(No Model.) 8 Sheets—Sheet 1.

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SHELL CARRIER FOR CARTRIDGE LOADING MACHINES.

No. 527,983. Patented Oct. 23, 1894.

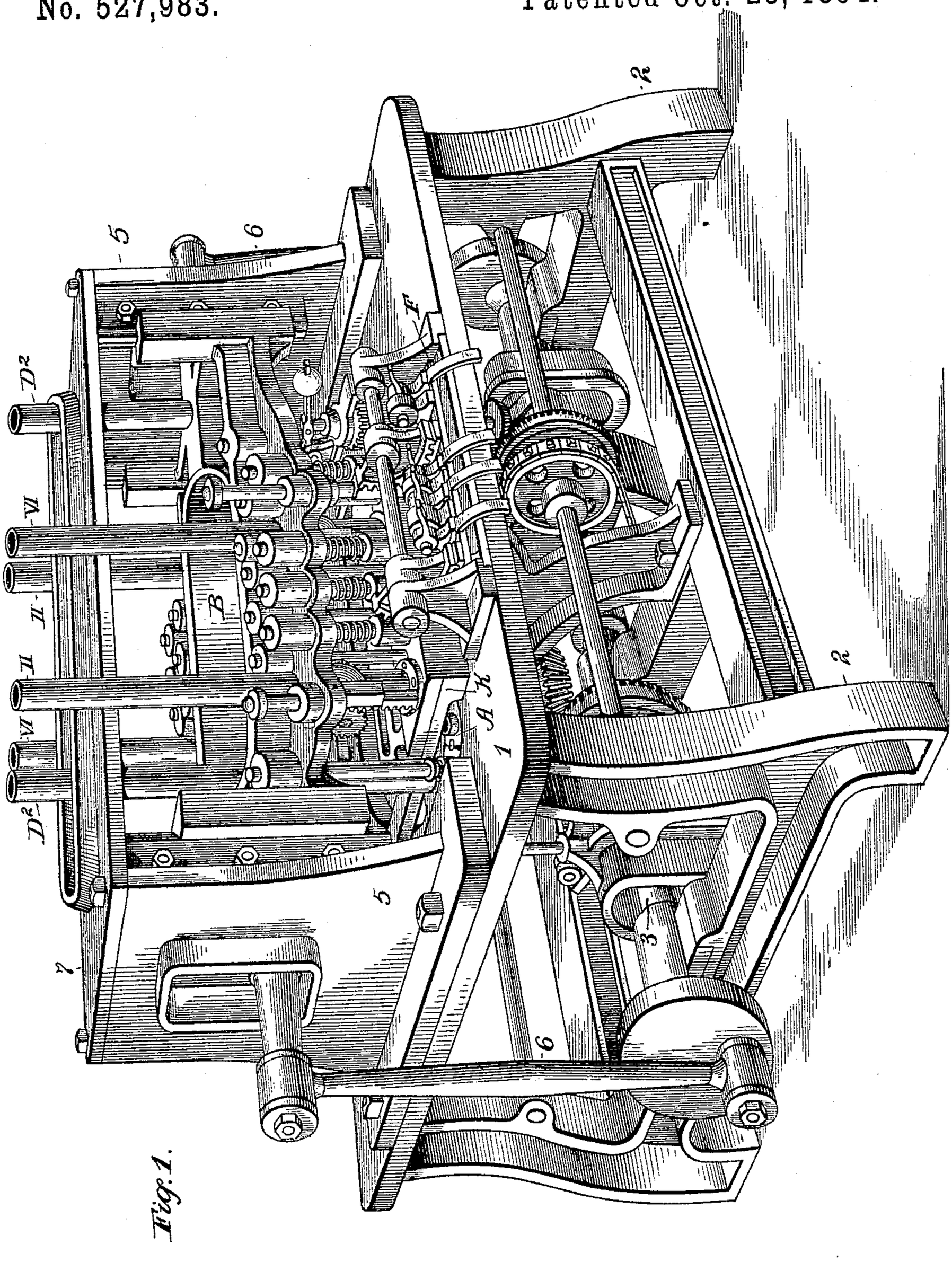

Fig. 1.

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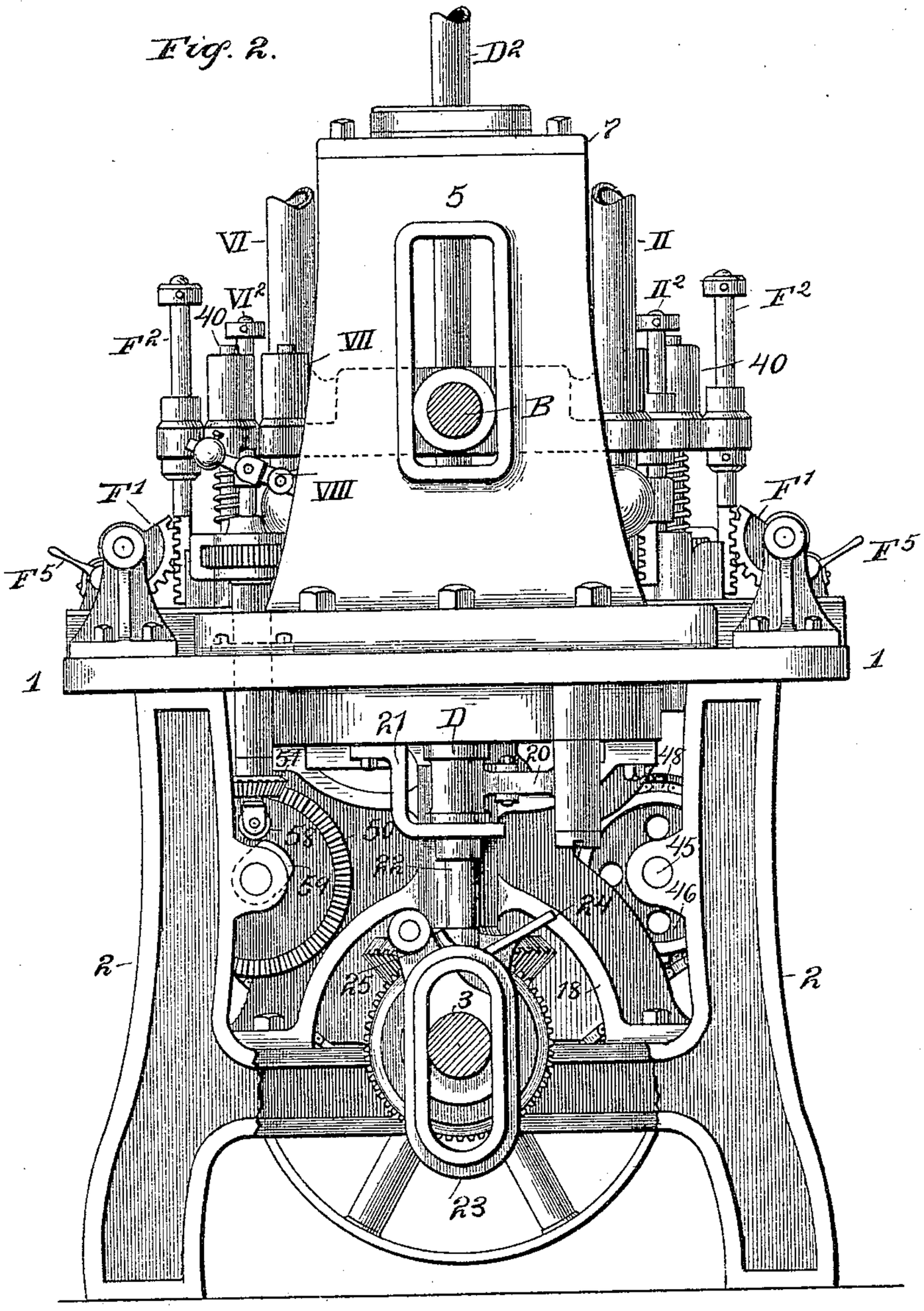
Fig. 2.



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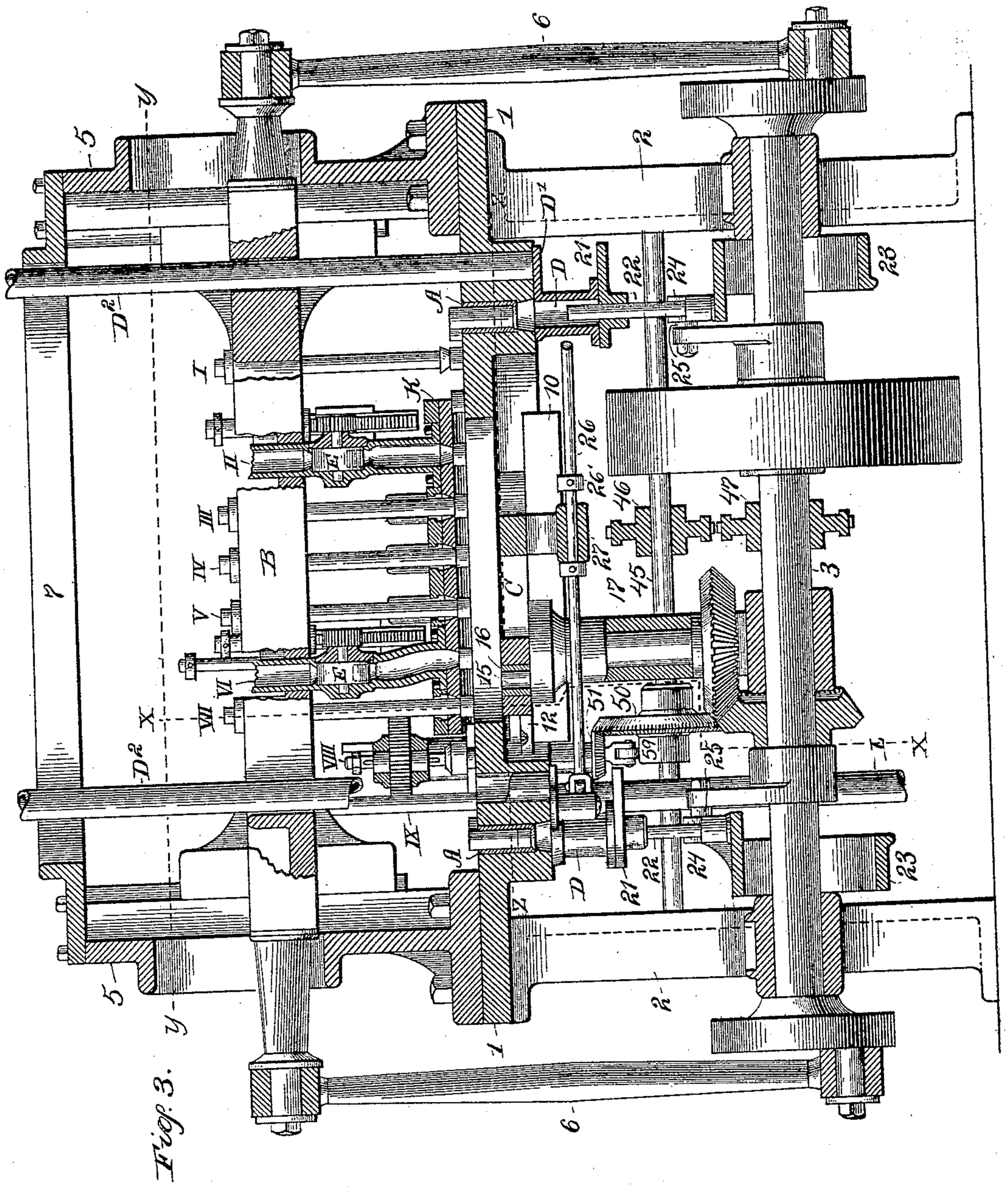

Fig. 3.

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8 Sheets—Sheet 4.

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SHELL CARRIER FOR CARTRIDGE LOADING MACHINES.

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Fig. 4.

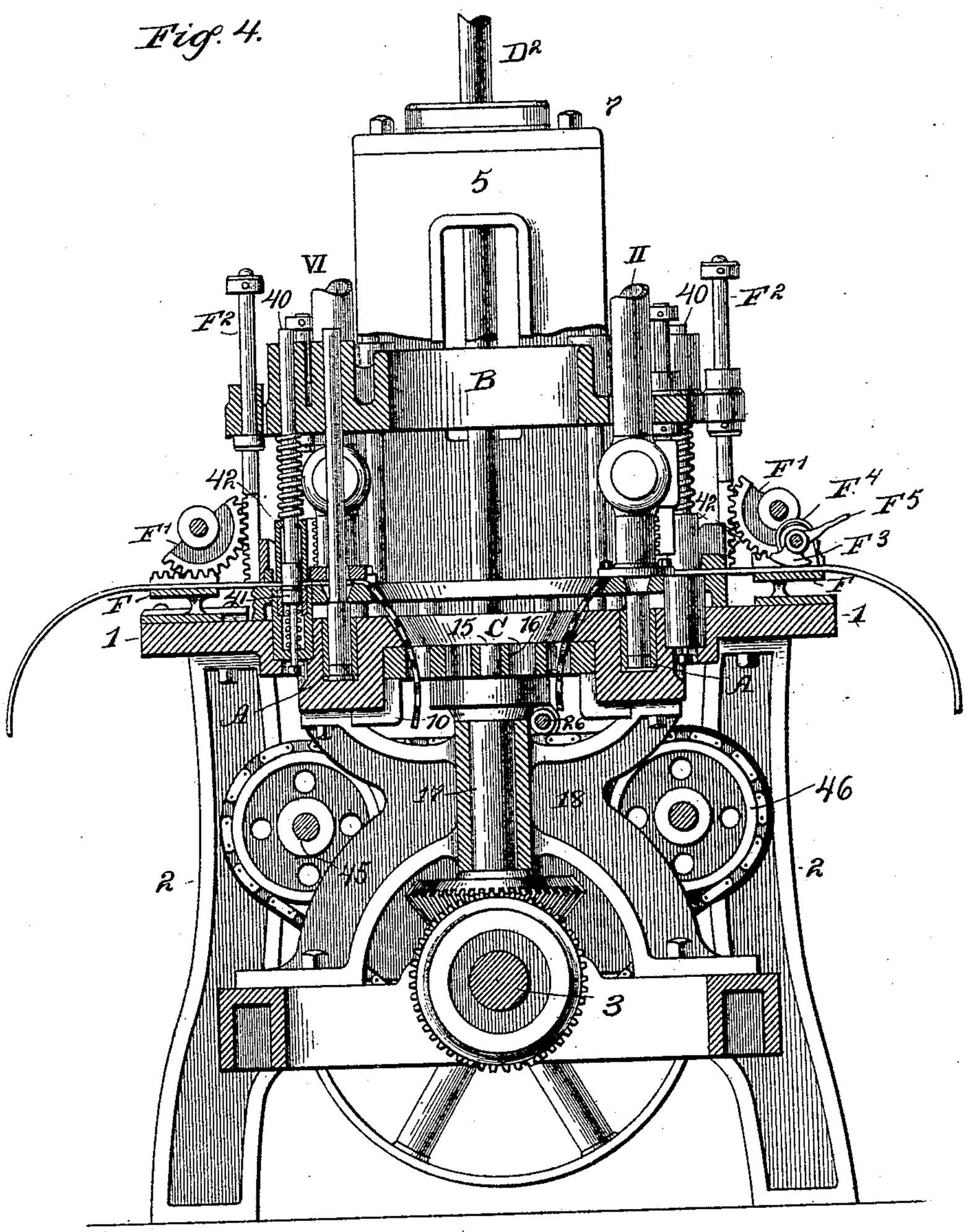

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Fig. 5.

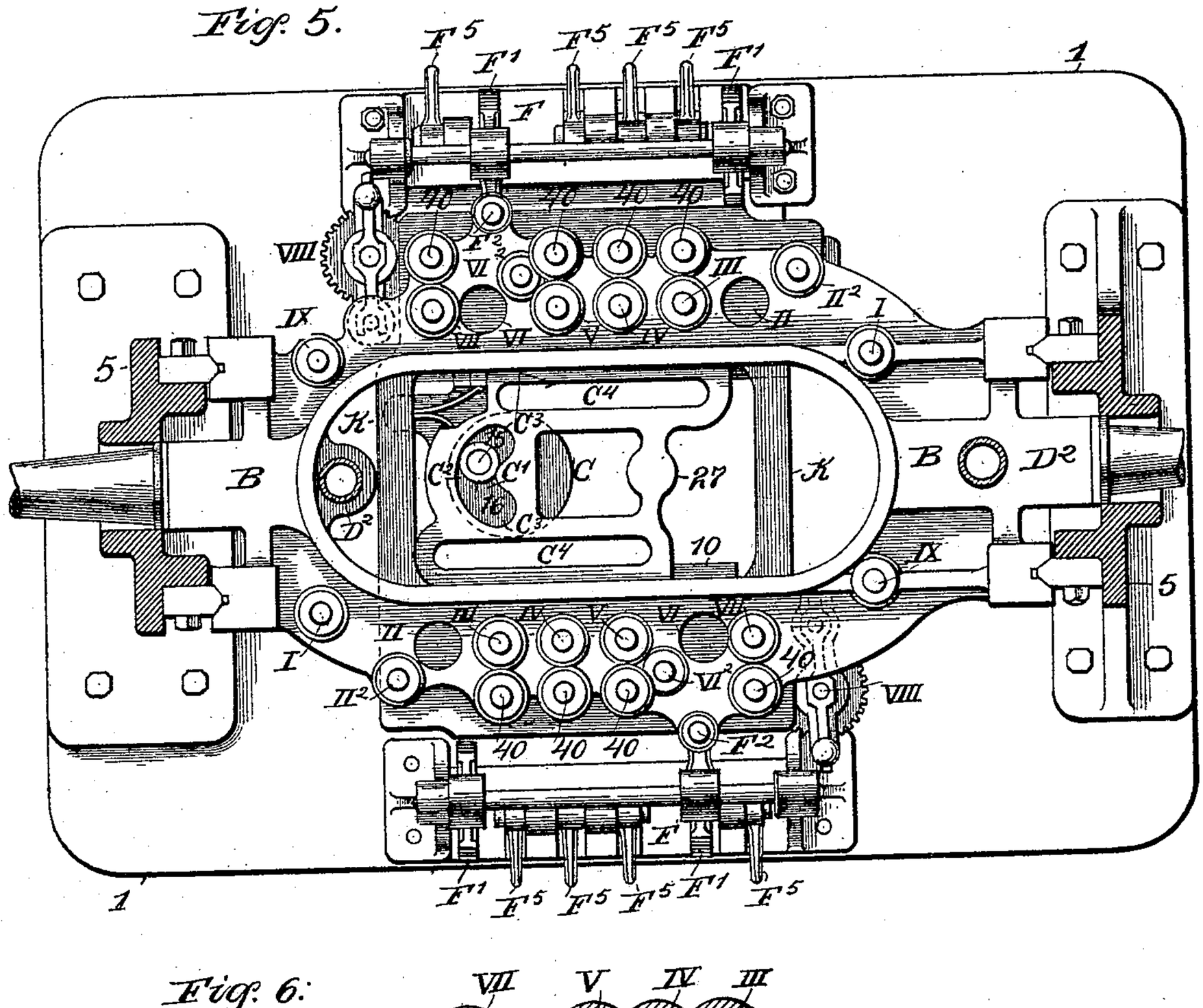
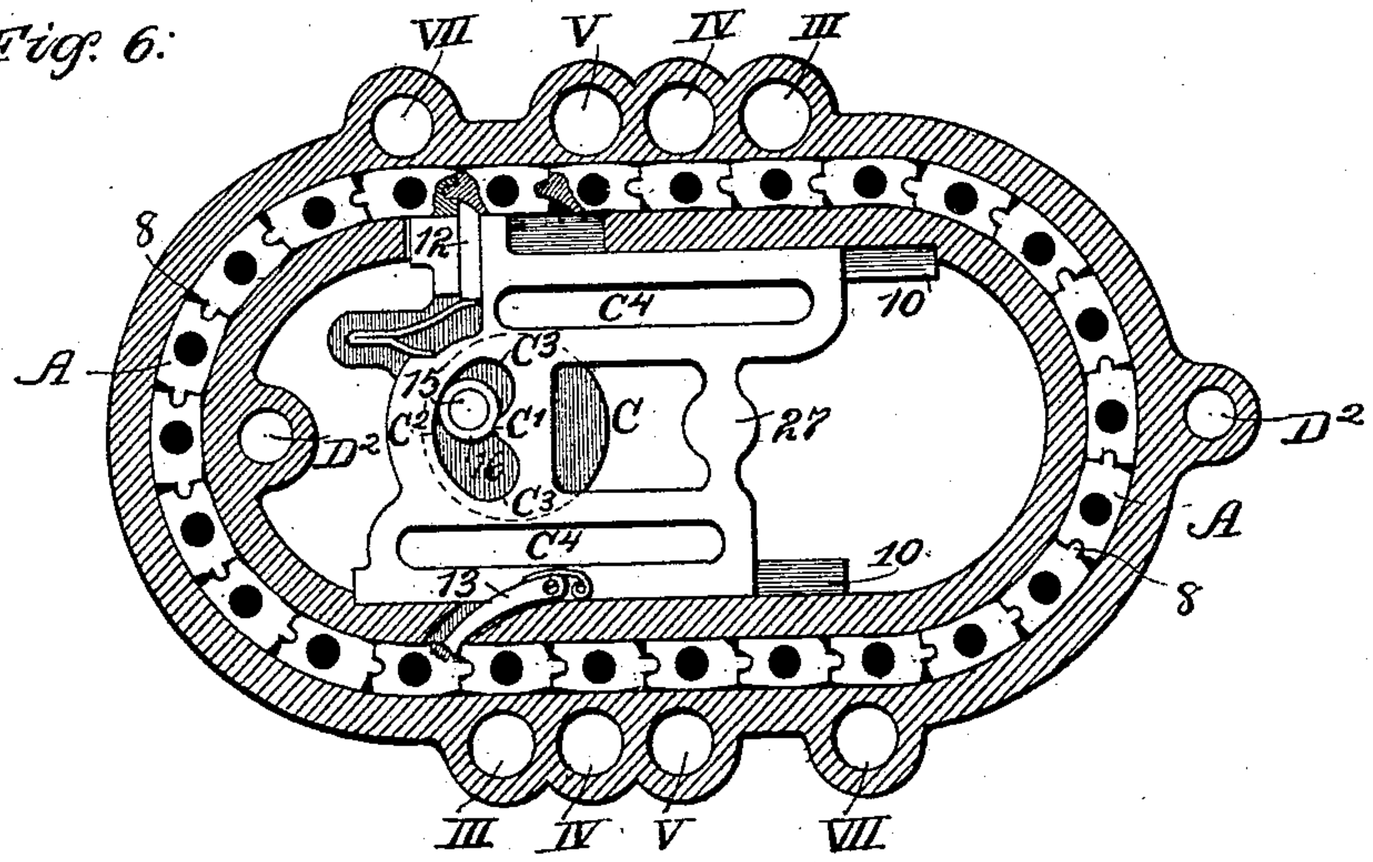


Fig. 6.



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SHELL CARRIER FOR CARTRIDGE LOADING MACHINES.

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Fig. 7.

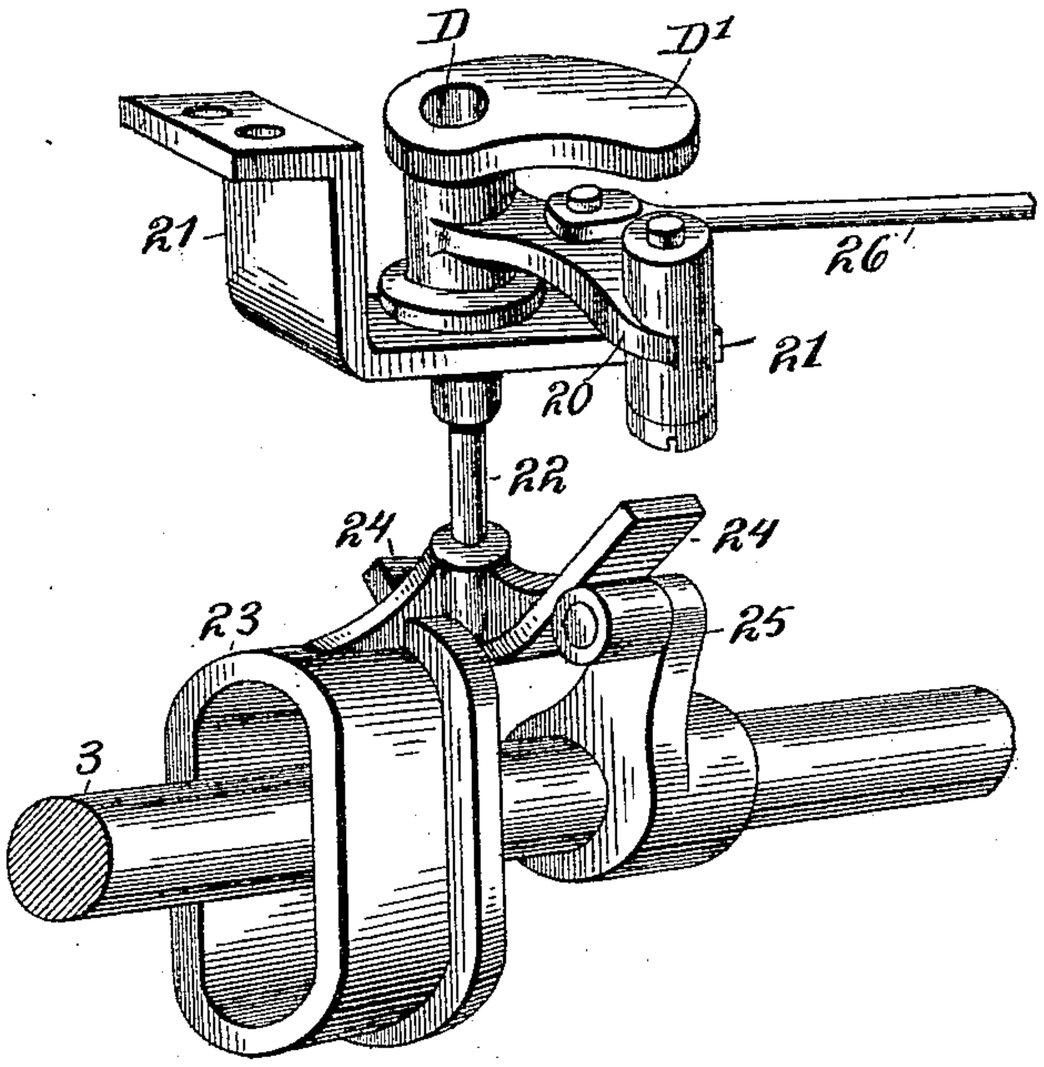

Fig. 8.

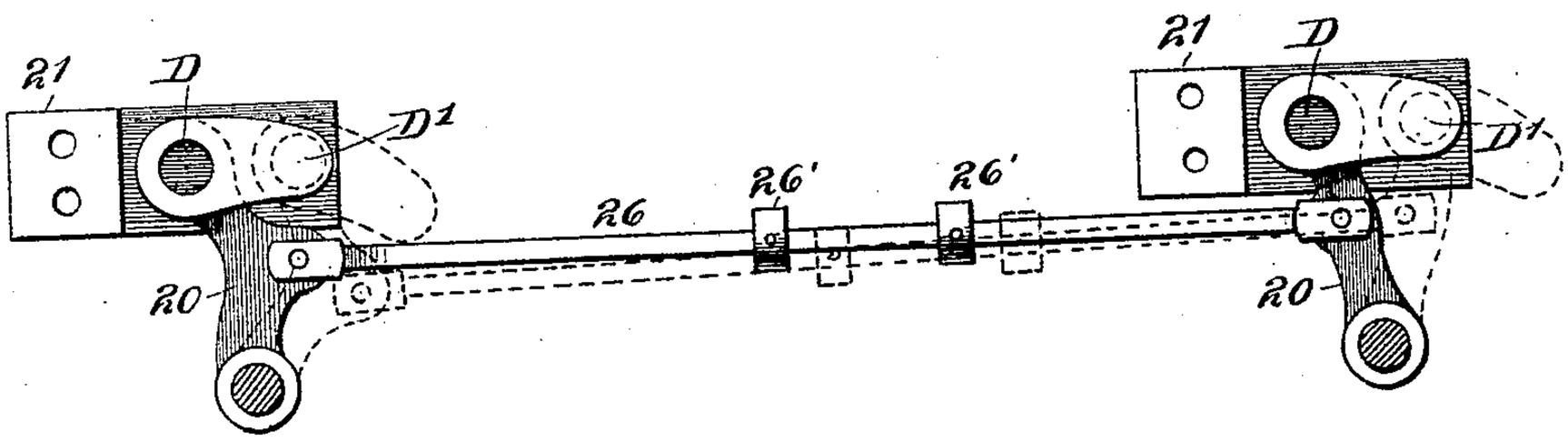

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Fig. 9.

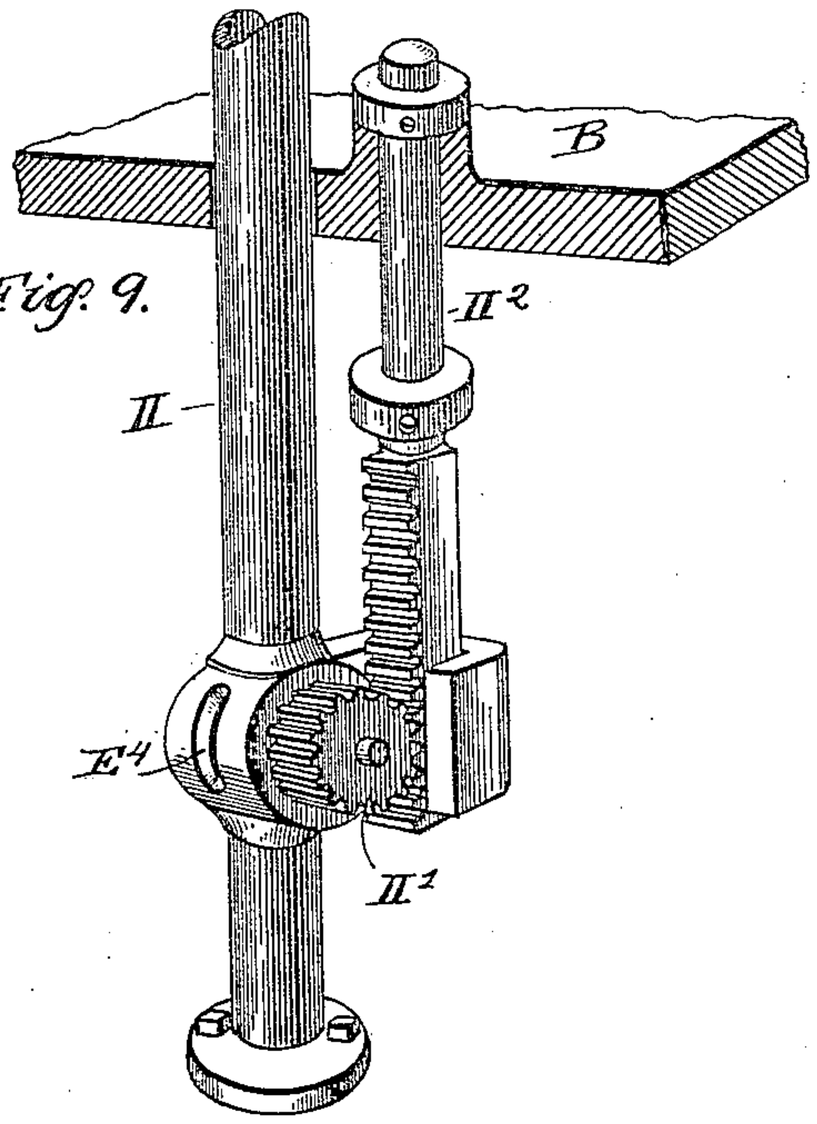


Fig. 9a.

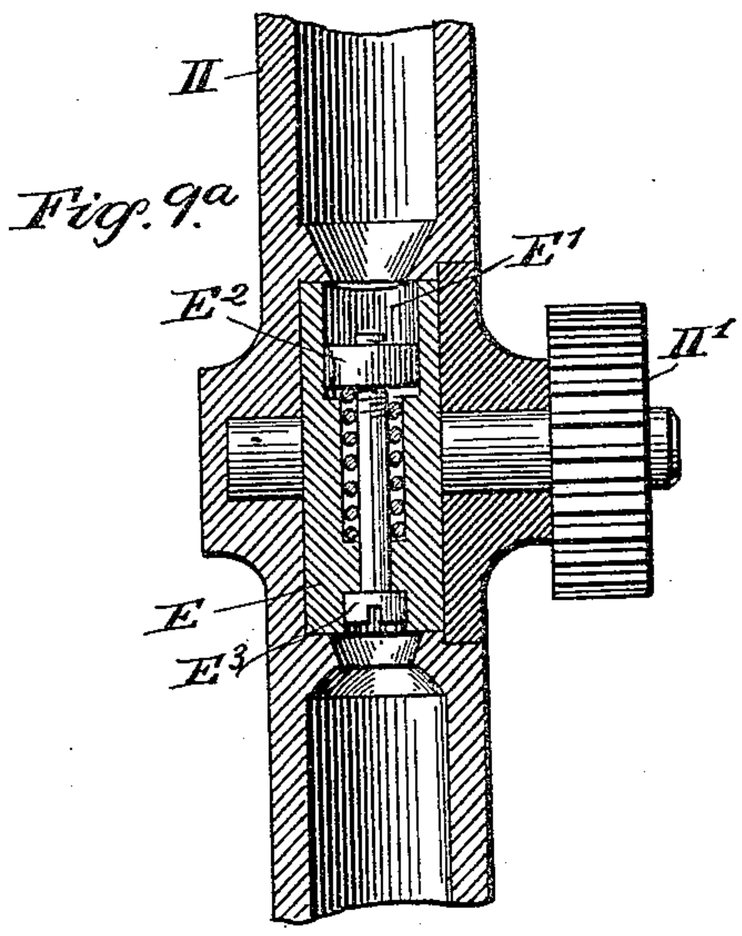
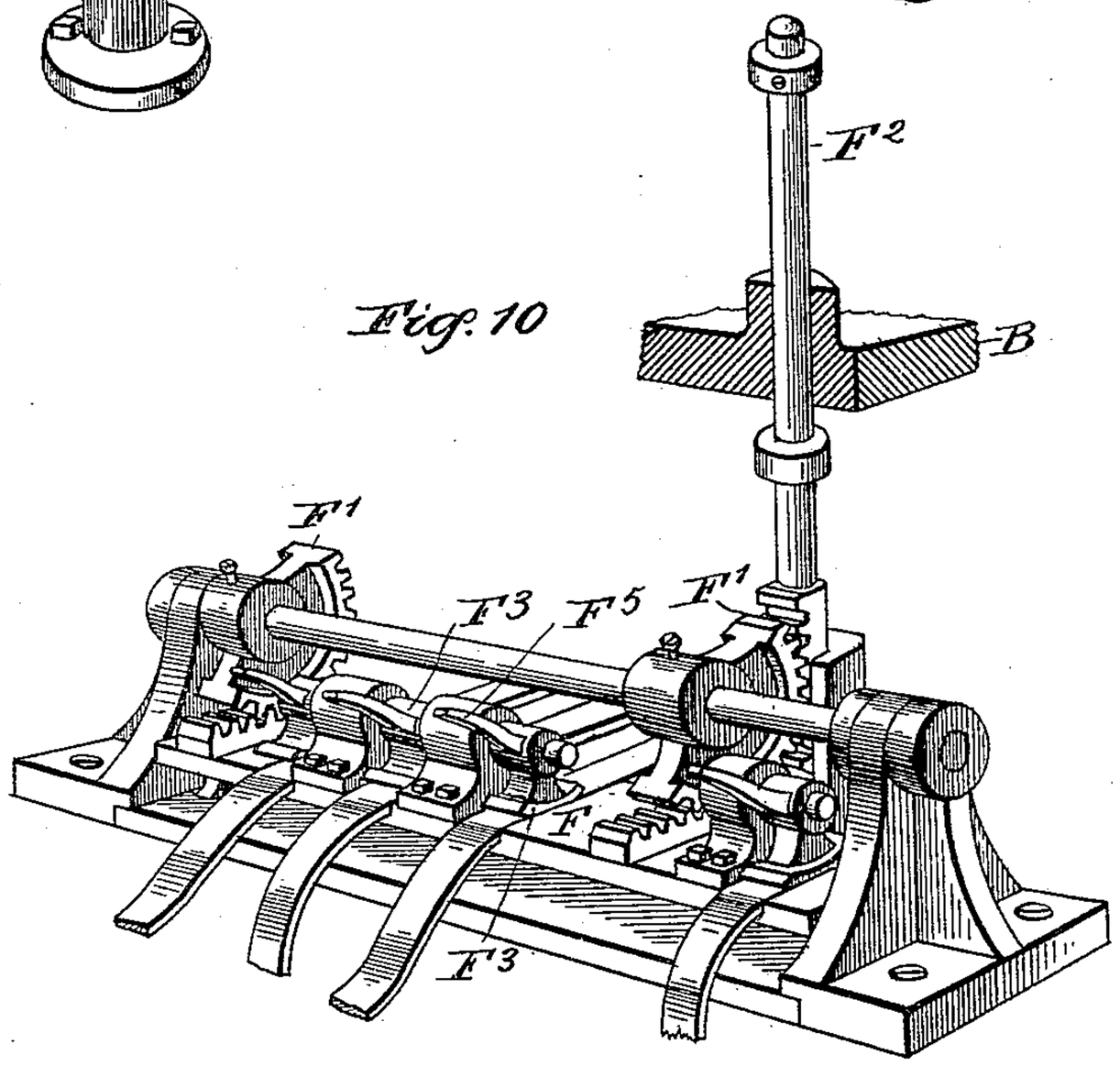


Fig. 10



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SHELL CARRIER FOR CARTRIDGE LOADING MACHINES.

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Fig. 11.

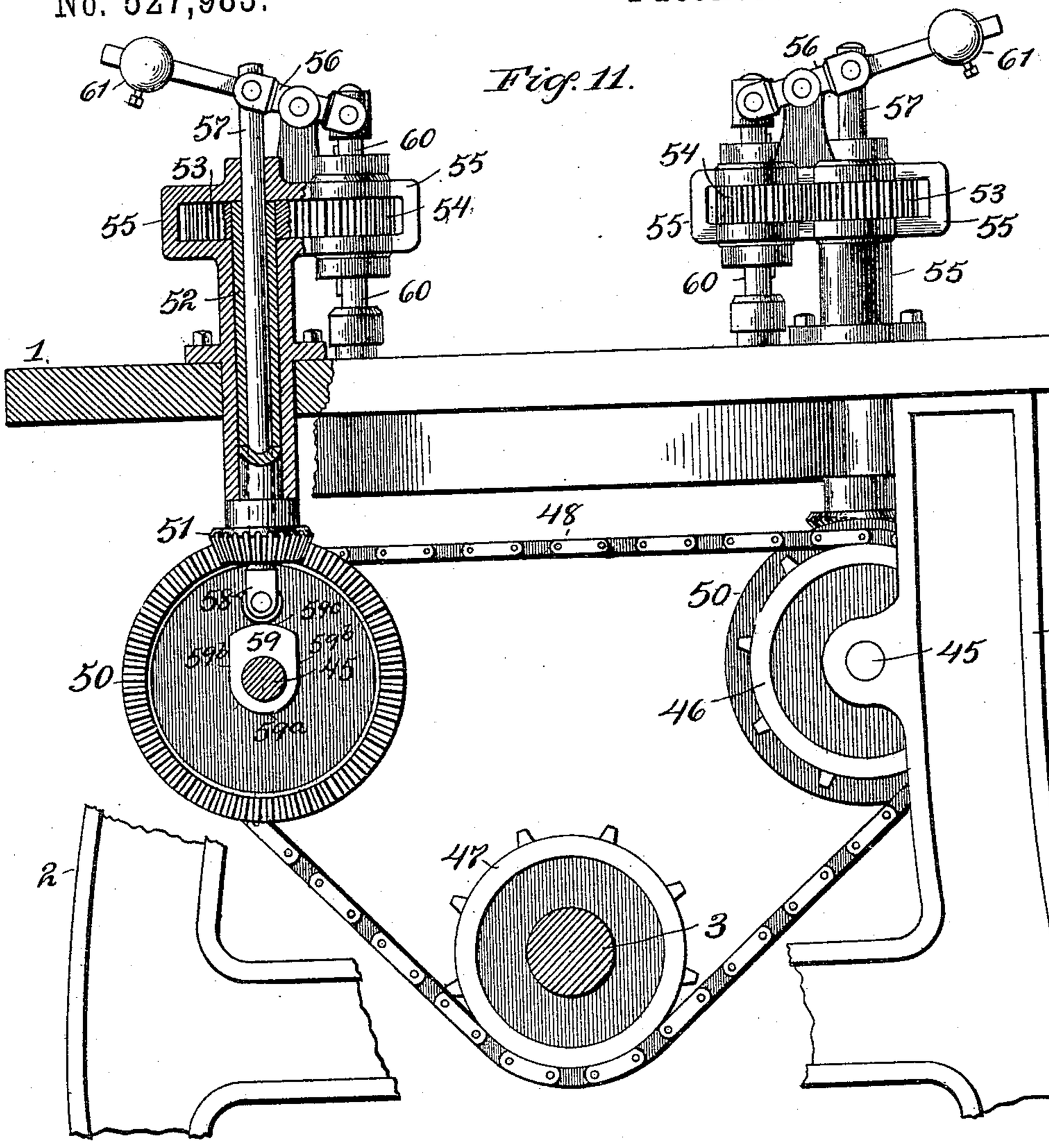
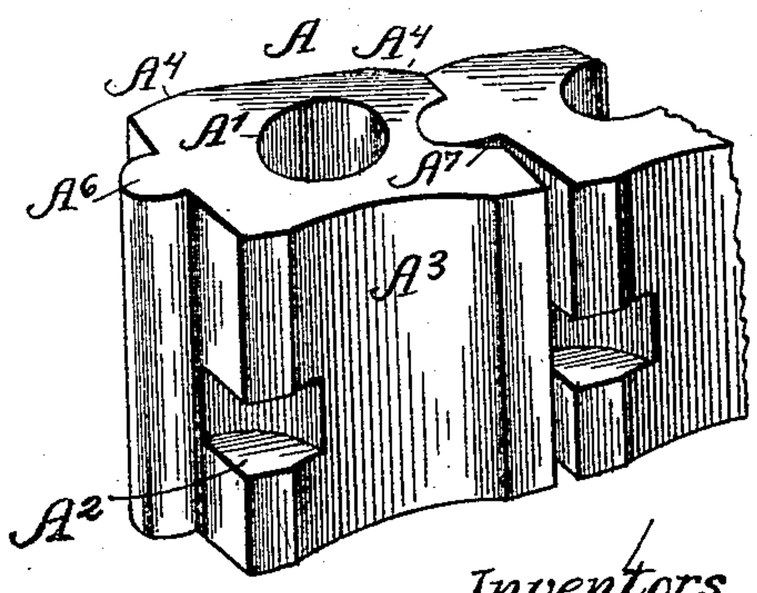


Fig. 12.



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UNITED STATES PATENT OFFICE.

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SHELL-CARRIER FOR CARTRIDGE-LOADING MACHINES.

SPECIFICATION forming part of Letters Patent No. 527,983, dated October 23, 1894.

Application filed March 1, 1894. Serial No. 501,935. (No model.)

To all whom it may concern:

Be it known that we, CHARLES S. HISEY, residing at Aurora, in the county of Dearborn and State of Indiana, and ELLIOTT S. RICE, residing at Chicago, in the county of Cook and State of Illinois, citizens of the United States, have invented certain new and useful Improvements in Cartridge-Loading Machines; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Our invention relates to cartridge loading machines, and to the particular class of said machines which is constructed and adapted to charge or fill shot gun cartridges, and it consists in an improved machine for charging or filling shot gun cartridges, the construction and arrangement of parts of which, and the mutual action of the separate mechanisms thereof in relation to each other, will be hereinafter fully described and particularly pointed out in the claims.

One object of our invention is to provide a machine in which shot gun cartridges can be more rapidly, as well as more safely, charged or filled than has heretofore been accomplished in other machines.

A further object of our invention is to simplify the mechanism for loading cartridges, so that the machine may be more readily understood, easily handled or operated, and thus made less liable to get out of order.

A further object of our invention is to minimize the amount of travel necessary for a single shell to pass under the various loading tools and receive its charge, and, by thus compacting the operative mechanism, to enable the machine bed to be made smaller than that of any machine now in use, so that the entire machine will occupy much less space than is occupied by any of the machines now known, and to distribute the applied power so that there shall be no unequal strain on the several parts of the machine, thus preventing breakage.

A further object of our invention is to provide a cartridge loading machine in which more than one set of loading tools can be advantageously used along the line of travel of the shell carrier, all of the sets of loading tools being operated by a primary power shaft.

A further object of our invention is to provide a machine in which there shall be no lost motion, the several parts being so timed that each part performs its office or function in the manner and at the instant of time required for the continuous operation of the entire machine.

A further object of our invention is to so arrange the timing of the various loading tools that they will have a considerable dwell in each of their operative positions, so that each tool will have an abundance of time to completely perform the function assigned to it.

In the machine which we have devised to accomplish the above stated objects of our invention, the shell carrier consists of a series of independent blocks, which abut one another, and slide in a groove cut in the machine table, and which are given an intermittent forward movement by a reciprocating carriage mounted in guides formed in the machine table, and intermediately operated by the power shaft of the machine. A plurality of sets of loading tools are provided, operating at different points along the line of travel of the shell carrier, and it is thus possible to multiply the capacity of the machine, a plurality of shell feeders being provided, and a plurality of loaded shells being ejected from the machine at each revolution of the primary power shaft.

In our machine, the primary actuating mechanism is all situated below the machine table. The shell placers, which operate to carry the empty shells from the shell feeders to the shell carrier, are also situated below the machine table, and are operated through intermediate mechanism by the primary power shaft, being directly actuated by the reciprocating carriage which imparts an intermittent forward movement to the shell carrier. The shell openers, wad rammers, and ejectors are attached to a reciprocating cross head, which moves in vertical bearings formed in the machine frame, and to which a reciprocating movement is imparted by connecting rods attached to cranks on the main power shaft of the machine. By this cross head are also operated the powder and shot feeding

devices, the operation being effected in such a manner that such devices have a considerable dwell, both when in a position to receive, and when in a position to deliver their charges, thus greatly enhancing the completeness and safety of their operation; and also the wad feeding devices. The crimpers are situated above the machine table, and a rotary motion is imparted to them by mechanism intermediately actuated by the power shaft, and situated in part below the machine table. The operative mechanism is so arranged that a considerable dwell of the rotating crimpers upon the loaded shells is permitted. It is thus possible to completely crimp or finish the shells by the operation of a single crimper upon the same.

Our invention is fully illustrated in the drawings accompanying and forming a part of this application, in which the same reference letters and numerals refer to the same or corresponding parts, and in which—

Figure 1 is a perspective view of the entire machine. Fig. 2 is an end view of the same. Fig. 3 is a central section of the machine, the cross-head being down and the loading tools operating upon the cartridge shells. Fig. 4 is a transverse section of Fig. 3 taken on the line *x x*, and showing particularly the wad feeding devices. Fig. 5 is a top plan view of the machine on the line *y y*, Fig. 3, the primary mechanism being omitted for the sake of simplicity. Fig. 6 is a partial section of Fig. 3 taken on the line *z z*, showing the series of independent abutting blocks, which form the shell carrier, moving in the groove cut in the machine table, and the reciprocating carriage which imparts an intermittent forward movement to said carrier blocks. Fig. 7 is a detail perspective view of one of the shell placers, and of the operative mechanism therefor. Fig. 8 is a plan view of the shell placers, showing their connection, they being represented in full lines in the position they assume, when delivering, and in dotted lines in the position they assume when receiving a shell. Fig. 9 is a detail perspective view of the powder feed, and the operative mechanism therefor. Fig. 9ª is a sectional view of the powder charger, showing the spring pressed piston which forms its bottom surface, and which renders the charge containing recess adjustable. Fig. 10 is a detail perspective view of the wad feeding device. Fig. 11 is an end view of the machine table, showing the two crimpers, and the operative mechanism therefor, one of the crimpers being partly in section. Fig. 12 is a view of the shell carrier block.

Referring to the drawings, 1 represents the machine bed or table. It is rectangular in form, and is supported from the ground by the standards 2. In the upper surface of the table is cut a deep groove, approximately elliptical in form, in which move the shell carrier blocks A, and on both sides of which sets of loading tools operate.

3 is the main power shaft of the machine, and is journaled centrally between the standards of the machine table in cross pieces running between the same.

To the top of the machine table are bolted the upright castings 5, which form bearings for the double cross head B, from which project the shell openers, the wad rammers and the ejectors, and through which also pass rods operating the powder and shot chargers, and the wad feeding devices. The ends of the cross head project through slots formed in the castings 5, and connection is made between said cross head and the central power shaft by the connecting rods 6, which are attached at their lower ends to cranks on the power shaft. The castings 5 are connected together at the top, in order to give them firmness and rigidity, by the tie-plate 7.

The various mechanisms are all actuated directly or indirectly by the main power shaft, but it will be convenient, in the description of the machine, to first observe the construction of the machine bed, and the shell carrier blocks moving in the groove cut in the same, together with the mechanism by which an intermittent forward movement is imparted to said blocks; then to consider the shell placing mechanism, which is located below the machine table; then to follow up the operation of the powder and shot feeding and the wad feeding devices, all of which are above the machine table, and are operated from the cross head; and, finally, to consider the operation of the crimper and the mechanism for actuating the same, which mechanism is in part situated below the machine table.

Having then considered the various portions of the machine in detail, it will be possible to intelligently discuss the operation of the entire machine, and to consider, in connection therewith, the timing of the various mechanisms comprising the same.

I. *Shell carrier blocks and mechanism therefor.*

It has been stated that in the machine table 1 a deep groove is cut which is approximately elliptical. This groove, in fact, has straight sides and rounded ends. It is of a depth sufficient to receive the shell carrier blocks A with their upper ends flush with its surface, but the ends of the cartridge shells, when inserted in such blocks, project above its surface. The interior of the machine table is cut away so as to lighten its weight, and afford a passage for the wad strips through the same. The shell carrier blocks which slide in this groove are not fastened together, but are entirely independent of each other, and merely abut one another. In each of the blocks is formed a central cell A′, adapted to receive and hold a cartridge shell, the end of the shell when in position projecting above the surface of the block, and with a recess A^2 in the front end of its inner face at about the middle portion of its height, into which the pawl may be pressed by means of which the

blocks are given an intermittent forward movement.

The shell carrier blocks are somewhat peculiar in form, in order to enable them to round with ease the curved portions of the groove, and one of the same is shown in detail in Fig. 12. On the inner sides of the blocks a portion of the metal is centrally cut away, so as to form a curved recess A^3, and the two corners A^4 of the outer side are each rounded in a corresponding curve. The reason for thus forming the block will be apparent when its action is considered in passing around the curved portions of the groove in the machine table. When passing along the straight portions of this groove, the bearing surfaces of the blocks are the ends of its inner face, and the middle of its outer face; but when rounding a curve, the bearing surfaces change, now becoming the curved recess A^3 and the curved ends A^4, thus completely reversing the bearing surfaces. To further enable the blocks to pass around the curve, the inner portion of the front face of the block is cut away at an angle, and each block is formed with a curved projection A^6 at one end of the block, and a corresponding recess A^7 at the other end of the block. The recess A^7 should be made on a somewhat larger circle than the projection A^6 to give the necessary play in passing around a curve.

The shell carrier blocks A merely abut one another when sliding in the groove formed in the machine table, and are entirely independent of one another. Any one of them may be removed at any time in case of breakage, or in case a shell becomes jammed in its cell, and another block inserted in its place.

The mechanism for moving forward the shell carrier blocks with an intermittent motion consists of the reciprocating carriage C, and the parts in connection therewith. This carriage is shown in horizontal section in Fig. 3, in transverse section in Fig. 4, and in top plan in Fig. 6. Its manner of support is best shown in Fig. 4. As there shown, it slides between a bottom bearing surface formed by the right angled casting 10, and an upper bearing surface formed by a projecting portion of the machine bed 1, and is so held that its upper surface is level with the top of the side recesses A^2 formed in the carrier blocks. Its general form and operation, however, are best shown in Fig. 6. As there shown, the carriage is arranged to reciprocate a distance equal to the length of a single shell carrier block, so that the spring pressed pawl 12, which slides in a groove cut in one side of its upper surface, will engage with the side recess A^2 formed in each shell carrier block, a portion of the machine bed being cut away to allow for the reciprocation of said spring pressed pawl 12, and the projecting portion of the carriage C which forms a guide therefor. Starting then from the position shown in Fig. 6, when the blocks are in their forward position, it will be seen that as the carriage is moved backward, the spring pressed pawl will be forced out of the recess of the block in which it now is, and at the end of such movement will be forced into a corresponding recess in the next following block; and that on its return forward movement, the carriage C will move the shell carrier blocks forward the length of a single block.

To assist the pawl 12 in locking the blocks in their forward position, a spring pressed pawl 13 is pivoted to the carriage C on the side of such carriage opposite to that where the pawl 12 is situated. This pawl 13, when the carriage is in its forward position, projects through a curved opening formed in the machine bed, and engages with one of the side recesses A^2 in one of the shell carrier blocks A. When the carriage C moves backward, the said pawl is also carried backward, its end moving up the curved recess in the machine table. But when the carriage is in its forward position, this pawl, projecting as it then does into a recess formed in one of the carrier blocks, securely locks the same, and renders impossible any movement of the blocks. If desired, more than one of such locking pawls may be used.

The reciprocating movement of the carriage C is caused by the crank pin 15 moving in the cam groove C′, cut in the front portion of the carriage C. This pin, on which is mounted a roller 16 to minimize the friction, is formed on top of the short shaft 17, which is supported and held in position by the H-shaped casting 18, shown in Fig. 4, and which is provided on its lower end with a miter gear wheel, which meshes with a corresponding miter gear on the main power shaft. Thus at every revolution of the power shaft, the pin 15 describes a complete circle, and the carriage C is caused to move forward and back.

The movement of the pin 15 in the cam slot C′ is somewhat peculiar, and is important in the operation of the machine. This slot is formed of two portions, a central portion C^2, whose radius is the diameter of the circle in which the crank pin 15 moves, and end portions C^3, which extend outward at an angle of forty-five degrees to the radius of the circle. The entire width of the slot is equal to or exceeds the diameter of the circle in which the pin 15 moves. The result of thus forming this cam slot is that the reciprocating carriage dwells or remains stationary for a time in its forward position, as while the crank pin 15 moves through the central portion C^2 of said slot, it has no tendency to move the carriage, and the backward movement of the carriage only commences when the crank pin reaches the portion C^3 of the slot. As the pin now continues its revolution, it carries the carriage back with it until a point is reached diametrically opposite the middle portion of its dwell, when the pin rises into the center of the cam slot, forcing the carriage into its extreme back-

ward position, and then commences its forward movement, carrying the carriage with it. The dwell of the carriage in its forward position, while the pin is passing through the central portion of the cam slot, amounts to two-eighths of a complete revolution of the crank pin, or of the power shaft. The shell carrier blocks further remain stationary while the carriage C is moving backward, so that the said blocks remain stationary during five-eighths of a revolution of the power shaft. It is during this interval of rest that the loading tools operate, and plenty of time is thus furnished for their complete operation. Slots C^4 are formed in the carriage C to lighten the casting, and to provide apertures through which the wad strips may pass.

II. *The shell placing mechanism.*

The shell placer consists of an oscillating arm 20, pivoted to the machine frame, and having an enlarged outer end in which is formed an aperture D, which is sufficiently large to contain a cartridge shell. The top surface of the shell placer bears against the bottom of the machine table, and a bearing is provided for its bottom surface by the bracket 21, which also forms a guide for the reciprocating plunger 22. The shell placer oscillates from a position under the shell feeding tube D^2 to a position under the shell carrier blocks, an outwardly projecting flange D′ preventing the shells from falling from the shell feeding tube during such movement. When in position under the shell carrier, the plunger 22 forces the shell in the shell placer up into position in one of the shell carrier blocks, where it is held by friction, an aperture in the machine bed formed at this point permitting such upward movement. The plunger 22 is secured to the top of a slotted casting 23, which rides upon the power shaft, and which is given a reciprocating movement by the crank 25, secured to the power shaft, which, during a certain stage of the revolution of the shaft, rides under the angled arm 24, attached to said slotted casting, and forces the entire casting up until it passes under the angled arm. The upward movement of the slotted casting 23, and therefore of the plunger 22, takes place during one-eighth of a revolution of the power shaft, and the descent of the plunger occupies about the same time. The time occupied by this movement can, of course, be varied by changing the form of the angled arm 24.

Two shell feeding tubes are provided with this machine, one inside of the line of travel of the shell carrier, and one outside of the same. The two shell placers are connected together by a rod 26. When in one position, both are under the shell feeding tubes; and when in their other position, both are under the shell carrier blocks.

The shell placers are operated and given an intermittent reciprocating movement by means of a lug 27, which projects from the under side of the reciprocating carriage C, encircles the rod 26, and moves the shell placers into their proper positions by striking against collars 26′ formed on said rod. The lug 27 is attached to the reciprocating carriage C. It therefore remains stationary during the dwell of said carriage in its forward movement, which amounts to two-eighths of a revolution of the power shaft. When the carriage C is stationary, the shell placers are under the shell carrier. They have a further dwell in this position while the lug 27 is moving along the rod 26 previous to striking one of the collars 26′ formed on the same, this additional dwell amounting to one-eighth of a revolution of the power shaft. The total dwell of the shell placers under the shell carrier thus amounts to three-eighths of a revolution of the power shaft. Since the plunger 22 forces the shells into the shell carrier blocks and recedes again during two-eighths of a revolution of the power shaft, the dwell here is abundantly sufficient to give the said plunger time to act.

The dwell of the shell placers under the shell feeding tubes amounts to one-eighth of a revolution of the power shaft. This affords plenty of time for a shell to drop into a shell placer.

The movement of the shell placer is positive and exact. The dwell afforded in its two operative positions is sufficient to render certain the completion of the function assigned to it.

III. *The powder and shot feeding mechanism.*

After being placed in the shell carrier blocks, the shells next pass into the shell openers I, but as these consist merely of straight rods, firmly secured to the cross head, and having cone shaped lower ends, whose function consists in opening the ends of the shells so that they may receive their charges more easily, attention is next called to the powder and shot feeding devices, which are situated at suitable points along the line of travel of the shells, and are precisely similar in construction. Previous to considering them, attention is first called to the supplemental table K. This table extends lengthwise of the machine sufficiently far to provide bases of support for the powder and shot feeding tubes, II and VI, respectively, which extend vertically upward and directly over the line of travel of the shell carrier; and also to afford guides for the wad rammers III, IV, V and VII, respectively, in their downward movement to punch the wads, which are fed horizontally through apertures in the supplemental table, into the shells. The supplemental table is cut away over the interior of the machine to afford passage for the wad strips, which pass through such openings and the opening in the reciprocating carriage C out of the machine.

A short distance above the supplemental table, the powder and shot feeding tubes II

and VI are rounded out to receive the revoluble chargers E, in the surfaces of which recesses or pockets E′ are cut in which the charges are received. The charge containing recesses or pockets E′ are made adjustable, so as to contain varying charges of powder and shot, by having their lower surfaces formed by the spring pressed pistons E^2, the position of which is determined by the philister headed screws E^3, which pass from opposite sides of the revoluble chargers through screw threaded openings in the pistons.

Mounted on the pins which afford bearings for the revoluble chargers E, are gear wheels II′ and VI′. With these gear wheels mesh the toothed portions of the rods II^2 and VI^2, which pass through apertures in the cross head B, and are provided with collars, so that the cross head, in moving up and down, after passing the stage between the two collars, will strike one of the collars and thus move the rods up or down, thereby rotating the chargers E between the two positions they assume, namely, (first) that in which the charge containing recesses E′ are in position to receive charges, and (second) that in which they are ready to discharge their charges. The action thus afforded is positive and certain.

Slots E^4 are cut in the rounded out portions of the powder and shot feeding tubes on the side opposite to that of the rotation of the charge containing recesses, by means of which access to the screws which regulate the contents of such recesses may be had. The simplicity of this mechanism is such that there is no danger of its getting out of order, and the dwell afforded while the cross head is passing between the collars on the actuating rods insures the proper receiving and delivering of the charges. The dwell at each of these positions amounts to about two-eighths of a complete reciprocation of the cross head, or one revolution of the power shaft.

IV. *The wad feeding devices.*

After receiving a charge of powder, each shell receives a varying number of wads upon the powder, then its charge of shot, and then a further wad upon the shot, before it is crimped and finally ejected from the machine. The wad feeding, wad cutting, and wad inserting devices are, however, all similar, and they may be described together. In our machine, as is customary in shot loading machines, we use three wads upon the powder which are forced into the shells by the rammers III, IV and V and one wad upon the shot, which is forced upon the same by the rammer VII though this number may be varied if desired.

In this machine, the wad cutting and inserting mechanism is the same as that shown in United States Letters Patent No. 505,423, granted to Charles S. Hisey on September 19, 1893; that is to say, the cutting of the wads is effected by a mandrel or punch 40, attached to the cross head of the machine, which forces the wad out of the strip against the action of the spring pressed plunger 41, which acts, as soon as the wad cutting punch has risen, to replace the cut out wad in the wad strip, so that it may be fed forward, by the intermittent movements of the feeding mechanism, through an aperture cut in the supplemental table, over the shells, and may then be placed in the shells by the wad rammers. The feeding, as before, is intermittent, and takes place in a plane at right angles to the movement of the shell carrier at the point where the wads are inserted; and, as before, the various punches acting on each wad strip are arranged in a right line. Surrounding the wad cutter 40 is a spring pressed collar 42, as before, but the collar in this case normally projects below the wad cutter, striking the wad strip before the cutter does.

The novelty of the wad feeding mechanism consists in the feeding mechanism itself, independent of the cutters and plungers which act upon the strips.

In this machine, the wad strips are all fed through grooves cut in the top surface of the reciprocating carriage F. This carriage extends lengthwise of the machine for a distance sufficient to receive and guide all of the wad strips, and is caused to reciprocate crosswise of the machine by means of the suitably journaled segment gear F′, which meshes with teeth formed on the top of the wad feeding carriage, and which is actuated by the toothed rods F^2. These rods pass through the cross head, and, as in the case of the rods operating the powder and shot chargers, are provided with collars, against which the cross head strikes to impart movement to the carriage F. By this construction, a considerable dwell in the movement of the wad strips is permitted, and the forward movement of the same, which takes place during the upward movement of the cross head B, may be made to take place with as short a movement of said cross head as is desirable. Two segment gears are provided with each carriage, one operating at each end of the same, although only one of the gears is directly actuated from the cross head. It is preferable to use two gears in order that perfect uniformity of movement may be secured.

The wad strips are held in grooves formed in the reciprocating carriage F by means of suitably journaled friction clamps F^3, one of which is provided for each wad strip, and which in the construction shown, are pressed downward against the wad strip by suitably formed springs F^4 (omitted in Fig. 10 in order to show other parts), though this downward pressure may be accomplished by other means if desired. Handles F^5 are provided for each clamp by means of which they may be moved free of the strips. The formation

of the clamps in the present case is such that, when moved free of the strips, they move forward as well as upward.

The operation of this portion of our machine is as follows:—When the strips are to be inserted, the clamps are raised and the strips are inserted in their proper places. The operation of the machine is then commenced. In this machine, during the downward movement of the cross head the reciprocating carriage is caused to move back to get a fresh hold upon the wad strips, and during the upward movement of the cross head, the wad strips are fed forward. When the cross head moves down, the spring pressed collar 42, which surrounds the wad cutting punch 40 and normally projects below the end of the same, first strikes the wad strip and firmly holds the same. As the downward movement of the cross head continues, the toothed rod F^2 is caused to move downward, and thus the reciprocating carriage F is caused to move backward; but as when this backward movement takes place the wad strips are firmly held by the collars 42, the said carriage cannot carry the wad strips back with it, but the hold of the clamps upon the wad strips F^3 is broken. The wad strips therefore remain stationary during the backward movement of the reciprocating carriage, and the reciprocating carriage is permitted to take a fresh hold upon the strips. When the reciprocating cross head moves up, after the moment of dwell, the reciprocating carriage is moved forward, and thus the wad strips are fed into the machine.

In order that the operation may take place as thus described, it is necessary that the collar 42 strike the wad strip before the carriage F is actuated to move backward, and that the pressure thus afforded may be sufficient to overcome the friction of the clamps F^3. This pressure need not, however, be very strong, as it does not require much force to break the hold of the clamps, due to their eccentric movement. The wad feed here provided is very positive, and the simplification of the wad feed over all previous mechanisms for accomplishing this purpose, due to running all the strips through grooves in the same carriage, is very great. An entire uniformity of movement is thus made possible. All trouble arising from the tendency of the wad strips to run to one side is prevented by the friction clamps. After the wads are rammed out of the wad strips, the strips pass, as before stated, through the middle of the supplemental table, and then downward out of the machine. Three of the wad strips, those from which the wads which were inserted over the powder were taken, pass through the oblong slots C^4 formed in the reciprocating carriage C. The other wad strips pass out at either end of this carriage.

V. *The crimping mechanism.*

After receiving its powder, wads, shot and wad, the shell is next crimped before being ejected from the machine. In the drawings, the entire crimping device as it appears above the machine table is designated by the character VIII, and the ejector, which forces the shells out of the machine through the delivery tubes L, is represented by the character IX. The ejector need not be again referred to, as its operation is entirely manifest. It is simply a rod attached to the cross head, and acts to push the loaded shells out of the cells formed in the shell carrier blocks.

The crimping mechanism deserves further notice.

The crimping mechanism proper is situated on top of the machine table, and is actuated intermediately by the power shaft by means of suitably arranged gears. The ratio of these gears may be so chosen as to give the crimper head any desired rapidity of movement, but in our machine it is not necessary that the crimper head have as rapid a movement as it must have for satisfactory operation in the existing machines, due to the fact that the crimper heads have a considerable dwell upon the heads of the shells, sufficient to enable them to completely crimp and finish the same.

As will be seen by reference to Fig. 5, the two crimping devices are situated at opposite ends of the machine, and at opposite sides of the same, but in Fig. 11, for convenience of illustration, we have shown both crimpers and the operative mechanism therefor, the remaining portions of the machine being eliminated from the drawings. In considering the action of the crimpers, attention need only be directed to Figs. 3 and 11.

In lugs projecting interiorly from the standards 2 are journaled shafts 45, one on each side of the machine, on which are mounted the sprocket wheels 46. On the power shaft 3 is mounted a corresponding sprocket wheel 47, and a sprocket chain 48, passing around the sprocket wheels, revolves the shafts 45. On each of the shafts 45, but on opposite ends of the same, is mounted a beveled gear wheel 50, which meshes with a gear wheel 51, attached to the end of a hollow shaft 52. On the upper end of the shaft 52 is mounted a gear wheel 53, which meshes with a gear wheel 54, by means of which shaft the rod to which the crimper head is attached is rotated. The support for the hollow shaft 52 is afforded by the casting 55, which is bolted to the machine table, and the upper end of which is **8**-shaped to afford proper bearing surfaces and support for the gear wheels 53 and 54. On standards projecting from the top of this **8**-shaped portion of the casting 55 is pivoted the lever 56. To one end of this lever is attached the rod 57, which passes down through the hollow shaft 52, and has journaled on its lower end the roller 58, which rides upon the cam-shaped piece 59, which cam is integral with the gear wheel 50, and is formed with a semi-cylindrical portion 59^a,

straight projecting sides 59b, and a curved top surface 59c. On the other end of the pivoted lever 56 is attached the rod 60, on the lower end of which is attached the crimper head, the connection here being such as to allow the free rotation of said rod. The rod 60 is formed with a feather 60', which engages with a vertical recess formed in the center of the gear wheel 54. In this manner the rod 60 is caused to rotate at a speed corresponding to that of the wheel 54, and is allowed a free up and down movement. An outward extension is formed on the lever 56, on which is adjustably mounted a weight 61, which is sufficient to counter balance the weight of the crimper head and attached rod.

The operation of the crimper is as follows:—During a portion of the revolution of the power shaft, the roller 58 rests upon the semi-cylindrical portion 59a of the cam 59, and when in this position, which amounts to half a revolution of the power shaft, the rod 57 drops, and raises the crimper head from the line of the shells, this movement being accelerated and made certain by the counter balancing weight 61. When, however, the roller begins to ride up on one of the straight faces of the cam, the rod 57 is raised, and the rod 60 correspondingly depressed, until, when the roller reaches the curved portion of cam 59, the rod 60 is fully depressed and the crimper is in active operation. While the roller 58 rides over the curved portion of the cam 59, the crimper head dwells upon a shell, the curve of this part of the cam being just sufficient to depress the crimper sufficiently to perfect the crimping of the shell. The dwell of the crimper upon the shell lasts for approximately two-eighths of a revolution of the power shaft, and may be increased or diminished by suitably forming the cam. After passing the dwell of the cam, the roller 58, riding upon the straight portion of the cam 59 descends and lifts the crimper head from the line of the shells.

In the construction shown in the drawings, the ratio chosen for the gear wheels is such that the crimper head revolves eight times as fast as the power shaft. This ratio may be varied if desired.

VI. *The operation of the machine.*

Having considered the construction and operation of the various mechanisms which make up our machine, it remains to consider the operation of the machine as a whole.

The dwell of the shell placer under the shell feeding tubes amounts to one-eighth of a complete revolution of the power shaft. It is during this dwell that a cartridge shell drops into the shell placer. The shell placer is then moved under the shell carrier, and during the dwell there of three-eighths of a revolution of the power shaft, the reciprocating plunger 22 forces a shell into the carrier block and retracts again. The shell is then carried forward under the shell opener, and then passes on to receive its charge of powder. The powder charger, having dwelt two-eighths of a revolution of the power shaft in a position to receive its charge, is revolved during the dwell of the shell under the powder feeding tubes, and discharges its charge of powder into the shell. Its dwell in this discharging position, is of the same duration as that in its charging position, namely, two-eighths of a revolution of the power shaft. It must be remembered that the dwell of the shells under each of the loading tools amounts to five-eighths of a revolution of the power shaft. It is amply sufficient, therefore, to enable it to receive its charge of powder. The shell is next carried under the wad rammers to receive the wads which are to be placed over the powder. These wads may be either of paper, or of felt, or of both. While the wad rammers descend to force the wads into the shells, other wads are cut out, and the wad feeding carriages F move backward to get a new hold on the wad strips, so that at the next movement of the cross head, the wad strips are carried forward, and new wads are ready to be forced into the shells. The shell next receives its charge of shot. In loading shells with large sized shot, it might happen that one of the shot would be caught between the edge of a charge containing recess and the side of the shot feeding tube. In the construction of chargers shown, however, no difficulty would arise therefrom, for should a shot become so lodged, it would force the spring pressed piston, which forms the bottom of the charge containing recess, down, and mutilation of the shot and locking of the charger would thus be avoided. After receiving a final wad on the shot charge, the shell is next crimped, the crimping head remaining on the shell during half of a revolution of the power shaft, and is finally ejected, a loaded cartridge, from the machine. In our machine two loaded cartridges are ejected from the machine at each revolution of the power shaft, and two empty shells are inserted to begin their line of travel under the loading tools.

The dwells of the various operative mechanisms of the machine may be varied by adjustment of the parts, and it is not essential that the dwells occupy the precise intervals of time which have been herein described.

We do not herein claim the shell carrier actuating mechanism, the powder or shot feeding mechanism, the crimper, the wad feeding mechanism, or the shell placer, as these are claimed in separate applications filed by Charles S. Hisey, whose dates and serial numbers are respectively, March 12, 1894, No. 503,333; March 27, 1894, No. 505,244; April 3, 1894, No. 505,144; April 13, 1894, No. 507,444; and March 26, 1894, No. 505,177.

What we do claim, and desire to secure by Letters Patent, is—

1. In a cartridge loading machine, the combination with a shell carrier consisting of a

series of independent abutting sliding blocks having cells formed therein adapted to receive and hold cartridge shel's, of means for imparting an intermittent forward movement to the same, substantially as described.

2. In a cartridge loading machine, the combination with a shell carrier consisting of a series of independent abutting sliding blocks moving in a returning line on a horizontal plane, of means for imparting an intermittent forward movement to the same, substantially as described.

3. In a cartridge loading machine, the combination with a machine table having a groove therein, of a shell carrier consisting of a series of independent abutting blocks sliding in said groove, and means for imparting an intermittent forward movement to said carrier, substantially as described.

4. In a cartridge loading machine, the combination with a machine table having a continuous groove therein, of a shell carrier consisting of a series of independent abutting blocks sliding in said groove, and means for imparting an intermittent forward movement to said carrier, substantially as described.

5. In a cartridge loading machine, the combination with a machine table having a groove cut therein with straight sides and rounded ends, of a shell carrier consisting of a series of independent abutting blocks sliding in said groove, and means for imparting an intermittent forward movement to said carrier, substantially as described.

6. In a cartridge loading machine, the combination with a machine table having a continuous groove cut therein, of a shell carrier consisting of a series of independent abutting operatively engaging blocks moving in said groove, whereby each block assists the following block in passing around the curved portions of the groove, and means for imparting an intermittent forward movement to said carrier, substantially as described.

7. In a cartridge loading machine, the combination with a machine table having a continuous groove cut therein, of a shell carrier consisting of a series of independent abutting blocks sliding in said groove, each of said blocks being formed with a projection at one end, and a corresponding recess at the other end, whereby the blocks operatively-engage each other, and means for imparting an intermittent forward movement to said carrier, substantially as described.

8. In a cartridge loading machine, the combination with a machine table having a groove cut therein, of a shell carrier consisting of a series of independent abutting blocks sliding in said groove, and means operated by the main power shaft of the machine for imparting an intermittent forward movement to the carrier, substantially as described.

9. In a cartridge loading machine, the combination with a machine table having a groove cut therein, of a shell carrier consisting of a series of independent abutting blocks moving in said groove, the said blocks having recesses cut in their inner faces, a reciprocating carriage, provided with a spring pressed pawl for engaging with said recesses to move the carriage forward, and having a cam slot formed therein which permits a dwell of the carriage in its forward movement, and a crank pin operated by the power shaft for working in said slot and reciprocating the carriage, substantially as described.

10. In a cartridge loading machine, the combination with a machine table having a groove cut therein, of a shell carrier consisting of a series of independent abutting blocks moving in said groove, the said blocks having recesses cut in their inner faces, a reciprocating carriage, provided with a spring pressed pawl for engaging with said recesses to move the carriage forward, a spring pressed pawl for engaging with said recesses to lock the carrier in its forward position, and having a cam slot formed therein which permits a dwell of the carriage in its forward movement, and a crank pin, operated by the power shaft, working in said slot and reciprocating the carriage, substantially as described.

11. In a cartridge loading machine, two or more abutting, independent, disconnected carrier blocks, each of which is formed with a shell-receiving cell, and engaging means between the blocks, whereby each block assists the movement of the following block, and yet is separately removable, substantially as described.

12. In a cartridge loading machine, a shell carrier block having a shell-receiving cell formed therein, and having a curved recess formed in one side and the corners of the other side rounded, substantially as described.

13. In a cartridge loading machine, a shell carrier block having formed therein a shell-receiving cell, and having a recess formed therein whereby the block may be engaged and moved, substantially as described.

14. In a cartridge loading machine, a shell carrier block having formed therein a shell-receiving cell, having a curved recess formed on its inner side, having the corners of the outer side rounded, and having the inner portion of the front face of the block cut away at an angle, substantially as described.

15. In a cartridge loading machine, two or more independent, abutting shell carrier blocks, each block having a shell-receiving cell formed therein, having a curved recess formed on its inner side, having the corners of the outer side rounded, and having the inner portion of the front face of the block cut away at an angle, and suitable engaging means between the blocks, substantially as described.

16. In a cartridge loading machine, a shell carrier block having formed therein a shell-receiving cell, having a curved recess formed on one side, having the corners of the other

side rounded, and having a slanting recess cut in the front end of one of its sides, substantially as described.

17. In a cartridge loading machine, two or more independent, abutting shell carrier blocks, each block having a shell-receiving cell formed therein, having a curved recess formed on one side, having the corners of the other side rounded, and having a recess formed therein whereby the block may be engaged and moved, and suitable engaging means between the blocks, substantially as described.

18. In a cartridge loading machine, two or more independent, abutting, shell carrier blocks, each block having a shell-receiving cell formed therein, having a curved recess formed on its inner side, having the corners of the outer side rounded, having the inner portion of the front face of the block cut away at an angle, and having a recess formed therein whereby the block can be engaged and moved, and suitable engaging means between the blocks, substantially as described.

19. In a cartridge loading machine, a shell carrier block having the shell-receiving cell A′ formed therein, having a slanting recess A^2 formed at its front and on its inner side, having a curved recess A^3 formed on its inner side, having the corners A^4 of the outer side rounded, having the projection A^6 formed at one end, and having the corresponding recess A^7 formed at its other end, substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

CHARLES S. HISEY.
ELLIOTT S. RICE.

Witnesses:
J. LOWE WHITE,
JOSEPH D. WOOD.