2 Sheets—Sheet 1.

T. J. POWERS.

Assignor to FITCH & VAN VECHTEN.

MACHINE FOR LOADING AND INSERTING THE BULLET INTO CARTRIDGES.

No. 61,456. Patented Jan. 22, 1867.

Fig. 1.

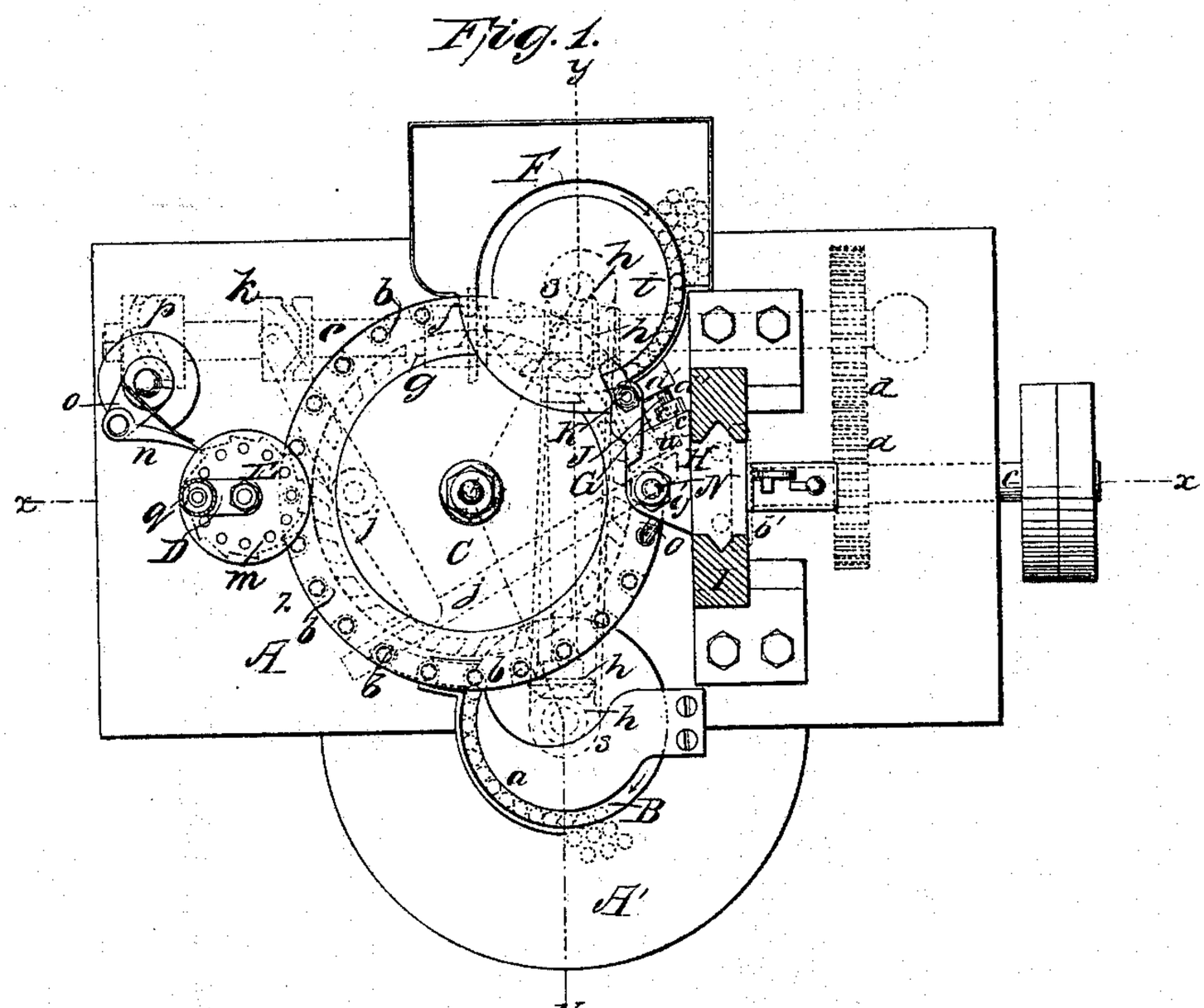
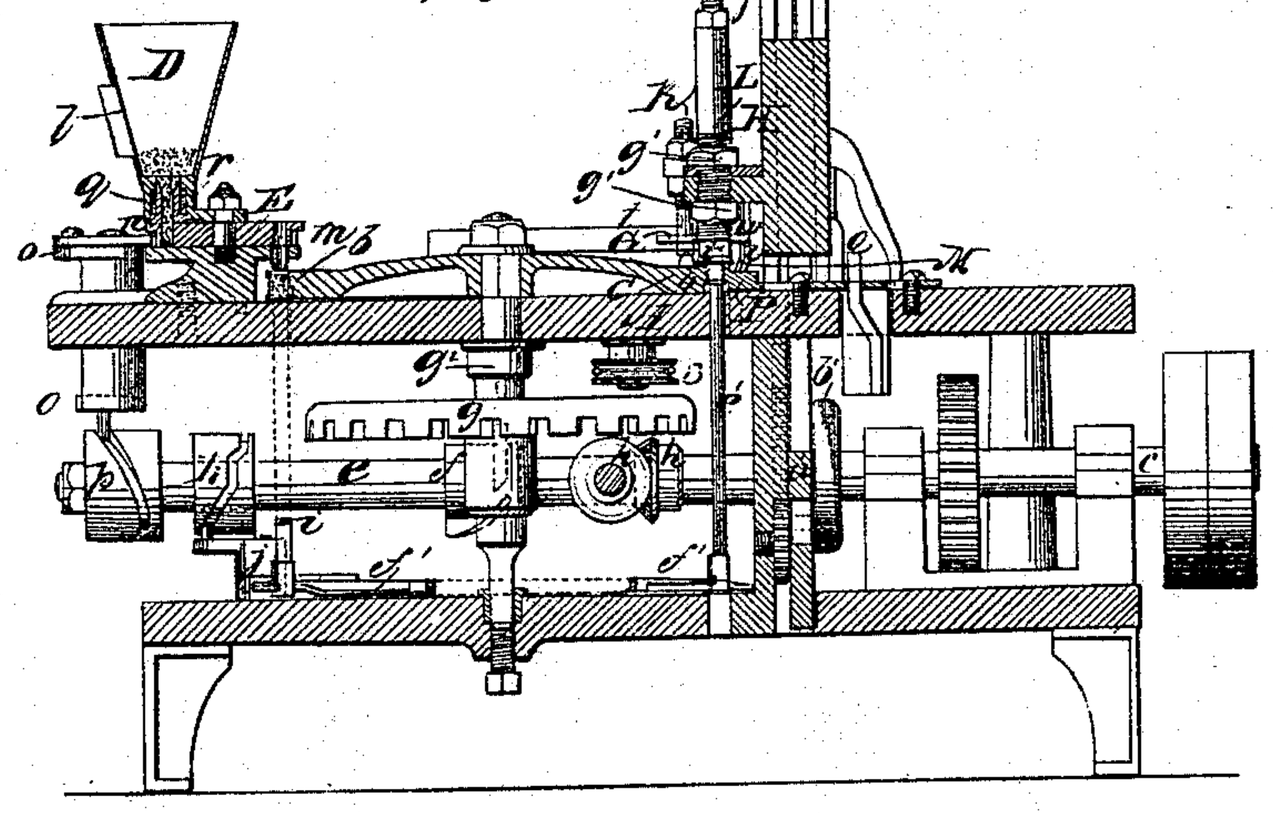


Fig. 2.



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Inventor:
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2 Sheets—Sheet 2.

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Fig. 3.

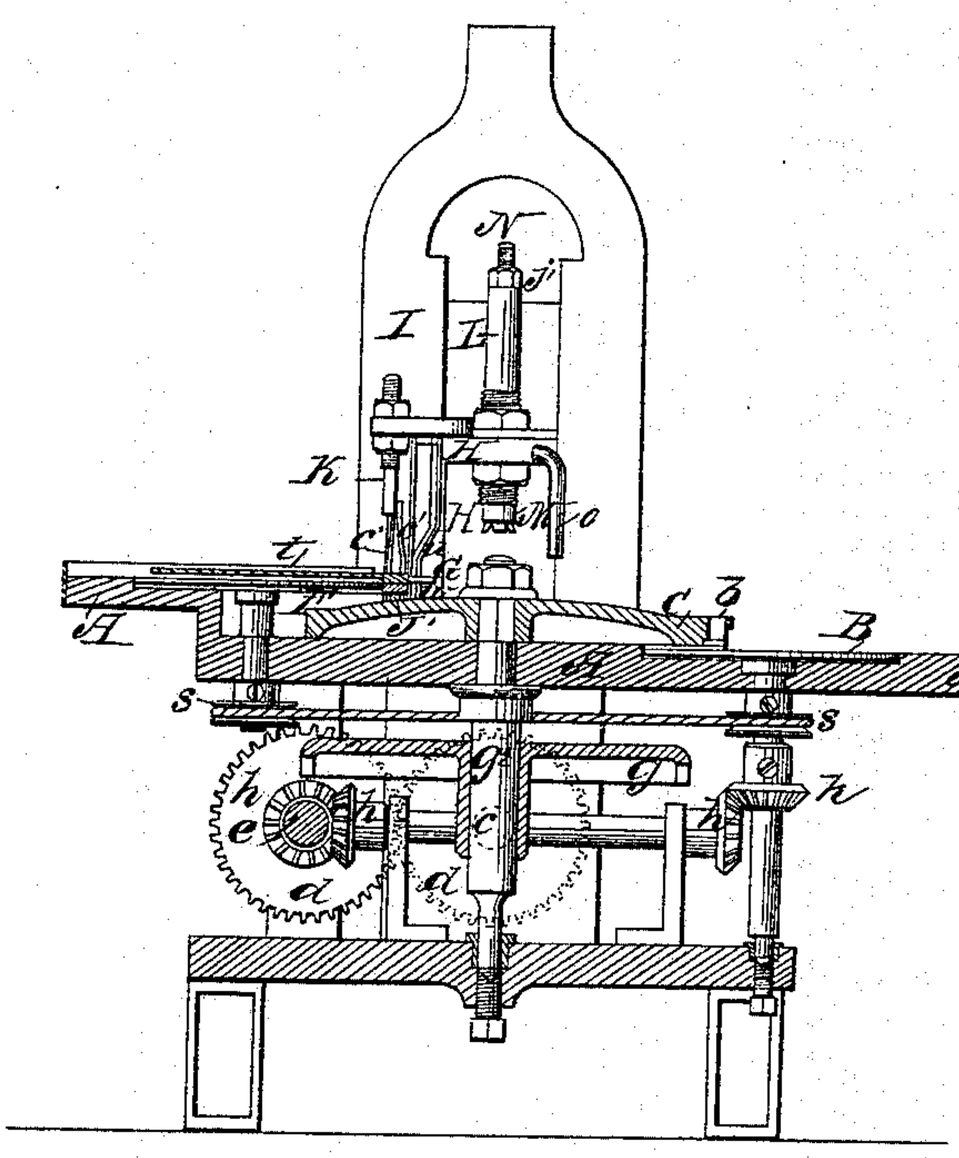

Fig. 5.

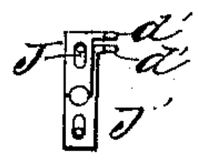

Fig. 4.

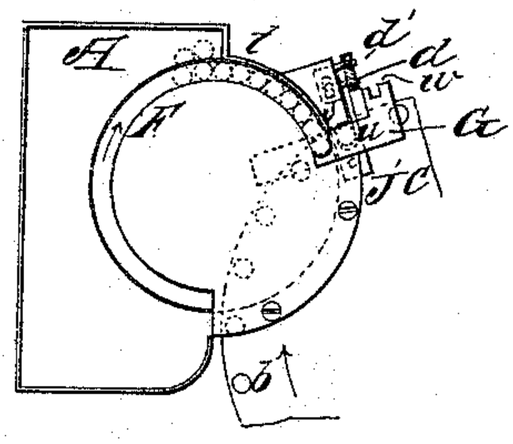

Fig. 6.

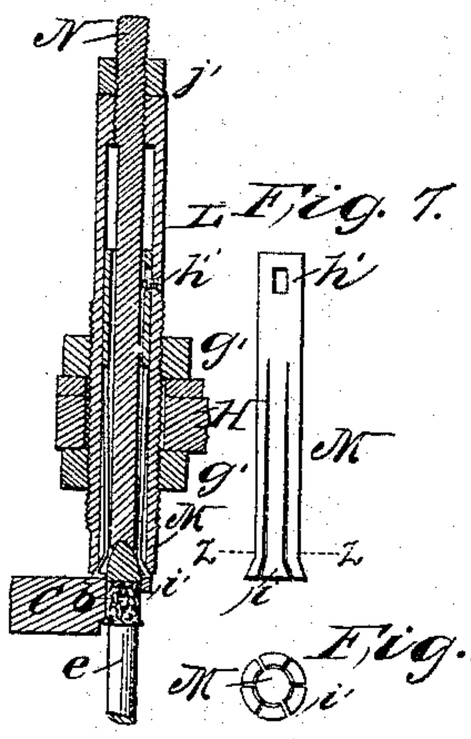

Fig. 7.

Fig. 8.

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United States Patent Office.

TIMOTHY J. POWERS, OF NEW YORK, N. Y., ASSIGNOR TO FITCH & VAN VECHTEN, OF SAME PLACE.

Letters Patent No. 61,456, *dated January* 22, 1867.

IMPROVEMENT IN CARTRIDGE-FILLING MACHINE.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, TIMOTHY J. POWERS, of the city, county, and State of New York, have invented a new and improved Machine for Loading and Inserting the Bullets into Cartridges; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a plan of the machine.

Figure 2 is a vertical section of the same in the plane indicated by the line *x x*, fig. 1.

Figure 3 is a vertical section of the same in the planes indicated by the line *y y*, fig. 1.

Figure 4 is a plan of the bullet-feeding devices.

Figure 5 is a plan of the die which conducts the bullets into the loaded shells.

Figure 6 is a vertical section of the devices for crimping and closing the mouth of the cartridge-shell around the bullet on a larger scale than the before-mentioned figures.

Figure 7 is an outside elevation of the crimping die.

Figure 8, a horizontal section in the plane indicated by the line *z z* in fig. 7.

Similar letters of reference indicate corresponding parts in the several figures.

The principal elements of this machine consist of an automatic device for feeding the cartridge-shells to the machine; an automatic device for feeding the gunpowder into the shells; automatic devices for feeding the bullets to the machine, conducting them to the loaded shells, depositing them therein, and ramming them down upon the charges; an automatic contrivance for crimping and closing the moulds of the shells around the bullets; an automatic contrivance for carrying the shells from the shell-feeding device to the powder-feeding or loading device, thence to the bullet-feeding and inserting devices, thence to the crimping device, and finally to the place of their discharge from the machine. The cartridge-shell feeder consists of a continually rotating horizontal disk and suitable guides by which the shells are fed and conducted in single file, one after another, to the intermittently rotating carrier which conveys them to the loading, bullet-inserting, crimping, and discharging devices. This carrier consists of a horizontal intermittently rotating disk, and has in its periphery suitable cavities for the reception of the shells. The powder-feeding or loading devices consist of a hopper into which the gunpowder is placed, and an intermittently rotating disk in which are suitable cavities in which the gunpowder is received in measured quantities from the hopper, and by which it is deposited in the shells during intermissions in the rotation of the carrier. Between the gunpowder hopper and the measuring and feeding disk or distributor above mentioned there is a device for preventing the fire resulting from any accidental explosion of the powder which has left the hopper, or the charged shells in their subsequent treatment, communicating with the powder in the hopper. The cavities provided in the carrier for the cartridge-shells are shown of such construction, and the bullet-inserting devices so applied and operated, and a contrivance for lifting up the shells is so arranged and operated, that a larger quantity of powder is fed into the shells than in its normal condition they could contain, such excess of powder being forced into the shells under the bullets by the compression of the whole charge. This, however, may be modified, as hereinafter referred to, when the powder in the shells does not require to be hard pressed. The crimping devices having a vertical reciprocating motion slip down over the bullet, and a contractible die, which constitutes the main feature of these devices, contracts the mouth of the shell upon and round the bullet. The vertically reciprocating slide, which carries the crimping devices, also carries a punch, by which the bullets are inserted into the cartridge-shells and caused to compress the charge of powder thereon, and another punch by which the cartridges, when completed by the insertion of the balls and crimping of the shells around them, are discharged from the machine.

To enable others skilled in the art to make and use my invention, I will proceed to describe it in detail with reference to the drawings.

The cartridge-shells containing the priming in their heads may be placed on the part A′ of the table A, mounted on a suitable frame for carrying the several working devices, and be fed in continuous and rapid succession on to a continuously rotating horizontal disk, B, which will convey them into a guiding-groove or channel, *a*, that, by the action of the disk, serves to conduct them in single file, one after another, into chambers, *b*,

arranged round the periphery of an intermittently revolving horizontal carrier, C, as the mouths of said chambers come in succession and remain for a short interval at rest opposite the inner end of the guiding-groove or channel *a*, (see fig. 1,) where the shells as they are fed are shown in red lines. Motion may be communicated to the continuously revolving disk B and intermittently revolving cartridge-shell carrier C by means of a main driving-shaft, *c*, wheels *d d*, counter-shaft *e*, carrying a drum, *f*, that is provided with straight and spiral threads, which mesh into a crown-wheel, *g*, on the carrier-shaft g^2 to give the necessary intermittent revolving motion to the cartridge-carrier C and bevel-gearing, *h h h h*, that serve to operate the continuously revolving cartridge-shell feeding disk B. The upper surface of the feeding disk B is on a level with the part A′ of the table A to facilitate the passage of the cartridge-shells on to the disk and into the guide *a*, but it should be arranged to be sufficiently below and made to underlap the carrier C to give free ingress of the cartridge-shells into the chambers *b* of the latter. This cartridge-shell carrier C has, according to the modification shown in the accompanying drawing, its chambers, *b*, formed by round holes (see figs. 1 and 2) in its top, opening into semicircular or U-shaped cavities below or portion forming the bodies of the chambers, and these again enlarged at the bottom into similar U-shaped cavities (see dotted lines at *z* in fig. 1) to receive the body and head of the cartridge-shells, which are fed into the chambers *b* under the top of the carrier, and not until the shell by the intermittent revolving motion of the carrier is conveyed some distance forward along a groove in the table A corresponding with the lower level of the part A′ of the table and channel *a*, is it made to enter for a short or partial height the round hole forming the top of the chamber, being steadied or guided and held from falling out in the mean time, it may be, by an extension of the rib which forms the outer boundary to the feed-guide *a*, and which rib, if necessary, may be extended further or nearly around the carrier. After the cartridge-shell, however, has been received within the U-shaped cavities of the chamber—here supposing the chambers not to be U-shaped through their entire length—and been conveyed by the carrier C a proper distance past the feeding-disk B, the shell, while the carrier C is at rest, is slightly raised out of the groove in the table A, so as to project into the round hole of the chamber in the top of the carrier to within a moderate distance of its upper surface or level. This may be done by a lifting-rod, *i*, operated by levers, *j*, acted upon by a grooved cam, *k*, on the counter-shaft *e*. In thus describing the action on one shell, the same applies to the remainder, which follow in rapid succession.

It will now be necessary to describe the operation of charging the shell with gunpowder, as it—that is, each shell in succession—comes by the action of the intermittently revolving carrier and for a short interval remains at rest under the proper charging devices. These consist, firstly, of a hopper, D, which should be fed at intervals with only a small quantity of powder to lessen the violence of an explosion in case of an accident. To prevent it being over supplied at any one time, and to give safe vent in case of an explosion, I cut an aperture, *l*, in rear of the hopper. The powder is conveyed from the hopper at suitable intervals to the extent of a cartridge charge; each delivery from it, by means of an intermittently revolving perforated distributor and measurer, E, which, by means of a ratchet-wheel or formation, *m*, and pawl, *n*, levers *o o*, fast to a vertical shaft and grooved cam, *p*, on the counter-shaft *e*, is made alternately and successively to establish and shut off communication with the hopper, each perforation in the distributor being of the necessary diameter anddepth to constitute a "charge," and only remaining under the delivery aperture of the hopper a sufficient time to fill, when, by the continued intermittently revolving action of the distributor, it is passed on till it arrives over a cartridge-shell in the carrier C, which it is timed to meet and into which it discharges itself. The delivery aperture of the hopper D, or discharging device forming a continuation of the lower portion of the latter, is contracted and fitted with a brass or other suitable bush, *q*, that is made to moderately press down upon and establish a close junction with the distributor E by means of an India-rubber spring packing, *r*, encircling the bush, and that also serves to give a close or tight character generally to the communication with the hopper from below, so that if by any accident any of the charged or loaded cartridges should explode in their after progress through the machine, and such explosion be extended by the fire igniting the other charged shells in the rear, it will be stopped from communicating or extending to the powder in the hopper. This close or tight character, too, of the hopper at its delivery end serves to prevent powder, during the charging process, from being scattered on the distributor and carried round by it to run to waste and endanger an explosion. Here it may be observed that in some cases, and when it is desired to compress the powder into the shell, the amount of loose powder discharged each delivery from the hopper is sufficient to not only fill the cartridge-shell under the process of being charged, but also the upper portion of the round hole in the top of the carrier, which is not occupied by the shell, so that there will be a surplus of powder that on being rammed down in a subsequent process will serve to closely pack and fully charge the cartridge. Next in succession is the bullet-feeding and loading process. To accomplish this, the table A is of a raised construction opposite, or nearly opposite, the cartridge-shell feeder, that is, on the other side of the shell-carrier C. Mounted on this raised portion of the table, and flush, or nearly so, with its surface, is a continuously revolving bullet-feeding disk, F, driven through belt and pulleys *s s* by or from the shaft of the shell-feeder, and arranged to overlap the shell-carrier, on to which the bullets are fed and conducted in single file (shown in blue lines in fig. 1) along a grooved channel or guide, *t*, as in the case of the cartridge shell-feeding device, and are delivered or dropped one after another in succession through a suitable hole or opening in the table outside the bullet-feeding disk, as at *u* in fig. 4, by means of an intermittently reciprocating slide, G, which, lying on or over the disk F, acts, firstly, as a stop to prevent the bullets being carried round too far by the disk, and at proper intervals to slide outward and convey a bullet lying in a notch or cavity in the edge of the slide over the delivery aperture in the bullet-feeding table. This bullet-delivery aperture is pitched to lie over the line of travel of the shell-chambers *b* in the carrier C, and at a point when, by the intermitting action of said carrier, the chambers in succession (each containing a shell loosely charged with powder) come and for a short interval remain at rest under the said bullet-delivery aper-

ture. The slide G, having drawn a bullet from off the disk F and dropped it through the delivery aperture in the table, next, or after a suitable pause, works inward again to repeat the operation of taking up a fresh bullet for the next shell in order. This intermittent action of the slide G is, or may be, effected by means of a straight and inclined guide, *v*, working in a clip or slotted arm, *w*, of the slide, and attached to a vertically reciprocating slide, H, that works in a standard, I, and is driven by an eccentric block, *a'*, attached to a disk, *b'*, on the driving-shaft *c*, and working in a slot in an under continuation of the vertical slide H, that may be balanced and steadied by fast-and-loose racks and pinions below, or said slide may be otherwise driven. After the bullet has been dropped by the slide G through the delivery aperture in the table, it passes, in its course down to the powder in the shell or shell-chamber under it, into a divided die, J J', (see more particularly figs. 4 and 5,) which serves to conduct the bullet to the powder-loaded shell, said die being closed at first so as to receive and guide the bullet to the shell-chamber and to hold or steady the bullet in a precise central position on the powder in the chamber containing the shell, while the punch or rammer K, which is connected with the slide H, comes down and rams home the bullet into its position in the mouth of the shell. The die J J' is then or afterward opened to allow the bullet to pass out or through in the next intermittent movement forward of the carrier C. Said die J J' may thus be operated to act upon each bullet in succession by means of straight and inclined guides, *c' c'*, attached to the slide H and working against or on horns, *d' d'*. The rammer K may be adjusted by means of a screw and nuts above and below at its top to regulate its action to or on the charge. To crimp and close the mouths of the shells in completion of the cartridge, each carrier-chamber, containing a shell thus charged with powder and bullet, is successively brought under, at a pausing point in the intermittent action of the carrier C, a crimping die or device, the loaded shell with its bullet being slightly raised at this period in the operation of the machine by a rod, *e'*, worked by a crooked slide or bar, *f'*, acted upon by the levers *j* and cam *k*, so as to project the mouth of the shell above the top surface of the carrier and at the same time serve as a base for the shell to rest upon while being crimped. Immediately prior to crimping, a notched intermittently reciprocating slide, P, acted upon by a straight and inclined guide, Q, attached to the slide H, is projected forward to stay and hold the shell while being crimped to its place in the carrier, said holding slide afterward drawing back or retiring. When up to the carrier, it forms a close tube of the U-shaped shell-chamber in the carrier, either partly or throughout the depth of said chamber. The crimping device is connected with the reciprocating slide H, and is vertically adjustable by means of a screw-thread on its outer hollow plunger, L, and lock-nuts, *g' g'*, to regulate its action. Within this hollow plunger L is a contractible die, M, that slips down over the bullet and contracts the mouth of the shell upon the bullet. This contractible die M is also hollow (see fig. 6) and is fitted in such a manner, by a slot and screw, *h'*, for instance, that, while it moves down with the outer plunger, L, it is free to allow the outer plunger to move further downward independently of it, so as when the enlarged inclined portion *i* of the longitudinally split or contractible die, illustrated in figs. 6, 7, and 8, comes down upon and over the bullet or portion of the bullet projecting above the table, the outer plunger L at its bottom or flaring mouth thereof will in its continued descent press upon and operate to close the enlarged inclined portion of the flexible or contractible die, and by means of internal projecting lips to the latter contract the mouth of the shell upon the bullet. Within the contractible die may be a rod or punch, N, passing out through the top of the outer plunger, and adjustable by nut *j'*, to regulate its height. The lower end of this punch is countersunk for reception of the upper or outer end of the bullet, which it will serve to centre and hold to its place while the shell is being crimped round it. This internal upper rod or punch N may be dispensed with, so as, in case of an explosion during the crimping process, a free upward vent or escape through the contractible die for the bullet is provided. When said rod, however, is used, the lifting rod *e'* may be made hollow to give a free vent in case of explosion. As soon as the crimping of the shell round the bullet has been effected, the plunger L will move upward, and, releasing itself from pressure on the contractible die M, release the latter from its gripe on the shell, and, continuing to move upward, carry the contractible die up along with it for in due time a repetition of its action on the next succeeding loaded shell that may come under it. The cartridge thus finished is next conveyed by the intermittent action of the carrier C under a discharging plunger, *o*, which, coming down in the next descent of the vertical slide H, to which it is attached, will press upon the bullet and expel the cartridge through a hole in the bed or table of the machine into any suitable receptacle that may be arranged to receive it.

By the machine herein described, apart from feeding the gunpowder to the hopper, but two manual operations are necessary in the working of it, the one to feed in the cartridge-shells and the other the bullets, with but little or no risk of an accident to the operatives, and without any excessive labor, so that almost children will suffice, and the machine be made to produce many thousands of finished cartridges in the hour. Numerous modifications in the details here described will naturally present themselves to the mechanic and others, which it is not necessary for me here to specify, nor yet to describe the many equivalent devices which may be employed as substitutes for those I have here illustrated and explained to make clear my invention, it being only necessary for me to select one of the many modes for carrying it into practice; a different construction of cartridge-shells, for instance, or different arrangement of the priming in them, requiring of necessity appropriate changes in the details. Thus also, if desired, the automatic bullet-feeding apparatus may be dispensed with and the bullets be fed directly into the shells in the carrier C by hand; so, also, the shell-chambers *b* in the said carrier may, instead of being round or enclosed at the top, be formed by continuing the U-shaped cavities throughout the entire thickness of the carrier C and the shell-feeding apparatus be arranged to feed the shells into said chambers on a level with the table A, and so that the upper ends of the shells be above or on a level with or only slightly below the upper surface of the carrier; and the powder-measuring device only discharge, each delivery, sufficient powder to charge a shell irrespective of compression or hard packing afterward, which may or may not be done.

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

1. The spring or contractible crimping die or device for closing the mouths of the shells on to or in the bullet, constructed to operate substantially as described.

2. I further claim said contractible crimping die, or its equivalent, in combination with an intermittent shell-carrier, for operation together, essentially as herein set forth.

3. The combination of an automatic bullet-feeder with an automatic shell-carrier, substantially as specified.

4. The combination of an automatic shell-feeder, shell-carrier, and bullet-feeder, for action together, as herein set forth.

5. The combination, with an automatic bullet-feeder, of a bullet take-up or slide to deposit the bullet over the shell.

6. In combination with an automatic bullet-feeder, a divided or opening and closing conducting die to guide the bullet to its place in or over the shell, and to hold it while the charge is being rammed, substantially as specified.

7. Providing the bottom of the powder-hopper or space intervening between it and the charge-measurer or distributor with an independent bush and rubber packing, or their equivalent, for operation together and in combination with the distributor, essentially as and for the purpose herein set forth.

8. Griping the shell while being crimped by an independent slide, or its equivalent, arranged to close upon the mouths of the shell-chambers in the carrier and afterward to open and retire therefrom, essentially as specified.

9. The combination in one machine of an automatic shell-carrier, bullet-feeder, powder-charger or measurer and distributor, and crimping device or die, for operation together substantially as herein set forth.

10. While not claiming, irrespective of the mode herein described, raising the shell at certain points within its chamber in the carrier, I do claim, in combination with an intermittently rotating carrier provided with chambers, substantially as described, the lifting rod *i* arranged to raise, during a pause in the motion of the carrier, the shell further up within its chamber and then to retreat, essentially as and for the purpose herein set forth.

11. Also elevating the upper end of the shell prior to crimping above the top surface of the carrier and retaining it there while crimping by means of an intermittently reciprocating rod, *e'*, arranged to operate in connection with the carrier and suitable crimping device, substantially as specified.

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