pot, the stem 84 is raised, the volume of liquid displaced by it is lessened, and so is the force of liquid urging it upward, so that it tends to return to its original position. Thus there is a kind of braking effect, which limits the movements of the beam and immediately stops its oscillations.

The automatic stoppage of the feed takes place between the limits of inaccuracy determined by the notch of the lever 83. If it should

be desired to change the counterweight 49, marked weights can be added. In this modification the hoppers 68 are dispensed with and the funnels 12 are large, so as to facilitate the pouring of the powder into the cases. When it is desired to verify the balances or do anything else requiring removal of the feeding-worms, balances, or other neighboring parts, it is only necessary to close the valves 122 to prevent powder from dropping into the lower part of the machine.

In the modification shown in Fig. 13 the feeding-cells 87 88 pour the powder into a hopper 123 below both of them, thus simplifying the construction of the machine.

In the modification shown in Fig. 14 the powder that falls into the hopper 124 behind the worm feeding-tubes is moved by them to their front ends, whence it pours into the pots 10.

Having thus described the nature of this invention and the best means I know of carrying the same into practical effect, I claim—

1. In a cartridge-loading machine, a powder-receptacle, a scale or balance carrying a charge-receiving bucket, movable conveying means for feeding the powder from the receptacle to said bucket, and connections whereby the movement of the scale when the charge is complete stops said feeding means, substantially as described.

2. In a cartridge-loading machine, a powder-receptacle, a scale or balance carrying a charge-receiving bucket, an intermittingly-operating feeding device for conveying an approximately accurate charge of power to said bucket, a supplemental feeding device for gradually feeding an additional amount of powder, and connections whereby the movement of the scale on the completion of the charge interrupts the feed of said supplemental feeding device, substantially as described.

3. In a cartridge-loading machine, a powder-receptacle, a scale or balance carrying a charge-receiving bucket, an intermittingly-operating feed-screw designed at each rotation to convey an approximate charge from said receptacle to said bucket, a continuously-operating feed-screw for slowly conveying a small quantity of powder from the receptacle to said bucket, and means whereby the movement of the scale on the completion of the charge interrupts the motion of said continuously-operating feed-screw, substantially as described.

4. In a cartridge-loading machine, a powder-receptacle, a plurality of scales or balances each carrying a charge-receiving bucket, intermittingly-operating means for conveying an approximate charge from the hopper to each bucket, means for slowly feeding an additional amount of powder to said buckets, said slowly-feeding means being controlled by the movement of the scales, an intermittingly-moving cartridge-carrier, funnels beneath the buckets with means for seating them upon the cartridges, and means for emptying the contents of said buckets into said funnels, substantially as described.

5. In a cartridge-loading machine, a powder receptacle or hopper, a scale-beam or balance carrying a charge-receiving bucket, a pair of tubes depending from said receptacle, an intermittingly-rotating feed-screw designed at each step to convey an approximate charge from said tube to the bucket, a continuously-driven feed-screw for conveying gradually a small quantity of powder from the other tube to said bucket, and means whereby the completion of the charge in said bucket causes the balance to interrupt the motion of the second feed-screw, substantially as described.

6. In a cartridge-loading machine, a powder receptacle or hopper, a balance carrying a charge-receiving bucket, an intermittingly-rotating feed-screw having a rapid pitch whereby at each rotation it will feed an approximate charge of powder from said receptacle to said bucket, a feed-screw having a less rapid pitch for feeding powder more slowly to said bucket, friction means for driving said second feed-screw and means whereby the movement of the balance on the completion of the charge holds said second feed-screw against movement, substantially as described.

7. In a cartridge-feeding machine, a powder receptacle or hopper, a balance-beam having a charge-receiving bucket, an intermittingly-moving feed device for feeding on each movement an approximate charge from said hopper to said bucket, a second feeding device for feeding powder gradually and slowly to said bucket until the balance is overcome, a shaft having friction-operated connections for driving said second feeding device, a disk included in said operating connections having an abutment or shoulder, a stop arm or lever designed to engage said abutment to hold said disk stationary and a finger or arm carried by the balance for holding said stop-arm out of the path of the shoulder on the disk until the balance is moved on the completion of the charge, substantially as described.

8. In a cartridge-loading machine, a powder hopper or receptacle, a balance having a charge-receiving bucket at one end, adjustable counterbalancing means at the other end of said balance, a pair of feed-tubes located side by side receiving powder from said hopper and delivering it into said bucket, a feed-screw having a quick pitch in one of said tubes, means for imparting an intermittent movement to said screw, a feed-screw in the other tube having a less pitch, a shaft arranged transversely of said tubes, means rotating said shaft continuously during the operation of the machine, a disk and gear frictionally connected with said shaft, a gear on the shaft of screw having less pitch and en-

gaging said first-named gear, a stop-arm designed to engage a shoulder or projection on said disk, and a finger or arm projecting upward from the balance and designed to normally hold said stop-arm out of engagement with said disk, substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

LOUIS CHAMBON.

Witnesses:
EDWARD P. MACLEAN,
JULES FAYOLLET.