No. 806,461. PATENTED DEC. 5, 1905.

P. BUTLER.

# CARTRIDGE SHELL GAGING MACHINE.

APPLICATION FILED APR. 26, 1897.

2 SHEETS—SHEET 1.

Fig. 1.

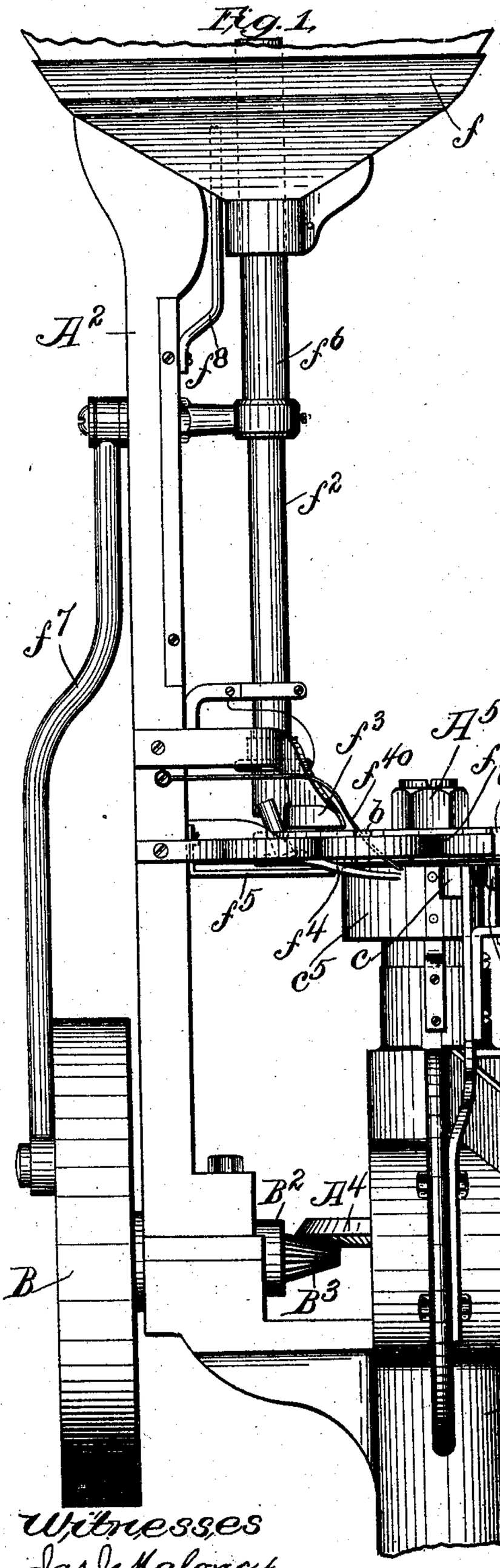
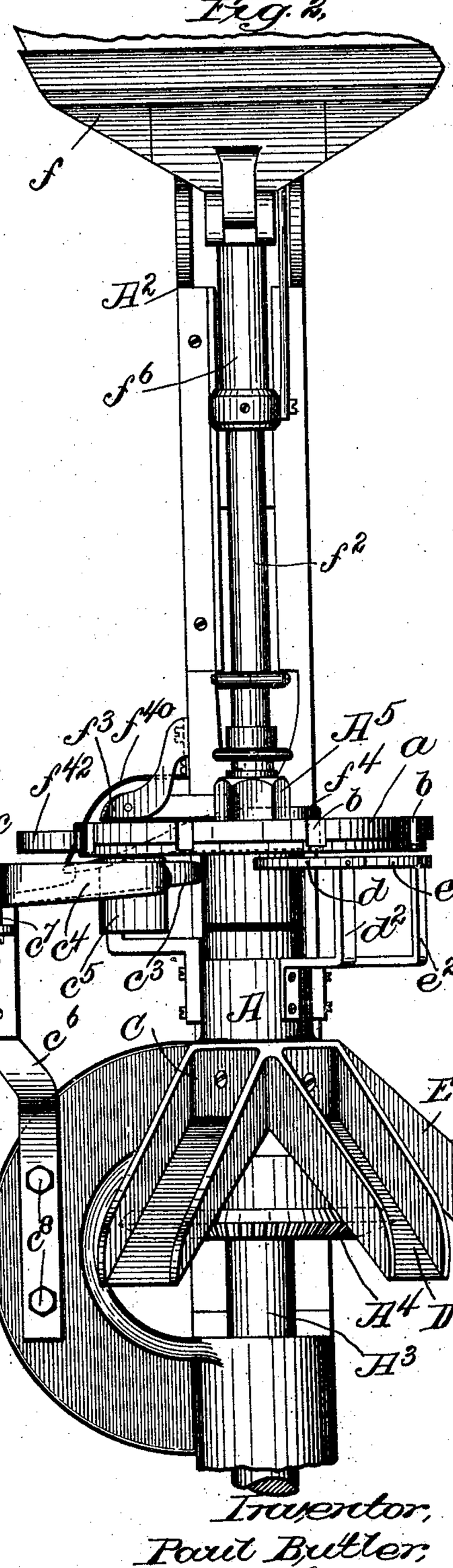



Fig. 2.

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2 SHEETS—SHEET 2.

Fig. 3,

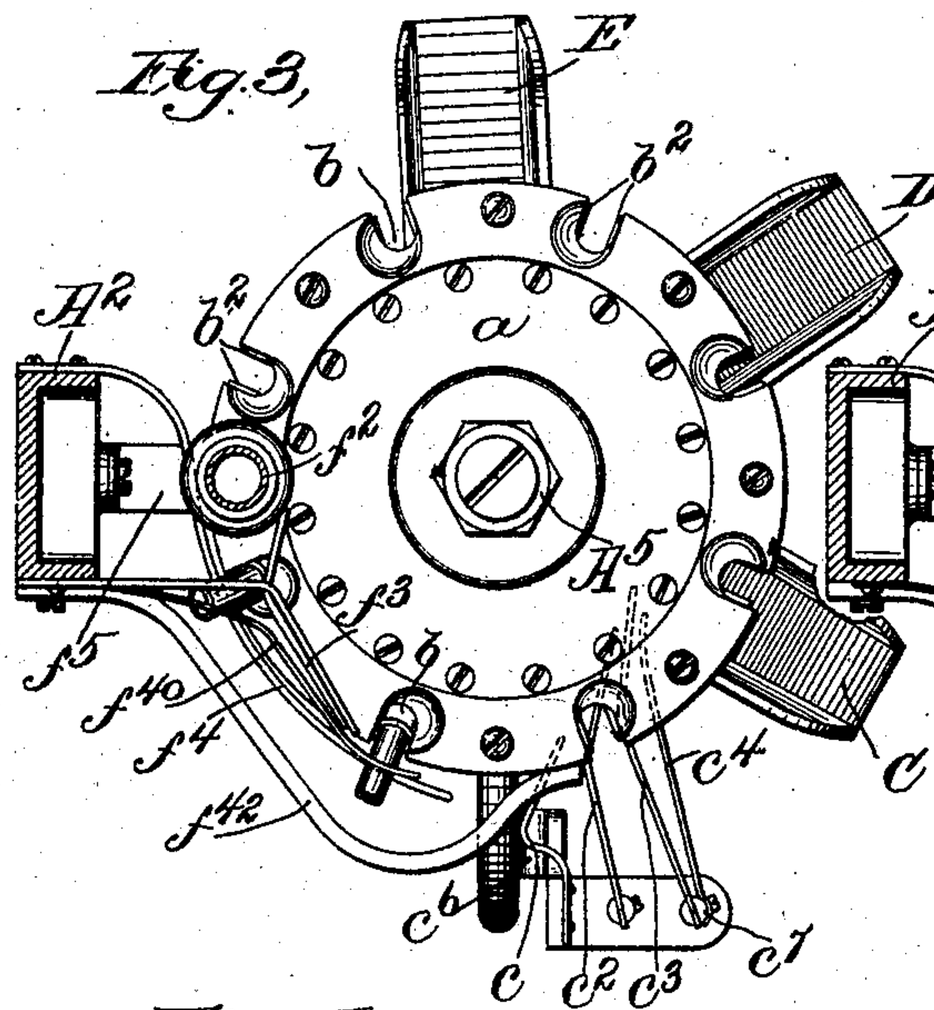



Fig. 4.

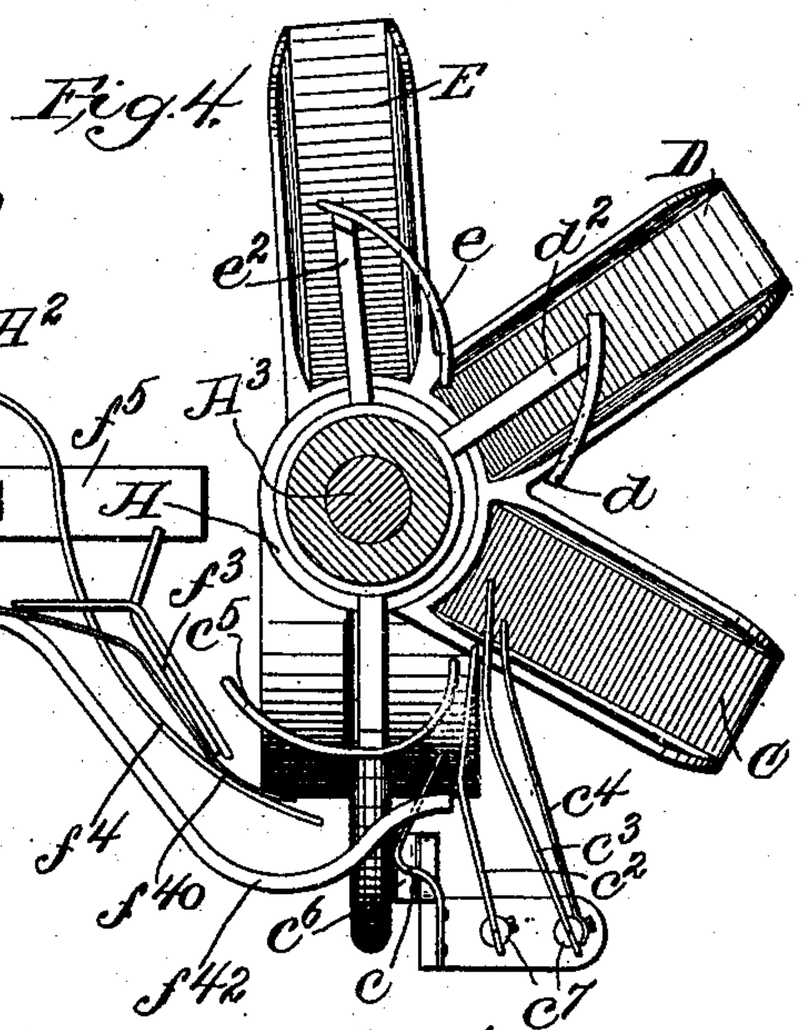



Fig. 5,

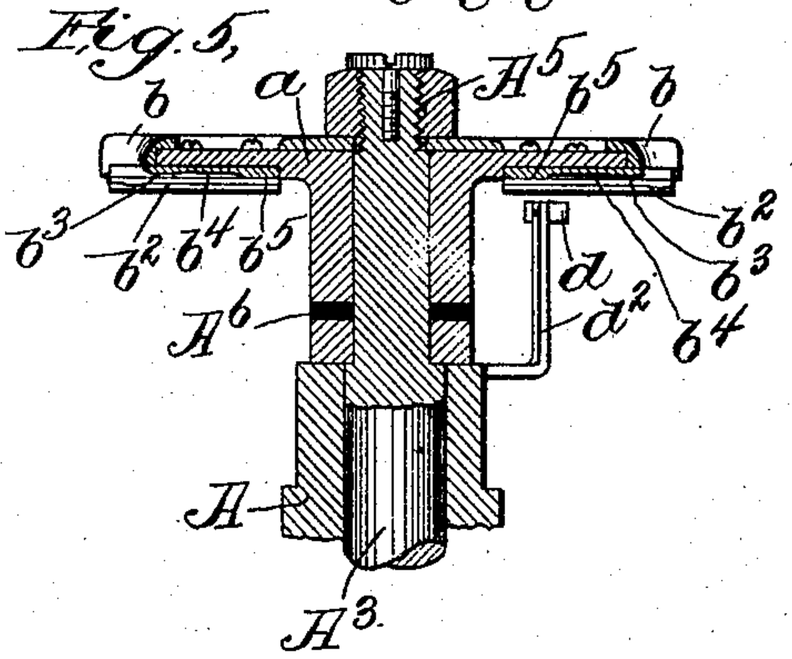



Fig. 6,

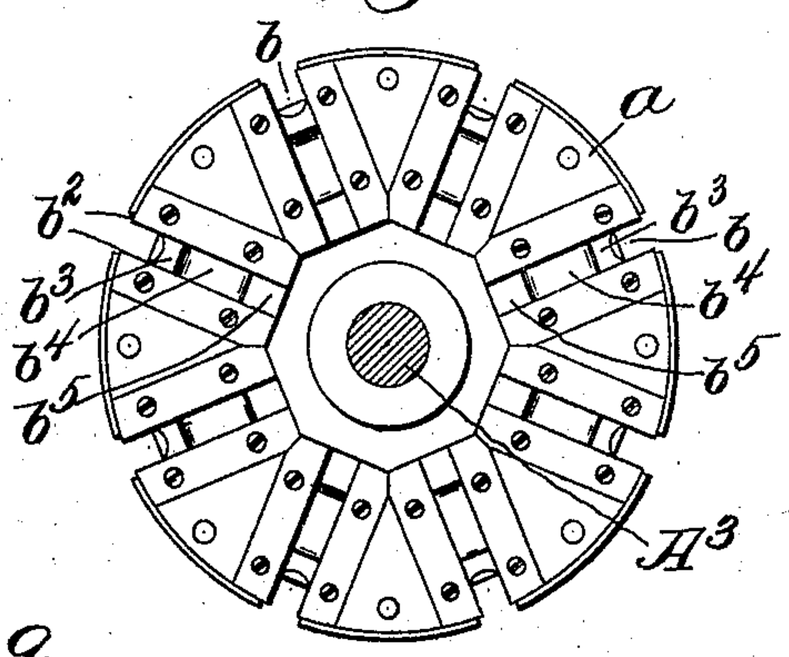



Fig. 7.

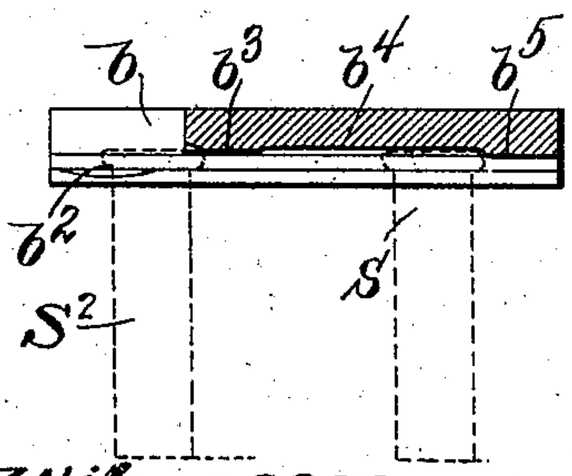



Fig. 9.

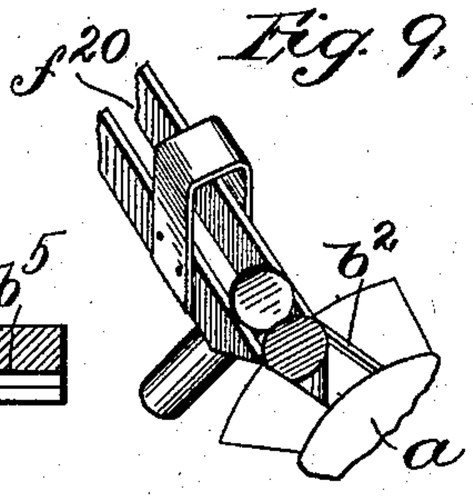
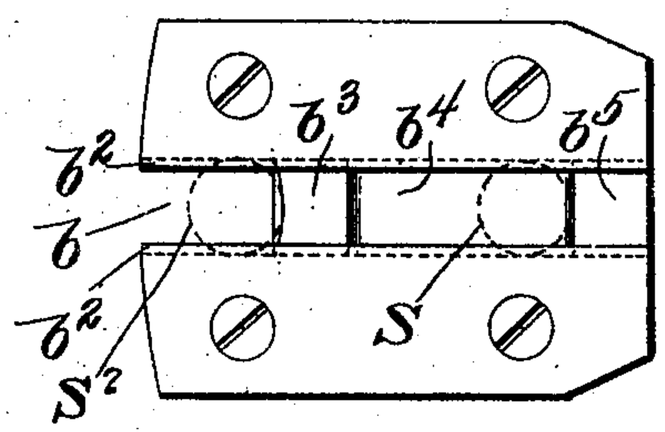



Fig. 8,

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# UNITED STATES PATENT OFFICE.

PAUL BUTLER, OF LOWELL, MASSACHUSETTS.

## CARTRIDGE-SHELL-GAGING MACHINE.

No. 806,461. Specification of Letters Patent. Patented Dec. 5, 1905.

Application filed April 26, 1897. Serial No. 633,901.

*To all whom it may concern:*

Be it known that I, PAUL BUTLER, of Lowell, county of Middlesex, State of Massachusetts, have invented an Improvement in Cartridge-Shell-Gaging Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

The present invention relates to a gaging-machine for cartridge-shells or analogous articles in which the finished article is to be of a standard size, thus rendering it necessary to sort out those of standard size, separating them from those which depart from such standard, which may be otherwise classed or subjected to further operation or discarded.

It is necessary that that portion of a cartridge-shell which enters the chamber of the gun should be of standard size or have only a very small deviation from the given standard. In the manufacture of shells, therefore, it has been common to gage the same by presenting them one at a time by hand to a gage having a passage of just the right size to permit a shell of proper dimension of the part to be gaged to pass through. The gaging operation thus performed involves considerable labor and depends to some extent upon the judgment of the operator; and the object of the present invention is to produce an automatic machine by which the shells are taken from a mass and presented one by one to gaging devices and assorted, so that those of standard size are collected together and separated from those not standard, and preferably those of less than standard and those of greater than standard size are also assorted and separately collected.

The invention also consists in gaging devices adapted to coöperate with the shells in such manner as to gage the thickness of the flange provided at the base of the shell for engagement with the extractor of the gun, said gaging devices, however, not necessarily depending for their operation upon a wholly automatic feed mechanism for the shells.

The invention is shown as embodied in a machine having a traveling carrier provided with the gages composed of pairs of gage-passages to which the flanged end of the shell is presented and a yielding presser to press the shell toward the gage-passages in the traveling movement of the carrier, said passages having gaging-surfaces opposite each other the distance between which is not uniform throughout. The non-uniformity of distance between said gaging-surfaces is such that a part of the passage will admit a shell having a flange of standard thickness, but will exclude a shell having a thicker flange, while another part will exclude a standard shell, but will permit one with a flange thinner than the standard to pass through under the action of the yielding presser. Thus standard shells are carried into the gage-passages to a predetermined point and thicker ones are stopped before entering the said gage-passages or at another point with reference to the length of the gage-passages, and the machine also comprises clearers, one arranged to engage and eject shells thicker than standard at a given point in the travel of the carrier and the other to engage shells of standard thickness and eject them at another point in the travel of the carrier. Thus the three sizes—standard, larger, and smaller—are delivered at three different points and may be collected by themselves.

If it is necessary or desirable to separate out only the shells of excessive thickness, the gage-passage may be made to permit all others to pass through it at once under the action of the yielding presser, the thicker ones only being stopped in and subsequently cleared from the gage-passage.

A further feature of the invention consists in feeding and arranging devices of novel construction whereby the shells to be gaged are fed from a hopper and automatically arranged in proper position to be presented to the gage-passages. While this feature of the invention is shown in conjunction with the gaging devices, it is obvious that it might be utilized with other machines in which cartridge-shells or analogous articles are to be operated upon and must be uniformly arranged in order to be properly presented to the instrumentalities which are to perform the operations.

Figures 1 and 2 are side elevations of the machine, taken, respectively, on planes at right angles to each other. Fig. 3 is a top plan view of a machine embodying the present invention with the feed-hopper and a portion of the feed mechanism removed; Fig. 4, a sectional view below the gage-carrier, showing the yielding presser and clearing devices in plan; Fig. 5, a vertical section of the gage-carrier; Fig. 6, an underneath plan view of the gage-carrier; Fig. 7, an enlarged sectional view of one of the gages, showing the formation of the gage-passage; Fig. 8, a detail, somewhat enlarged, showing the under side of one

of the gages; and Fig. 9, a detail in perspective, showing a modified form of feeding device.

The machine herein shown to illustrate the invention is adapted for use in gaging cartridge-shells and will be described with reference thereto, although it is obvious that the invention is applicable to other articles.

The machine comprises a gage-carrier *a*, herein shown as a rotatable disk arranged to turn in a horizontal plane about a vertical axis. Such arrangement is not essential; but the terms "upper" and "lower," &c., will be hereinafter used with reference to such arrangement of the carrier. The said gage-carrier is provided near its periphery with a number of gage-passages to coöperate with the shells which are deposited in the spaces *b* at the entrance of the gage-passages with the closed or flanged end uppermost, the said pairs of gage-passages being formed one at each side of an open passage-way for the body of the shell. The shells are delivered one at a time by a suitable feeding apparatus, that will be hereinafter described, to said spaces *b*, from which the gage-passages extend, the lower gaging-surfaces $b^2$ of which extend beyond the entrance to the gage-passage proper toward the periphery of the carrier to form a track or supporting-guide for the shell, which is dropped with its open end downward between the said gaging-surfaces $b^2$, so that it is supported by its flange resting upon the upper edges of said surfaces $b^2$ in position to be slid along the same into the gage-passages proper, said surfaces $b^2$ constituting the lower gage-surfaces, between which and the upper gage-surfaces the flange is gaged. The shells thus drop one at a time in front of the entrance to the gage-passages as the latter arrive at the feeding-point in the rotary movement of the gage-carrier and are then carried forward by the gage-carrier, so as to be acted upon by a yielding presser, shown as composed of a number of yielding fingers $c$ $c^2$ $c^3$ $c^4$, which press against the body of the shell in the direction to crowd the same laterally toward the gage-passages between which it is supported by its flange. The shell thus has its flanged end either carried wholly through the gage-passages by the pressure of said yielding presser or arrested at one or another point in said gage-passage according to the thicknnss of the flange, and in the further movement of the gage-carrier the shells which remain in the gage-passages are subjected to the action of clearing devices *d* and *e*, one arranged to coöperate with shells that have been stopped at one point and the other with shells that have been stopped at another point in said gage-passages, the said clearing devices forcing the shells respectively engaged thereby back out from the gage-passages and ejecting the same at different points around the periphery of the gage-carrier.

In the machine herein shown the shells that are to be gaged are received with the flanged end uppermost and with the body hanging below the gage-plate, so that the presser and clearers are below the plane of the gage-plate and act upon the bodies of the shells as they are carried past by the gage-plate in its rotary movement and deliver or eject the shells at different points, according to the thickness of their flanges.

As herein shown, the gage-passages are formed in gage portions adapted to be secured to the under surface of the carrier-disk, said gage portions each consisting of a plate in which are formed the upper surfaces $b^3$, $b^4$, and $b^5$ of the gage-passages, and a pair of bars attached thereto, in which the lower gage surfaces or tracks $b^2$ are formed. The bars in which the lower gage-surfaces are formed may be secured to the plates which are shaped to constitute the upper gage-surfaces, while the gage portions complete are shown as secured to the carrier-disk, the fastening devices being shown as screws. The distance between the upper and lower gage-surfaces is not uniform throughout their length, but is of such width near the entrance as to exclude shells thicker than normal, as indicated in Fig. 7 at $b^3$, and then preferably extends of uniform and somewhat greater width, as shown at $b^4$, for a distance about equal to the diameter of the shell and is then sufficiently contracted, as shown at $b^5$, to prevent the passage of a standard shell, the distances between the upper and lower surfaces in the different parts being such that a standard shell will pass through the first contracted portion $b^3$ near the entrance into the portion $b^4$ of uniform width, which will be called the "main" portion, and will be arrested or stopped by the second contracted portion $b^5$, while shells slightly thinner will pass through said second contracted portion and out from the inner end of the gage-passages, and shells slightly thicker than standard will be arrested in the first but less contracted portion $b^3$ before entering the main portion. The said main portion $b^4$ is shown as somewhat wider than the contracted portions $b^3$ and $b^5$, so as to permit a shell which has passed the first passage to travel freely toward the second.

After the yielding presser has acted upon a shell as it moves past it so as to force it if thinner than standard through the gage-passage and deliver it or to force one of standard thickness or one thicker than standard to the points at which they are respectively stopped by the gaging-surfaces the said gage-passage next moves past the clearing device *d*, the end of which is so located as to be at the rear of or nearer the axis of the disk than is a thick shell when stopped in the entrance to the gage-passage, but in front of or nearer the periphery of the disk than is a shell of standard thickness which has passed through

the first contracted portion $b^3$ and is stopped in the main portion $b^4$ of the gage-passage by the contracted outlet thereof. The said clearing device $d$ is inclined outward toward the periphery of the gage-carrier, and thus acts as a cam on the shells arrested near the entrance to the gage-passage to crowd the same back through the mouth of the gage-passage and cause them to drop as they pass over the chute D, which delivers them into a receptacle placed to receive them. The shells of standard thickness, however, pass by inside of the end of the clearer $d$ and are thus carried beyond the chute D and in the further movement of the gage-carrier encounter the clearer $e$, the end of which is nearer the axis of the gage-plate than the end of the clearer $d$ and is thus at the inside of such shells of standard thickness as are brought to said clearer $e$, and said clearer $e$ is also inclined outward from its end and acts as a cam to crowd back shells of standard thickness and eject them into the chute E, whence they pass into a receptacle set to receive them.

The assorting operation will be best understood from Fig. 7. The shells (shown in dotted lines) are first received with their flanges resting on the tracks $b^2$ near the periphery of the gage-carrier. They are then carried by the gage-carrier past the presser, which will force shells thinner than the standard wholly through and out of the inner end of the gage-passage, dropping them into the chute C. A shell thicker than the standard, on the other hand, will be arrested near the entrance of the gage-passage in the position shown at $S^2$ and will then push aside the yielding presser-fingers and be carried on until it engages with the outer surface of the clearer $d$, which crowds it back through the entrance of the gage-passage and drops it into the chute D. A shell of standard thickness will pass through the first contracted portion into the main portion of the gage-passage, but will be arrested by the second contracted portion in the position shown at S, Fig. 7, when it will pass by the fingers of the presser and will also pass by at the inside of the clearer $d$, but will be finally engaged by the clearer $e$, which will crowd it back through the gage-passage and deliver it into the chute E, said shells being thus assorted in the receptacles placed to receive them from the chutes C, D, and E, the latter receiving shells of standard thickness, the former shells thinner than standard, and the intermediate one shells thicker than standard.

In order to render the machine completely automatic, it embodies in its organization feed mechanism for taking the shells from a promiscuous mass and presenting them properly to the gaging appliances above described, the invention, however, so far as it relates to the feed mechanism, not being limited to the specific construction of the gaging mechanism. As herein shown, the feed mechanism comprises a chute $f^2$, leading from a hopper $f$, supported on an upright $A^2$ of the frame A, which is adapted to contain a mass of shells to be gaged and terminates at a point above the carrier and near the periphery thereof, so that the inlets $b$ to the gage-passages will during the rotation of the carrier successively come under the mouth of said chute, so that a shell passing down through the same will drop until arrested by its flange upon the tracks $b^2$, leading to the gage-passages.

The chute $f^2$ is cylindrical in shape, its inner diameter being substantially equal to that of the outer diameter of a shell, so that shells passing down through said chute will travel endwise therein, the column of shells thus being supported upon the upper surface of the carrier, the main portion of which is, as shown in Fig. 1, extended out beyond the mouth of the gage-passages, there being, however, an opening provided in front of each gage-passage and over the extended bars $b^2$, forming the inlet $b$, before mentioned, to the gage-passage. As each of said openings passes the chute the lowermost shell in the column will drop into it and onto the tracks $b^2$. The shell thus dropped into said opening will be engaged by the sides thereof and carried forward, the next shell of the column being supported by the surface of the gage-carrier $a$ until the next opening arrives at a position to receive it. It is essential, however, that the shell should rest upon the shoulders $b^2$ with its flanged end uppermost in order that it may be operated upon by the gaging devices in the proper way, as before described, during the forward movement of the carrier. Since the shell in passing down the chute may travel with either end up, it is necessary to provide means for inverting a shell which is presented to the carrier with its flanged end down. A shell thus presented will be supported by its flange on the tracks $b^2$ with the body projecting above the carrier-plate, and said body is engaged during the onward movement of the carrier by a tipping-cam $f^3$, which may be secured to the upright $A^2$, the inclination of which cam is toward the periphery of the carrier, so that a shell thus engaged will be tipped outward, as indicated in Fig. 1, it being prevented, however, from falling completely away from the carrier by means of a guide $f^4$, which engages the outer side of the body of the shell, the upper surface thereof inclining downward, as shown in Fig. 1, so that the body of the shell rides down the same and near the end thereof is engaged on its then upper side by a supplemental guide, shown as a wire $f^{40}$, to insure its complete inversion and also to prevent it from falling out from the end of its recess in the gage-carrier as it drops off from the end of the guard $f^4$. A guard $f^{42}$ extends near to the periphery of the carrier, so that any shell that may happen to project out beyond the periphery of the car-

rier will be engaged thereby at its flange and carried inward into proper position to be acted upon by the presser. Said guard is supported on the upright $A^2$ and is at sufficient distance from the carrier, as shown in plan, Figs. 3 and 4, not to prevent the shells from being turned over by the devices above described. As the carrier moves onward, therefore, the shell will be tipped outward until finally the outer end or mouth of the body portion will fall from the guard $f^4$, the shell thus becoming inverted and resting with its flange upon the tracks $b^2$ at the entrance to the gage-passage with its body extending downward into a position to be engaged by the yielding presser. If, on the other hand, a shell is presented in the proper position — that is, with the muzzle down—it becomes necessary to prevent it from at once falling between the tracks $b^2$ into its final position, since it is necessary for the said shell to support the column of shells above it until the opening into which it has fallen has passed beyond the mouth of the chute, so that the said column of shells will be supported upon the said gage-carrier until the next opening is presented. For this purpose the machine is provided with a shelf or support $f^5$, also supported from the standard $A^2$ and extending under the gage-carrier directly below the mouth of the chute, so that the shell, if presented muzzle down, will be supported upon this shelf until carried beyond the same by the movement of the gage-carrier, after which it will drop to the proper position for further operation.

The support $f^5$ is narrow in the direction of travel of the carrier, so that a shell originally presented flanged end up drops into place before the tipping-cam $f^3$ is reached.

The openings in the gage-carrier are enlarged, as shown, at the mouth and provided with inclined walls at the side which is forward with relation to the direction of movement of the carrier, this formation being desirable in order to insure the entrance of the shell to the opening. The rear wall is preferably made substantially perpendicular in order that the shell which drops into the opening may not tip in that direction and clog.

The machine is preferably provided with means for agitating the shells in the hopper, the upper portion of the chute $f^2$ being shown as having a supplemental tube $f^6$ telescoped thereon and longitudinally movable with relation thereto, the said supplemental tube extending into the hopper and having a reciprocating motion imparted thereto by a rod $f^7$, connected to the driven pulley B, through which the machine is operated, as will be hereinafter described, a projection $f^8$ also being extended upward into the hopper, so that the shells therein are engaged and agitated by the said supplemental chute and the said projection and are continually thrown toward the mouth of the said chute and fed downward therethrough.

It is obvious that the invention so far as it relates to the instrumentalities which produce the gaging operation is not dependent on the specific means employed to feed the shells, since the said shells may be presented to the gage-passages during the rotation of the carrier otherwise than by means of the automatic devices above described. For example, as shown in Fig. 9, the shells may be fed toward the periphery of the carrier through a chute or guideway $f^{20}$, terminating at a point adjacent to said periphery, the said guideway being adapted to support the shells flanged end upward and being inclined toward the carrier so that the lowermost shell will slide by gravity toward the passage when the said passage comes in line with the end of the chute. The shells may be supplied to the chute $f^{20}$ by hand with great rapidity.

The yielding presser may obviously be of any suitable construction to engage the shells during the forward movement of the gage-carrier and might, for example, consist of a single spring-arm extending from a point near the periphery of the gage-carrier toward the mouth of the gage-passage, so as to come in contact with the outer sides of shells which have been fed to the carrier and press them inward toward said gage-passage or yield if they will not readily enter therein, in order to accomplish the desired result as above set forth. The said yielding presser as shown herein, however, consists of a series of springs $c$, $c^2$, $c^3$, and $c^4$, which are successively engaged by the shells as they are carried around, this construction being desirable when the gage-carrier is provided with a number of gage-passages, since it is obvious that if a single spring were used with such a construction a shell excluded by the thickness of its flange from the said gage-passage would cause the said spring to yield, thus holding it away from the shells following in adjacent recesses, so that they would not be properly operated upon by the said yielding presser. In connection with said yielding presser a guide $c^5$ for the shell operated upon by the yielding presser is shown, said guide being adapted to operate as a support for that side of said shell which is opposite to the side engaged by the said yielding presser, so that the said shell is maintained in vertical position and prevented from being tipped or canted by the action of the presser, which would tend to cause binding in the gage-passage, and hence preclude the proper operation of the machine.

The traveling gage-carrier may be mounted and caused to travel or rotate in any suitable way and, as shown herein, is secured to the end of the shaft $A^3$, mounted in bearings in the frame A, the said shaft being driven by a bevel-gear $A^4$, Fig. 1, meshing with a similar gear $B^3$ at the end of a shaft $B^2$, hav-

ing a suitable bearing and being provided with the pulley B, which may be driven in any suitable way, as by a belt.

As shown herein, the carrier is readily removable from the end of the shaft $A^3$, being provided with a nut $A^5$, threaded on the end of said shaft, by which the said carrier is secured in position thereon. In this manner a gage-carrier having gage-passages adapted for shells of different sizes can be readily substituted, so that the same machine can be easily used when shells of different gages are to be operated upon. The carrier is preferably frictionally engaged by the shaft, so that if obstructed in any way it will stop turning, and thus prevent damage. For this purpose the washer $A^6$ is provided, between which and the nut $A^5$ the carrier is secured, the shaft being thus capable of turning while the carrier is stationary without damage.

The chutes C, D, and E may be secured to the frame of the machine in any suitable way, as by screws, it being essential only that they be secured in such relation to the yielding presser and clearing devices as to receive the shells assorted thereby and guide them to the receptacles into which they are to be finally discharged.

As herein shown, the springs $c$, $c^2$, $c^3$, and $c^4$, which form the yielding presser, are secured to an arm $c^6$ by means of studs $c^7$, the said arm being secured to the frame A, as by cap-screws $c^8$, in the proper position to cause the said springs to bear against the body of the shells as they extend down below the gage-carrier, so as to push the same toward the gage-passage as is desired. The clearing-cams $d$ and $e$ are mounted, respectively, on brackets $d^2$ and $e^2$, secured upon the outside of the frame A, in which the shaft $A^3$ bears, the said brackets also being underneath the gage-carrier, so that the clearing devices mounted thereon will also engage the body of the shell as it extends downward. These and other details of construction, however, are obviously not essential to the invention, and it is therefore not intended to limit the invention to the specific construction herein shown and described, since obvious modifications may be made. It should be noted, moreover, that when it is desirable to separate from the mass of shells only those of which the flanges are thicker than the standard the contracted portion at the rear end of the gage-passage may be omitted, in which case all the shells the flanges of which are not thicker than the standard will be discharged into the chute C, the thicker ones being discharged into the chute D, as above described. In such case the clearer $e$ and chute E are not required.

The operation of the device as thus far described may be briefly summarized as follows: During the movement of the gage-carrier a shell falls from the mouth of the chute into one of the openings $b$ as it passes under the said mouth and is carried onward by the carrier and inverted if it has fallen closed end down, in any event reaching the yielding presser $c$ $c^2$ $c^3$ $c^4$ in a position to be operated upon thereby, and during the continued movement of the carrier the said shell will be pressed toward the gage-passage, the presser yielding if the said shell is arrested thereby at either position determined by the thickness of its flange. The yielding presser terminates directly over the chute C, so that all shells having a flange of less than the standard thickness will be pressed completely through the gage-passages and discharged therefrom at the inner end over the chute C, and thus collected apart from the others. The shells which are of standard thickness will be pressed inward by the yielding presser until they reach the position indicated at S in Fig. 7, after which the presser will yield and each standard shell will be carried onward, passing by the inner end of the clearer $d$, and finally being engaged by the clearer $e$ and carried thereby toward the periphery of the carrier until it drops over the chute E, which thus collects all standard shells. The shells which have a flange of more than the standard thickness will be stopped in the gage-passage in the position shown at $S^2$ in Fig. 7 and will remain in such position, the presser yielding to permit them to pass, and during the onward movement of the carrier they will be engaged by the outer surface of the clearer $d$ and discharged into the chute D, which thus collects all shells of more than standard thickness of flange. Thus each shell is presented to a gage-passage and operated upon during the movement of the carrier and discharged at a predetermined position according to the thickness of its flange.

I claim—

1. A gaging-machine for cartridge-shells or analogous articles, consisting of a traveling gage-carrier adapted to receive said articles, and provided with gage-passages the distance between the gaging-surfaces of which is not uniform throughout; and a yielding presser adapted to press said articles in a direction to enter said passages and thereby contribute in the gaging operation, substantially as described.

2. A gaging-machine for cartridge-shells or analogous articles, consisting of a traveling gage-carrier adapted to receive said articles, and provided with gage-passages the distance between the gaging-surfaces of which is not uniform throughout, combined with a yielding presser adapted to press said articles toward said passages and thereby contribute in the gaging operation, and a clearer adapted to engage and eject shells remaining in said passages during the onward movement of said gage-carrier, substantially as described.

3. A gaging-machine for cartridge-shells or analogous articles, consisting of a traveling

gage-carrier adapted to receive said articles, and provided with gage-passages the distance between the gaging-surfaces of which is not uniform throughout, combined with a yielding presser adapted to press said articles in a direction to enter said passages and thereby contribute in the gaging operation, and means for automatically feeding said articles to said carrier, substantially as described.

4. A gaging-machine for cartridge-shells or analogous articles, consisting of a traveling gage-carrier adapted to receive said articles, and provided with gage-passages the distance between the gaging-surfaces of which is not uniform throughout, combined with a yielding presser adapted to press said articles in a direction to enter said passages, and a guide for the side of said article opposite said presser, substantially as described.

5. A gaging-machine for cartridge-shells or analogous articles, consisting of a traveling gage-carrier adapted to receive said articles, and a number of passages thereon the distance between the gaging-surfaces of said passages being non-uniform throughout, combined with a yielding presser consisting of a series of springs adapted to be successively engaged by the articles in the carrier during the movement thereof, substantially as and for the purpose described.

6. In a gaging-machine for cartridge-shells, the combination with a traveling gage-carrier provided with gage-passages the distance between the gaging-surfaces of which is not uniform throughout, and a support for the shell at the mouth of each passage, of a feed-chute adjacent to said supports and adapted to deliver shells thereto, and a yielding presser in the path of said shells adapted to engage the same during the onward movement of the carrier and contribute in the gaging operation, substantially as described.

7. In a gaging-machine, the combination with a gage-carrier, of gage-passages carried thereby, each having a portion in which the distance between the gaging-surfaces is substantially equal to the standard thickness of the article to be gaged, and a portion in which said distance is less than said thickness, a yielding presser adapted to press the article to be gaged toward said passages, and clearing devices which eject such of said articles as are not pressed through the gage-passages, substantially as described.

8. The combination with the rotating gage-carrier, provided with gage-passages each having a portion adapted to receive a shell with a flange of standard thickness but to exclude a shell with a flange of greater than standard thickness, and a more contracted portion at the rear end of each passage to prevent further movement of such standard shell when it has reached a predetermined position, a yielding presser adapted to press shells toward said passage, a clearer comprising a cam extending from a point in front of said predetermined position of the shells in the gage-passage to eject the non-standard shells which are excluded from said portion of the gage-passages, and a second clearer comprising a similar cam extending from a point at the rear of a shell in said predetermined position to eject standard shells, substantially as described.

9. In a machine for operating upon cartridge-shells, the combination with a traveling carrier provided with recesses along the edge thereof, said recesses being open laterally; of shoulders at opposite sides of said recesses, the distance between said shoulders being greater than the diameter of the cartridge-shell body and less than the diameter of the cartridge-shell flange; a feed-chute located above said carrier and adapted to deliver shells endwise into said recesses; and a tipping-cam located above the carrier and adapted to engage the inner side of a shell standing flange end down and projecting above the carrier, whereby the said shell is tipped over and inverted, the body passing through the laterally-open mouth of the recess, while the flange remains supported upon the said shoulders, as set forth.

10. In a gaging-machine for cartridge-shells, the combination with a gage-carrier consisting of a rotating disk, of a number of pairs of gage-passages extending inward from the periphery thereof, an opening in said carrier adjacent to each pair of passages, supporting-tracks below the said opening for the flanges of the shells, a feed-chute for the shells extending to the said carrier and terminating over the path of said openings in the rotation of the carrier, and a yielding presser adapted to engage the body of a shell during the forward rotation of the carrier, substantially as described.

11. In a gaging-machine for cartridge-shells, the combination with a gage-carrier consisting of a rotating disk, of a number of pairs of gage-passages extending inward from the periphery thereof, an opening in said carrier adjacent to each pair of passages, supporting-tracks below the said openings for the flanges of the shells, a feed-chute for the shells extending to the said carrier and terminating over the path of said openings in the rotation of the carrier, a yielding presser adapted to engage the body of the shell during the forward rotation of the carrier, and a guiding-spring for the side of the body opposite the said presser, substantially as described.

12. In a gaging-machine for cartridge-shells, the combination with a traveling gage-carrier having gage-passages on the under side thereof, of an inlet-track for each gage-passage, a feed-chute extending to the said carrier and terminating in line with the said inlet-tracks, said feed-chute being adapted to carry a column of shells endwise, a tipping-

cam at one side of the plane of said carrier adapted to engage the body of the shell during the movement of the carrier, and tip the same from its vertical position, and a yielding presser on the opposite side of the plane of said carrier adapted to engage the body of the shell to press the same toward the said gage-passage, substantially as described.

13. In a machine for operating on cartridge-shells, the combination with a traveling carrier provided with openings along the periphery thereof, and also provided with supports for the flanges of the shells below said openings, of a feed-chute adapted to carry a column of shells endwise and extending to and terminating over said openings, and a tipping-cam above the carrier to act on those of the shells which are standing on their flange ends and project above said carrier, as they are moved past said cam by the carrier, substantially as described.

14. In a machine for operating on cartridge-shells, the combination with a traveling carrier provided with openings along the periphery thereof, and supports for the flanges of the shells below said openings, of a feed-chute adapted to carry a column of shells endwise and extending to and terminating over said openings, a tipping-cam adapted to engage one side of the body of the shell, and a guide-support for the opposite side thereof, substantially as described.

15. In a machine for operating on cartridge-shells, the combination with a traveling carrier provided with openings along the periphery thereof and supports for the flanges of the shells below the said openings; of the feed-chute $f^2$ terminating over the said carrier in line with the path of travel of said openings, the tipping-cam $f^3$; the guide-support $f^4$; and the supplemental guide-support $f^{40}$, substantially as and for the purpose described.

16. In a machine for operating on cartridge-shells, the combination with a traveling carrier provided with openings along the periphery thereof and supports for the flanges of the shells below the said openings; of the feed-chute $f^2$ terminating over the said carrier in line with the path of travel of the said openings, the tipping-cam $f^3$, means for guiding the shells thus tipped, and the guard $f^{42}$, substantially as and for the purpose described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

PAUL BUTLER.

Witnesses:
H. J. LIVERMORE,
NANCY P. FORD.