

No. 681,300.

Patented Aug. 27, 1901.

P. BUTLER.

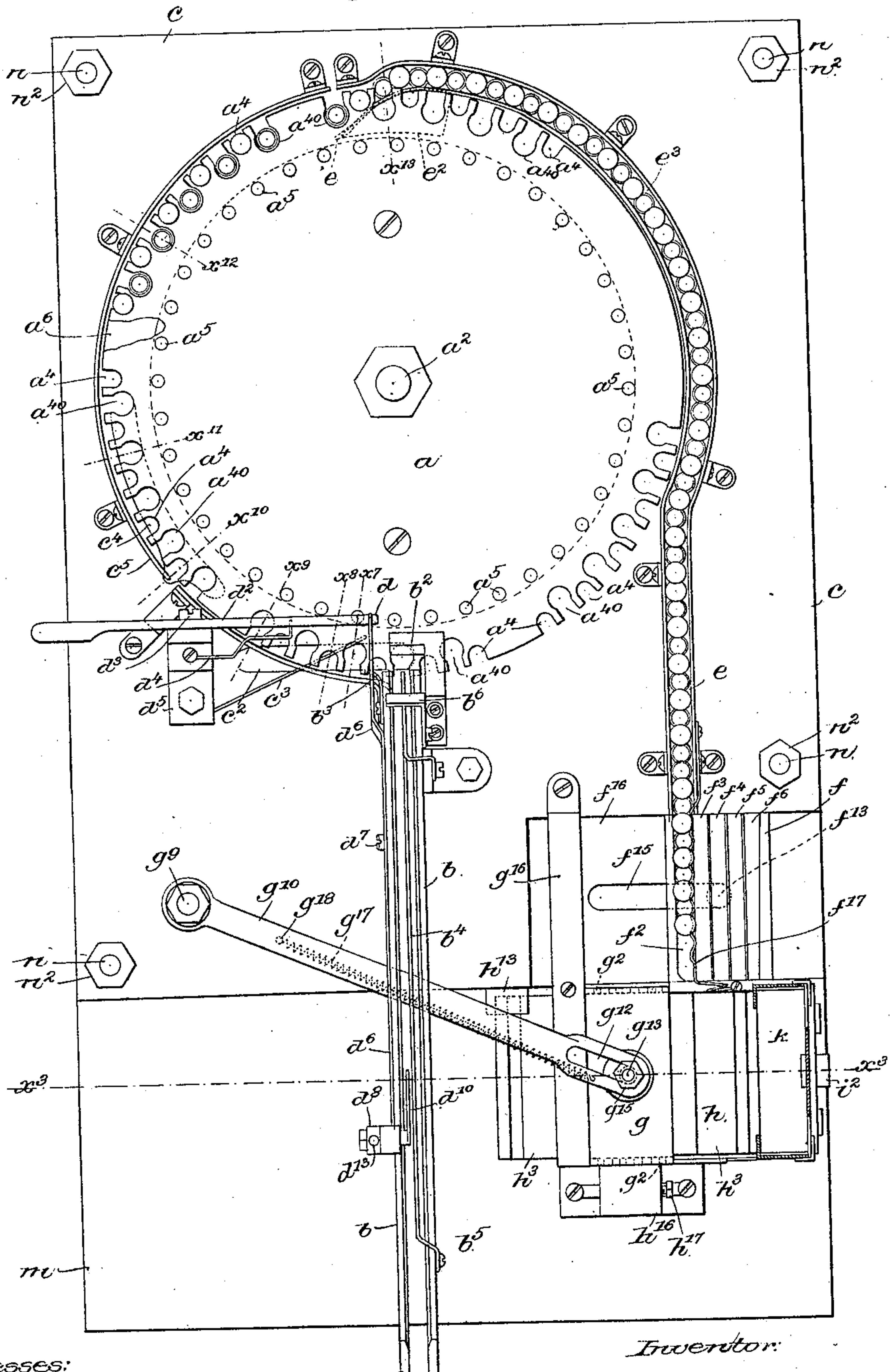
MACHINE FOR PACKING ARTICLES INTO BOXES.

(Application filed Jan. 9, 1899.)

(No Model.)

4 Sheets—Sheet 1.

Fig. 1.



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Fig: 4.

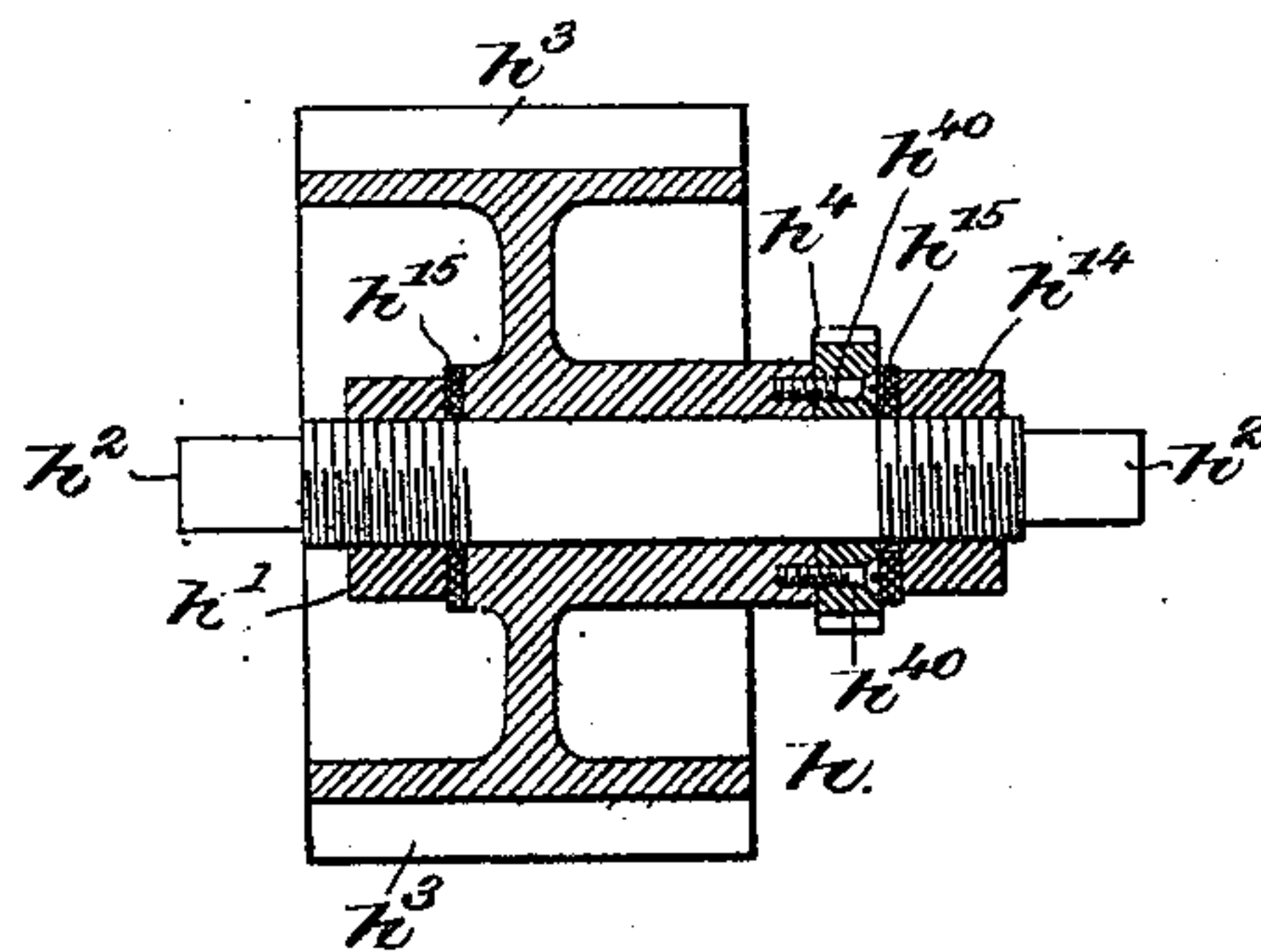
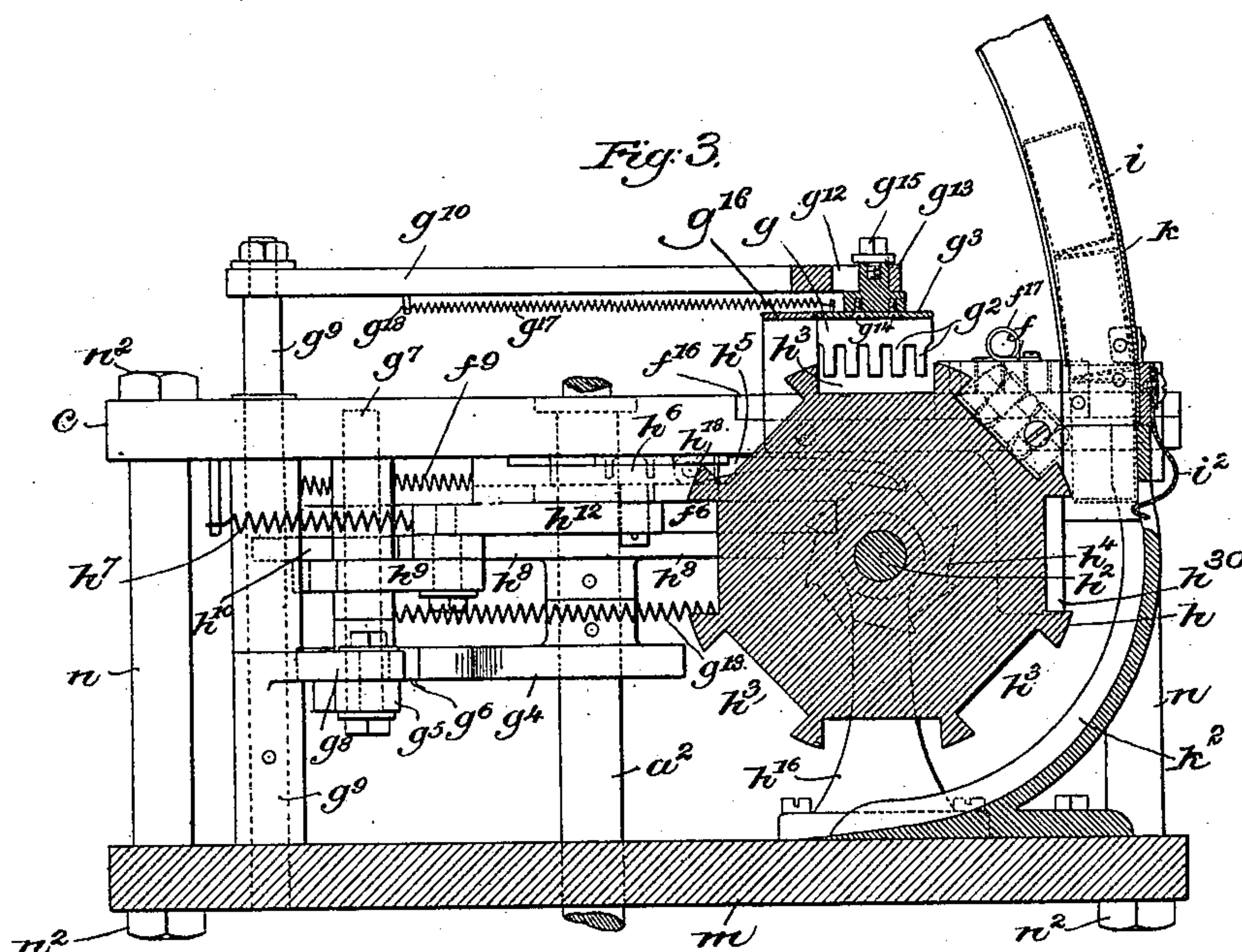


Fig. 3.



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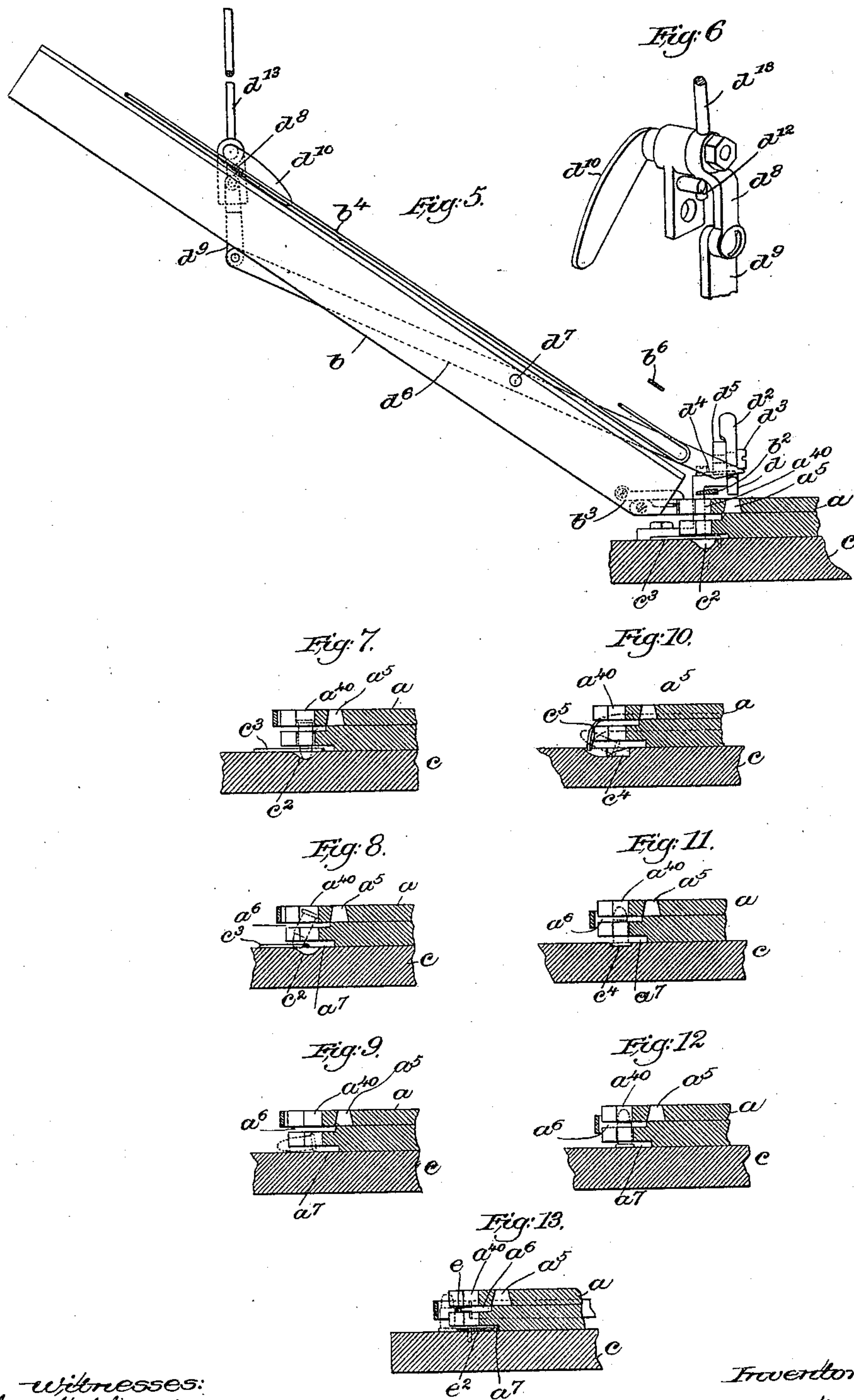
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MACHINE FOR PACKING ARTICLES INTO BOXES.

(Application filed Jan. 9, 1899.)

4 Sheets—Sheet 4.

(No Model.)



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UNITED STATES PATENT OFFICE.

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MACHINE FOR PACKING ARTICLES INTO BOXES.

SPECIFICATION forming part of Letters Patent No. 681,300, dated August 27, 1901.

Application filed January 9, 1899. Serial No. 701,653. (No model.)

To all whom it may concern:

Be it known that I, PAUL BUTLER, of Lowell, county of Middlesex, and State of Massachusetts, have invented an Improvement in Machines for Packing Articles into Boxes, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

10 The present invention relates to a machine for packing articles into boxes, and is herein shown as embodied in a machine especially designed for packing metallic cartridges, although with slight modifications it may be
15 easily adapted for packing other similar articles.

The machine embodying the invention comprises what may be conveniently termed an "arranging device" adapted to receive cartridges or other articles uniformly fed there-
20 to and to arrange the articles in lines or columns, as may be desired, and a transferring device to transfer articles thus arranged to the box which is to be packed, a suitable "receiver," as it may be called, being shown as
25 employed to receive the articles directly from the arranging device, the articles being delivered from said receiver to the boxes, which are also suitably fed to the machine. As
30 herein shown, the receiver is arranged to travel and constitutes also a carrier or forwarding device. These elements or instrumentalities are arranged to operate automatically and are so timed as to cooperate in the
35 several operations, the machine thus being completely automatic, receiving cartridges or similar articles uniformly fed thereto and boxes to receive the said cartridges and delivering the boxes with the cartridges packed
40 therein, the operation being continuous and going as long as the machine is kept supplied with cartridges and boxes.

In packing cartridges it is customary, in order that they may be closely packed in the
45 boxes, to invert alternate cartridges in a layer or line, so that the bullet end of one will be adjacent to the flanged end of another, in order that the flanges may occupy the space afforded by the tapered end of the bullet.

50 The arranging device, therefore, is adapted not only to separate the cartridges into a se-

ries of lines or columns, but also to invert every other cartridge in a line, so that when the cartridges are delivered to the forwarding device they will lie snugly together in
55 lines or layers with the flanged end of one adjacent to the bullet end of another. For this purpose the arranging device comprises a traveling member, preferably consisting of a rotatable disk, and the said traveling mem-
60 ber is provided with several series of recesses, each one of the series corresponding to a line of cartridges, said recesses being adapted to receive a cartridge each from a suitable feeding device during the travel of the carrier,
65 and every other recess is so arranged that the cartridge contained therein during the further travel of the carrier will be acted upon by inverting devices which turn over or invert the cartridge therein prior to its
70 delivery to the transferring device. The cartridges thus arranged are caused to pass from the carrier into a passage or guideway, through which they are propelled by the movement of the carrier, and the said guideway leads to-
75 ward a supplemental arranging and compacting device comprising a traveling member having a series of channels equal in number to the number of lines of cartridges which are to be placed in the box and of such length
80 as to receive the number of cartridges which are to be in each line. The said supplemental arranging device is provided with intermittent feed mechanism adapted to bring the channels consecutively into line with the pas-
85 sage leading from the carrier, the initial position of said supplemental arranging device being such that the first channel of the series is in line with said passage. As the carrier rotates, therefore, a number of cartridges are
90 pressed forward into the said first channel, and as soon as the said channel is filled the feed takes place to present the next channel. To accommodate the feed movement, there is a slight dwell in the forward movement of
95 the line of cartridges, this dwell being preferably provided for by having a space between adjacent series of recesses upon the carrier, so that although the said carrier rotates continuously there will be a brief inter-
100 val after a series of recesses has passed the guideway when no cartridges are deflected

from the carrier into the guideway, the result being that the line of cartridges in the guideway will remain stationary.

The operation above described continues until all of the channels in the supplemental arranging device are filled, at the end of which time the transferring device operates to transfer the cartridges in said channels to the receiver or forwarding device, which has a recess or chamber substantially equal in size to that of the box in which the cartridges are to be packed, so as to retain the cartridges arranged in proper order. The walls of the receptacle which constitutes the supplemental arranging device converge toward the walls of the receiver, so that as the articles are transferred to the receiver they will be "compacted," so to speak, the receiver, as stated, being substantially the size of the box and only large enough to hold the requisite number of cartridges when the cartridges are as close together as possible. The said forwarding device preferably consists of a rotatable wheel having the chambers or recesses aforesaid arranged along its periphery, which is adjacent to the supplemental arranging device, the transferring device comprising a reciprocating member or members arranged to engage the cartridges at both ends of the columns and to move said cartridges transversely from the arranging device to the forwarding device, the engagement at both ends being for the purpose of preventing the cartridges from tipping over as they are pushed toward the receiver. As soon as the cartridges are transferred to the forwarding device the feed movement of the latter takes place, carrying forward the cartridges transferred thereto and bringing the next recess into line with the supplemental arranging device ready to receive the next instalment of cartridges. In the continued forward movement of the forwarding device the cartridges are inserted in the box, the forwarding device being shown as so arranged that the cartridges project beyond the main periphery of said forwarding device and in the travel thereof engage the inner surface of the side or end of the box, which is fed to a position adjacent to the forwarding device as through a suitable chute, the box being carried forward in such movement with the cartridges projecting into the same. The box-chute terminates at a point below the forwarding device, so that it finally rests on its bottom below the same, the cartridges remaining in the box and falling from the forwarding device by force of gravity.

The invention further relates to certain novel details of construction and arrangement, which will be hereinafter described.

Figure 1 is a top plan view of a machine embodying the invention, shown as especially designed for packing metallic cartridges in boxes. Fig. 2 is a sectional view of the same, taken just below the upper frame-plate, showing most of the operating mechanism in plan.

Fig. 3 is a sectional elevation on the line x^3 of Fig. 1. Fig. 4 is a sectional detail of the forwarding device. Fig. 5 is an enlarged sectional detail of the feed-chute and a portion of the carrier or main arranging device, showing the construction of a device for stopping or arresting the machine when there are no cartridges present in the feed-chute; Fig. 6, a perspective view, on a still larger scale, of a portion of said arresting device. Figs. 7, 8, 9, 10, 11, 12, and 13 are sectional details, lines x^7 x^8 , &c., Fig. 1, illustrating the manner in which the cartridges are turned over or inverted during the travel of the main arranging device or carrier.

The machine is herein shown as adapted to pack fifty cartridges in a box, the cartridges being arranged in the box in five rows, each row containing ten cartridges, it being obvious, however, that any other arrangement desired may be provided for without departing from the invention. In the construction shown the main arranging device, which will be hereinafter referred to as the "carrier" a , comprises a disk mounted on a shaft a^2 and arranged to be driven, as by a bevel-gear a^3 , dotted lines, Fig. 2, from a main driving-shaft A, provided with a similar bevel-gear A^2 and mounted in bearings A^3 , suitably positioned at a point below the main portion of the machine. The said shaft A is arranged to be driven by a pulley A^4 , which bears on the cone A^5 , Fig. 2, frictionally engaging the same, so as to properly drive the machine, but adapted to slip when the machine is acted upon by the arresting device, as will be hereinafter described. The said carrier a is provided with a number of recesses a^4 and a^{40} , each adapted to receive a cartridge from the feed-chute b as the carrier travels, the said recesses being shown as arranged along the margin of the carrier adjacent to which the feed-chute b terminates. The recesses are shown as arranged in groups, the number in each group being equal to the number of cartridges which are to be arranged in line, there being ten recesses in each group, as herein shown. The chute is shown as consisting of a pair of guide-strips separated by a distance substantially equal to the diameter of the body of the cartridge, so that a cartridge placed therein bullet down will be supported by its flange upon the said strips and will drop into a recess bullet end down.

As has already been stated, in arranging the cartridges it is desirable that adjacent cartridges should be inverted with relation to each other, and to this end the machine is provided with means for overturning every other cartridge of each series or row after it is delivered to the carrier. For this purpose the recesses a^{40} are somewhat different in shape and arrangement from the recesses a^4 , the latter comprising merely notches in the edge of the carrier substantially equal in width to the diameter of the body of the cartridge, so

that the said cartridge when delivered thereto from the chute will fit into the said recess and be supported by its flange upon the carrier at or near the edge thereof. The recesses a^{40} , on the other hand, are somewhat larger than the recesses a^4 , the width of said recesses a^{40} in the main portion thereof being substantially equal to the diameter of the flange, so that the cartridge is free to drop through the said recesses and to be supported upon the plate or table c , which underlies the carrier a and constitutes the top member of the frame. In the travel of the carrier, therefore, the cartridges which enter the recesses a^{40} instead of being supported by the carrier itself are supported upon the table c , but are engaged and carried forward by the carrier and in this forward movement are overturned or inverted, as follows: The table c is provided below the carrier with an engaging portion or shoulder tangential to the direction of movement of the carrier, Fig. 1, the said engaging portion being shown as the wall or edge of a groove or recess c^2 , so that as the said carrier rotates and the bullet portion of the cartridge travels along the said shoulder the tendency will be to drag the bullet portion out from under the body portion until the cartridge is finally thrown upon its side and rolled along by the carrier.

To assist in throwing down the cartridge, the table c is shown as provided with an inclined inverting member c^3 , consisting of a rod projecting across the surface of said table below the carrier and arranged to engage the bullet portion of the cartridge as the latter moves toward the same, it being obvious, however, that this member is not essential, since the walls of the groove alone are capable of performing the same function.

In order to prevent the cartridge from slipping out of the recess a^{40} , the inlet to said recess from the feed-chute is shown as substantially less in diameter than the diameter of the flange portion of the cartridge, so that when the cartridge is on its side the flange contained in the main portion of the recess will prevent the cartridge from moving out endwise.

Referring to Figs. 7, 8, &c., it will be seen that a cartridge dropped from the chute into one of the recesses a^{40} will fall into the position shown in Fig. 7, with its bullet end resting in the groove c^2 , and as the carrier advances the cartridge will be carried to the position shown in Fig. 8, the inverting-rod c^3 acting thereon until the cartridge is thrown on its side, as shown in Fig. 9. In order to again restore the cartridge to a vertical position, with the flange end down, the support c is shown as provided with a lifting device, shown as an inclined surface c^5 , up which the said bullet end of the cartridge rides until the said cartridge finally rests on its flanged end, as shown in Fig. 11. In order that the flanged end of the cartridge may drop below the bullet end, and thereby as-

sist the operation of raising the latter, the table is preferably, though not essentially, provided with a groove or channel c^4 , into which the said flanged end drops as the cartridge is rolled along the support. The surface of the said groove is inclined upward in the direction of travel of the carrier, finally terminating at the level of the table c , so that the cartridge is finally carried forward in the position shown in Fig. 12.

The cartridges, as already stated, are preferably fed by gravity, the lowermost cartridge resting against the periphery of the carrier and dropping into a recess when such recess comes in line with the end of the chute. The recesses a^4 extend inward a distance which is substantially equal to the diameter of the cartridge, so that when one cartridge has entered a recess the remainder of the cartridges in the chute are supported by the cartridge in the recess until the said recess has passed the chute. In the case of the recesses a^{40} , on the other hand, the main portion of the recess is farther in from the periphery in order to afford the contracted mouth or passage which prevents the cartridges from slipping out endwise during the inverting process. In order, therefore, to prevent more than one cartridge from entering one of the said recesses a^{40} , the chute b is provided at its end with a guard b^2 , arranged to engage a cartridge entering the said recess, the distance between the said guard and the periphery of the carrier being substantially equal to the diameter of the cartridge, so as to prevent others from following, as described in conjunction with the recesses a^4 . To insure the proper insertion of the cartridge into the main portion of the recess after the said recess has passed the guard, a spring-pusher b^3 is shown as connected with the chute b to engage the cartridge and force the same into the body of the recess, so that it will properly rest upon the support c and be inverted, as hereinbefore described. In the travel of the carrier the cartridges in the recesses a^4 are supported above the table c and do not project downward far enough to be acted upon by the inverting devices and are consequently carried forward just as they are received.

In conjunction with the chute b the machine is provided with an arresting device which is adapted to stop the operation of the machine as soon as the chute b is empty, the said arresting device being shown as consisting of a stop d , arranged to cooperate with any of a number of holes or openings a^5 in the carrier a , the said stop being shown as mounted on a lever d^2 , pivoted at d^3 and arranged to be pressed toward the said openings by means of a spring d^4 , the said lever and spring being shown as mounted on a bracket d^5 , suitably secured upon the support c . To hold the said lever in normal position, with the stop d out of engagement with the openings a^5 , the said lever is shown as acted upon by an arm d^6 , pivoted at d^7 to the chute b and arranged to

be acted upon by an elbow-lever d^8 through the agency of a link d^9 , the said elbow-lever having a projection or tongue d^{10} overlying the chute and arranged to be supported in the position shown in Fig. 5 by the cartridges in the chute. To prevent the tongue d^{10} from being lifted beyond its normal position, (which would lift the link d^9 and lower the stop d), the said tongue is arranged to cooperate with a stop d^{12} , which prevents the tongue from movement in one direction, while the cartridges prevent its movement in the other direction. For convenience in lifting the tongue from the chute when cartridges are to be fed the device is provided with a handle d^{13} . So long, therefore, as there is a line of cartridges passing down the chute the stop d will be held away from the surface of the carrier a ; but as soon as the supply of cartridges in the chute becomes exhausted the tongue d^{10} will drop, permitting the lever d^2 to rock in response to its spring and causing the stop d to be forced toward the surface of the carrier a , so that as soon as one of the openings a^5 passes under the said stop the latter will drop into said opening and lock the carrier, thus stopping the machine, as permitted by the friction driving connection hereinbefore described. To prevent the cartridges from being crowded out of the chute, the guard b^4 is arranged to extend along the chute over the supports, said guard being shown as secured to one of the said supports by a screw b^5 . To support a column of shells in the chute when the machine is not operating or when it is desired to rotate the carrier until it is emptied, the chute is provided with a hinged gate or guard b^6 , adapted to close the outlet or delivery end of the chute.

The cartridges being arranged in lines in the carrier, as described, are ejected therefrom by means of a suitable ejector, shown as a cam or inclined surface e , consisting of a narrow blade or strip of metal extending into a horizontal channel a^6 , cut in from the periphery of the carrier completely around the same, as indicated by the dotted line, Fig. 1, so as to engage the cartridges substantially at the middle thereof and exert an even pressure thereon as they move forward in the carrier. For convenience the carrier is made in two parts, as shown in Figs. 7 to 13, and the slot a^6 is made by cutting away a portion of the lower part. To properly act upon the cartridges which rest upon their flanges on the table c , a supplemental cam e^2 is shown as secured to the surface of the table c , Fig. 13, and underlying an annular undercut portion or recess a^7 , formed along the under side of the carrier and extending completely around the same, said supplemental cam engaging the flange and preventing the cartridge from being tipped over, as might otherwise occur. The cartridges thus ejected or delivered from the carrier pass into a passage or guideway e^3 , which is just wide enough to contain a single line or column of cartridges and long

enough to contain the number of cartridges which are to be arranged in a line or a multiple of such member, the capacity of said guideway being herein shown as fifty cartridges, or enough to completely fill a box. In the travel of the carrier, therefore, a line of cartridges will be forced into the said guideway from the recesses a^4 a^{10} , the cartridges as fast as they enter pushing the other cartridges before them until the said passage is full and contains, say, fifty cartridges. Prior to packing cartridges in the boxes, however, it is necessary to break up the column of cartridges into sections, there being, as already stated, five of such sections or lines, each containing ten cartridges, in the manner of packing herein shown. To this end the cartridges are caused to travel from the guideway into the supplemental arranging device f , which comprises a reciprocating member or box having five parallel longitudinal channels f^2 , f^3 , f^4 , f^5 , and f^6 , arranged to consecutively come in line with the end of the guideway e^3 . At the time when the guideway e^3 is full—that is to say, contains fifty cartridges—the passage f^2 is in line therewith, it being obvious, therefore, that as the carrier rotates and forces ten more cartridges into the passage an equal number will be forced out of the passage into the channel f^2 . The guideway is employed merely for convenience in the arrangement of the operating mechanism and may be dispensed with, it being obvious that with slight modifications the cartridges could be transferred directly from the main to the supplemental arranging device.

Referring to Fig. 1, it will be seen that if the carrier rotates from the position shown therein far enough to cause the two cartridges at the entrance of the guideway e^3 to be forced into the same the two cartridges at the end of the column in the guideway e^3 will be forced into the channel f^2 , pushing forward the cartridges already therein and completely filling the said channel. As soon as the said channel is filled it is necessary to feed forward the supplemental arranging device to bring the channel f^3 in line with the passage e^3 .

The feeding is herein shown as accomplished through the agency of a cam f^6 , mounted on the shaft a^2 , the said cam having a series of inclined surfaces equal in number to the number of channels in the device f and arranged to act upon the said device through the agency of a lever f^7 , provided with a cam-roller f^8 and held against the periphery of the cam by means of a spring f^9 , the said lever being pivoted at f^{10} to the under side of the support c and connected with the device f at f^{12} . As herein shown, the said device f is provided with a stem or projection f^{13} , engaging an elongated slot f^{14} in the lever f^7 to compensate for the difference in the direction of movement of the lever and that of the member f . The stem f^{13} projects through a

suitable slot f^{15} in the table c , and the device f is arranged to travel in a guide-channel f^{16} , formed in the surface of the table c , as shown in Fig. 1.

5 It is essential during the feed operation that there should be a slight dwell in the forward movement of the column of cartridges while the feed movement actually takes place, and this is accomplished, as herein shown, by
10 dividing the recesses in the carrier into groups, which are separated by the requisite amount of space, it being obvious that after the last cartridge of one group has been forced into the passage e^3 the cartridges in said passage
15 will not be acted upon or pushed forward until the first cartridge in the next group is forced into the same. As the operation continues the successive feed movements are produced by the cam, as clearly shown in Fig.
20 2, until the supplemental arranging device f contains fifty cartridges ready to be transferred to the box in which they are to be packed.

In inserting the cartridges into the transferring device the forward ones are prevented from falling by means of a retarding-spring f^{17} , curved so as to form a series of
25 spring-pockets, one for each cartridge, the said spring being connected at one end with the passage e^3 and at the other end with a
30 portion of the frame, so as to be stationary and to cooperate with the cartridges entering each of the five passages successively. The cartridges thus arranged and fed forward are
35 then acted upon by the transferring device and moved to the forwarding device, from which they are directly inserted into the boxes, and in order that they may be compactly held together one wall of the box or receptacle,
40 which constitutes the supplemental arranging device, is inclined, as shown in Fig. 1, so that the walls of the box converge toward the receiver, and the partitions between the channels are made of thin division-strips, which
45 may advantageously be of spring metal, separated a sufficient distance to receive the cartridges between them, so that the cartridges as they are pressed out of the box are closely packed together or condensed by the inclined
50 or converging walls of the box. The strips are secured only at the end of the supplemental arranging device where they enter the same and are free to move laterally throughout nearly their entire length, the purpose of
55 the said strips being merely to afford a straight guiding-surface for the incoming column of cartridges instead of the corrugated surface presented by the cartridges in the line previously inserted. The strips are made as
60 thin as possible and the cartridges, with the strips between them, are practically as compact as they are when in the box. As the cartridges are pushed out of the supplemental arranging device and crowded together or
65 compacted by the action of the convergent walls the division-strips yield to admit of

such compacting action and do not in any way interfere with such action.

In order that the cartridges may lie in a compact mass in the box, it is necessary not
70 only that the cartridges in a line should alternate in position, as has already been described, but also that the adjacent cartridges in two lines which lie side by side should likewise alternate. This is accomplished, as
75 shown, by properly arranging the recesses a^4 and a^{40} along the carrier, one series of recesses beginning with a recess of one kind and the next series beginning with a recess of the
80 other kind, as shown in Fig. 1.

In the arrangement shown the first recess of the first series is arranged to carry forward a cartridge, bullet end down, so that, as
85 illustrated in Fig. 1, the first cartridge of the column is bullet end down, it being necessary, therefore, that the first cartridge of the line which is pushed into the passage f^3 of the supplemental arranging device should be
bullet end up. The next series of recesses, therefore, begin with a recess a^{40} and the next
90 succeeding series with a recess a^4 , as shown, so that the cartridges properly alternate throughout when finally arranged.

As herein shown, the transferring device comprises a reciprocating member g , having
95 a series of fingers g^2 , one for each column of cartridges, in the channels f^2 f^3 , &c., and being arranged to move transversely to the feed movement of the device f , so as to act upon the cartridges and push them out of the chan-
100 nels endwise.

In order to prevent the cartridges from tipping over as they are transferred from the device f to the forwarding device h , the transferring device is shown as provided with two
105 sets of fingers g^2 , projecting downward from the supporting portion g^3 and arranged to engage the lines or columns of cartridges between them. Each set of fingers may be regarded as constituting a member to engage
110 one end of the set of cartridges, it being immaterial, of course, whether the said members are connected together or not, provided that they are capable of traveling together. It is necessary, however, in the construction
115 shown that the transferring device should remain in its initial position during the feed movement of the supplemental arranging device f , so that in such feed movement the cartridges will be pushed forward into the space
120 between said fingers. It is also necessary that the said transferring device should remain in its abnormal position after the cartridges are transferred until the said cartridges are carried forward from between the
125 fingers prior to the return movement of the said transferring device.

As herein shown, the movement of the transferring device is produced by a cam g^4 , acting through the agency of a lever g^5 , provided
130 with a cam-roll g^6 and pivoted on a stud or projection g^7 from the lower side of the table

c. The said lever is connected with an arm g^8 , secured to a stud g^9 , having a suitable bearing in the said table and projecting through the same, the said stud having connected therewith a lever g^{10} , provided with a slot g^{12} , engaging a stud or projection g^{13} , suitably secured, as by screws g^{14} , to the member g . The said stud is herein shown as held in the slot by means of a nut or cap-screw g^{15} . The transferring device is guided and supported in its movement by a guide surface or strip g^{16} and is held against the same by means of a spring g^{17} , shown as connected to a pin g^{18} on the under side of the lever g^{10} .

As best shown in Fig. 2, the cam g^4 , which is indicated in dotted lines, has two abrupt cam-surfaces to produce the movement of the member g in one direction and to permit its movement in the opposite direction in response to a spring g^{19} , and the said cam is so arranged with relation to the cam f^6 , hereinbefore described, as to cause the device g to move quickly into line with the device f just prior to the first feed movement thereof, the member g then remaining stationary in such position during the remainder of the feed, but moving quickly in the opposite direction just prior to the return movement of the member f , which occurs when the cam-surface f^{60} reaches the cam-roll f^8 .

The receiver or forwarding device h , to which the cartridges are transferred from the supplemental arranging device f , is shown as consisting of a rotatable disk or wheel mounted on a spindle h^2 and provided along its periphery with a series of recesses h^3 of the proper size and shape to contain the requisite number of cartridges arranged for insertion in the boxes. The said wheel is arranged to have an intermittent feed movement, each step of which brings one of the recesses h^3 into line with the final position of the device f , so that in the movement of the transferring device g the cartridges will be slid out of the channels $f^2 f^3$, &c., into the recess h^3 . After such transferring movement the member g dwells in the position shown in Fig. 1 while the feed movement of the wheel h takes place, forwarding the cartridges, which have been transferred thereto, and bringing an empty recess in line with the final position of the member f . The fingers of said member support the cartridges during the feed movement of the wheel, and as the cartridges pass out from between the fingers they are prevented from moving endwise out of the recesses h^3 by guards h^{30} , consisting of plates adjacent to the sides of the wheel h . To produce the feed of the member h , the said member is shown as provided with a ratchet-wheel h^4 , arranged to be operated upon by the pawl h^5 , shown as pivotally connected to a slide h^6 , having a suitable bearing below the table c and provided with a spring h^7 , which tends to draw the pawl from one tooth to the next after the feed movement, which is produced by means of a

cam h^8 , acting through the agency of the lever h^9 , provided with a cam-roll h^{10} and connected with the slide h^6 by means of a link h^{12} . The said lever h^9 is herein shown as pivoted upon the stud g^7 , which has already been described as constituting the support for the lever g^5 . The cam h^8 is shown as having a gradually-inclined surface, so that the feed movement of the forwarding device h is comparatively slow and causes the cartridges to gently engage the box in the packing operation, as will be hereinafter described. To accommodate such movement, the line of cartridges in the passage e^3 is arranged to dwell stationary for a longer interval after the requisite number have been inserted in the supplemental arranging device f than that which occurs during the successive feed movements of the said device f . This dwell is provided for by the comparatively long space between the first and the last series of recesses in the carrier a , the feed movement of the forwarding device h taking place while this part of the carrier is passing the guideway e^3 and while the column of shells in said guideway is consequently stationary. During the last part of such feed movement, however, and prior to the return movement of the transferring device g the first series of recesses on the carrier will reach the guideway e^3 and the cartridges from the carrier will begin to push those in the said guideway forward and to fill the first of the channels in the transferring device f . The return movement of the member g will then take place after the feed movement of the member h is completed and just prior to the first forward feed movement of the member f , the parts being shown in the drawings as at the critical point just prior to the return movement of the member g and just after the complete feed of the member h . It will be seen, therefore, that time is economized to the fullest extent possible consistent with the slow feed movement of the forwarding device h , which is necessary to more certainly prevent any disturbance of the cartridges in the said forwarding device h and to prevent all likelihood of breaking or tearing the box as the cartridges are transferred thereto.

It is obviously essential that the feed of the member h should be positive and exact and that the said member should be arrested and firmly held in the proper position to receive the cartridges from the member f . To this end the feeding device is so arranged that the wheel or member h will be positively locked against rotation in either direction at the end of the feed movement, this being accomplished, as shown, by means of a locking projection h^{13} , arranged to travel with the slide h^6 , which carries the pawl h^5 , the said projection moving, as best shown in Figs. 2 and 3, across the rear wall of one of the recesses h^3 , so as to be engaged thereby at the end of the feed movement. As indicated in dotted lines, Fig. 3, the member h is prevented from

rearward movement by the pawl h^5 , which is held in position by the cam which operates it and from forward movement by the locking projection h^{13} . As the pawl h^5 moves back, however, prior to the feed operation the locking projection h^{13} will move out of engagement with the member h , and during such period the weight of the cartridges carried by said member h will have a tendency to cause a forward rotation thereof independently of the action of the feeding device. To prevent such rotation, the said member h is shown as secured on its spindle h^2 by means of nuts h^{14} , between which and the hub of the wheel h are interposed washers h^{15} to engage the wheel and to prevent the same from moving, except when acted upon by a considerable force, as that imparted to the pawl h^5 by its actuating-cam. The ratchet h^4 is shown as secured to the hub of the wheel h by means of screws h^{40} , one of the washers h^{15} bearing directly against said ratchet. The spindle itself is supported in brackets h^{16} , mounted on the lower plate m of the frame, and is secured in suitable sockets by means of set-screws h^{17} , which prevent the rotation of the spindle. The cartridges having been transferred to the forwarding device, as described, are advanced in the feed movement of said forwarding device, as shown in Fig. 3, and in such movement are inserted into the boxes i , which are independently fed into a chute k , down which they descend by force of gravity. The said chute k is adjacent to the periphery of the forwarding device h , and the lowermost box in said chute is supported by a yielding supporting device i^2 , herein shown as a spring-finger projecting into the said chute across the path of the boxes. In the travel of the forwarding device h , therefore, the cartridges which project beyond the periphery of said forwarding device will engage the forward wall of the box and will force the same along down the chute, overcoming the stress of the spring-support i^2 and carrying along the box with the cartridges projecting into the same. The chute k beyond this point is curved to follow the periphery of the forwarding device and provided with lateral guides k^2 , so that the box is carried forward until it finally reaches a point directly below the forwarding device. The cartridges then settle into the box by force of gravity, and each box is pushed out upon the support m , from which they may be gathered up by the attendant. The said support m is shown as constituting the lower member of the frame and is connected with the table c by means of columns n , held in place by nuts n^2 , the main operating portions of the machine being supported between the table c and the plate m , as best shown in Fig. 4. As soon as the box has been engaged by the cartridges and carried forward another box drops into its place until arrested by the support i^2 and is then ready to receive the cartridges which have

been transferred, as above described, from the arranging devices into the next adjacent recess in the forwarding device.

It is not intended to limit the invention to the specific construction and arrangement herein shown and described, since modifications may obviously be made without departing from the invention.

I claim—

1. In an apparatus for packing articles in boxes, the combination with means for arranging in the shape of the box a sufficient number of such articles standing on end to fill the box; of a receiver for the articles thus arranged; means for moving said articles laterally into said receiver; means for presenting a box to said receiver to take the articles therefrom; and connecting mechanism whereby the several parts are arranged to operate consecutively, substantially as described.

2. In a machine for packing articles into boxes, a feeding device for supplying the articles to the machine; means for arranging the articles to fit the box or package; a receiver or forwarding device; devices for inserting the articles thus arranged into said receiver and for transferring the articles from said receiver to a box; a box-feeding device; and connecting mechanism whereby said parts are caused to operate consecutively, as set forth.

3. In a machine for packing cartridges in boxes, the combination with means for arranging the cartridges in parallel lines with the flanged end of one adjacent to the bullet end of the next; of a box-feeding device; means for inserting the cartridges thus arranged into a box presented by said feeding device and connecting mechanism whereby said instrumentalities are caused to coöperate, substantially as described.

4. In an apparatus for packing articles in boxes, the combination with means for arranging the said articles, of a transferring device to act upon the articles when properly arranged; a receiver for the articles to which they are transferred by said transferring device; means for presenting a box to receive the said articles and connecting mechanism whereby said instrumentalities are caused to coöperate, substantially as described.

5. In a machine for packing articles in boxes, the combination with means for arranging the articles to fit the box, of a transferring device to act upon the articles so arranged, a forwarding device to receive the articles from the transferring device, means for presenting the box to the said forwarding device to receive the articles therefrom and connecting mechanism whereby said instrumentalities are caused to coöperate, substantially as described.

6. In a machine for packing cartridges in boxes, the combination with a feeding device for said cartridges, of an arranging device adapted to receive the cartridges therefrom and to invert alternate cartridges so that the

bullet end of one will be adjacent to the flanged end of another, a supplemental arranging device to arrange the cartridges in lines, means for transferring the cartridges thus arranged into boxes automatically fed to the machine and connecting mechanism whereby said instrumentalities are caused to cooperate, substantially as described.

7. In a machine for packing cartridges in boxes, the combination with an arranging device adapted to receive cartridges uniformly fed thereto and to carry said cartridges forward, of means for inverting alternate cartridges during such forward movement, a supplemental arranging device comprising a traveling member having a series of channels to receive the cartridges from said main arranging device, means for intermittently feeding said member until each channel contains a line of cartridges, a transferring device for the cartridges thus arranged, a forwarding device to receive the cartridges from said transferring device, a feed-chute for presenting empty boxes to said forwarding device to receive cartridges therefrom and connecting mechanism whereby said instrumentalities are caused to cooperate, substantially as described.

8. In a machine for packing cartridges in boxes, the combination with an arranging device adapted to receive cartridges uniformly fed thereto and to carry said cartridges forward, means for inverting alternate cartridges during such forward movement, a supplemental arranging device comprising a traveling member having a series of channels each adapted to receive part of the cartridges from said main arranging device as they are carried forward, means for intermittently feeding said member until each channel contains a line of cartridges, and means for transferring the cartridges from said arranging device into a box, substantially as described.

9. In a machine for packing cartridges in boxes, the combination with an arranging device adapted to receive cartridges uniformly fed thereto and to carry said cartridges forward, of means for inverting alternate cartridges during such forward movement, a supplemental arranging device comprising a traveling member having a series of channels to consecutively receive the cartridges from said main arranging device, means for intermittently feeding said member until each channel contains a line of cartridges, a feeding device for empty boxes, and means for transferring the cartridges from said supplemental arranging member into a box presented by said feeding device, substantially as described.

10. A machine for packing cartridges in boxes, comprising a traveling carrier to receive cartridges uniformly fed thereto; recesses formed in said carrier to receive and support some of the cartridges presented thereto; other recesses to receive others of the cartridges and to cause them to travel

along a fixed support adjacent to the carrier; a shoulder or engaging portion of said fixed support inclined from the direction of movement of the carrier to engage the end of the cartridges and tip the same sidewise; a channel to receive the opposite end of the cartridges in the further movement of the carrier, and an inclined surface to engage the cartridges and lift one end thereof, the other end resting in said channel; means for arranging the cartridges carried forward in said recesses in lines; and means for transferring the cartridges thus arranged to a box suitably fed to the machine, substantially as described.

11. In a machine for packing cartridges in boxes, a main arranging device comprising a continuously-traveling carrier, recesses in said carrier to receive cartridges, said recesses being arranged in groups separated from each other by a space greater than the space between adjacent recesses in any one group, a supplemental arranging device having channels each adapted to contain a number of cartridges equal to a number contained in a single group of recesses in the carrier, means for feeding said supplemental arranging device to successively move the channels therein to a position to receive cartridges from the main arranging device, means for transferring cartridges from said supplemental arranging device to an empty box, and connecting mechanism whereby all of said instrumentalities are caused to cooperate, substantially as described.

12. In a machine for packing cartridges into boxes, the combination with a carrier provided with recesses to receive cartridges, of a clearing device to eject the cartridges from said recesses in the travel of the carrier, a guideway to receive cartridges thus ejected, a movable member provided with a series of parallel channels arranged to be consecutively moved into line with said guideway to receive cartridges therefrom, and means for transferring the cartridges from all of said channels at once to an empty box, substantially as described.

13. In a machine for packing cartridges into boxes, the combination with a carrier adapted to receive the cartridges fed to the machine, of a clearing device to eject the cartridges from the carrier in the travel thereof, a traveling member having a series of parallel channels adapted to be consecutively moved into position to receive said cartridges, means for actuating said member, and means for transferring the cartridges from said channels to a box, substantially as described.

14. In a machine for packing cartridges into boxes, the combination with a carrier provided with recesses to receive cartridges, of a clearing device to eject the cartridges from said recesses in the travel of the carrier, a guideway to receive cartridges thus ejected, a series of parallel channels arranged to be consecutively moved into line with said guide-

way to receive cartridges therefrom, a forwarding device comprising a traveling member adjacent to the ends of said channels and having a recess adapted to receive the contents of all of said channels, means for transferring the cartridges from said channels to said recess, and a feed-chute for empty boxes adjacent to the said forwarding device whereby a box in said chute will receive cartridges from said forwarding device in the movement thereof, substantially as described.

15. In a machine for packing cartridges into boxes, an arranging device comprising a member having parallel channels, means for intermittently feeding said member to bring said channels consecutively to a position to receive cartridges and for restoring the same to its initial position, a transferring device having fingers to engage the cartridges at both ends of each channel, a forwarding device adjacent to said arranging device and having one or more recesses each adapted to receive the contents of all the channels, intermittent feed mechanism for said forwarding device, and means for moving the transferring device from the channels to the forwarding device prior to the return movement of said arranging device and prior to the feed movement of the forwarding device, and for moving the transferring device in the opposite direction after a feed movement of the forwarding device and prior to the first feed movement of the arranging device, substantially as described.

16. In a machine for packing cartridges into boxes, the combination with a carrier having recesses to receive cartridges, of a feed-chute leading toward the said carrier, a controlling device held in normal position by the cartridges in said chute, and means for moving said controlling device to arrest the carrier when not so held, substantially as described.

17. The combination with the carrier *a* provided with recesses a^4 and a^{40} , and with openings a^5 , of the chute *b*, the stop *d* arranged to cooperate with the openings a^5 , the supporting-lever d^6 for said stop, and the tongue d^{10} cooperating with said supporting-lever and adapted to be held in normal position by the cartridges in the chute, substantially as described.

18. The combination with the carrier *a* provided with the recesses a^4 and a^{40} , of the support *c* below said carrier to support the cartridges in the recesses a^{40} , a tipping device to act on the cartridges moved along said support by said carrier, and means for lifting the bullet end of the cartridge so tipped during the continued forward movement of the carrier until said cartridge rests on its flanged end on said support *c*, substantially as described.

19. The combination with the carrier provided with marginal recesses having a main portion of larger diameter than that of the flanged end of the cartridge and a passage

leading from said main portion to the margin of the carrier, the width of said passage being less than the diameter of the flanged end of the cartridge but greater than the diameter of the body portion thereof, of a support for the cartridges below said carrier; means for tipping the cartridge on its side with its body portion lying in said passage and its flange portion in said recess and means for subsequently lifting said body portion until the cartridge rests upon its flanged end on said support, substantially as described.

20. The combination with the carrier provided with marginal recesses having a main portion of larger diameter than that of the flanged end of the cartridge and a passage leading from said main portion to the margin of the carrier, the width of said passage being less than the diameter of the flanged end of the cartridge but greater than the diameter of the body portion thereof; of a support for the cartridges below said carrier; means for inverting the cartridges in said recesses during the travel of the carrier; a cartridge-chute leading toward the margin of the carrier to supply cartridges to said recesses; and a guard for the cartridges in said chute, the distance between said guard and the end of said chute being substantially equal to the diameter of the body portion of the cartridge; substantially as and for the purpose described.

21. The combination with the carrier provided with marginal recesses each having a main portion of larger diameter than that of the flanged end of the cartridge, and a passage leading from said main portion to the margin of the carrier, the width of said passage being less than the diameter of the flanged end of the cartridge but greater than the diameter of the body portion thereof; of a support for the cartridge below said carrier, means for inverting the cartridge in said recess during the travel of the carrier, a cartridge-chute leading toward the margin of the carrier to supply cartridges to said recesses; a stop for the cartridges in said chute, the distance between said stop and the end of said chute being substantially equal to the diameter of the body portion of the cartridge; and means for inserting the cartridge into the body of the recess after it has been carried past said stop, substantially as described.

22. In a machine for packing cartridges into boxes, a traveling carrier to receive cartridges uniformly fed thereto; means for inverting certain of the cartridges as they are forwarded by said carrier, the other cartridges remaining as presented to the carrier; and a clearing device to eject all the cartridges from said carrier, substantially as described.

23. In a machine for packing cartridges into boxes, a traveling carrier to receive cartridges uniformly fed thereto; means for inverting certain of the cartridges as they are forwarded by said carrier; an independent support for the inverted cartridges, the non-

inverted cartridges being supported by the carrier; a clearing device to act on all of the cartridges in the carrier; and a supplemental clearing device for those cartridges which
5 are inverted and supported on said independent support, substantially as described.

24. In a machine for packing cartridges in boxes, the combination with a carrier to receive cartridges fed thereto; of a traveling
10 member having parallel passages to receive cartridges from the carrier; means for advancing said traveling member to successively bring said passages to a position to receive the cartridges; and a spring-support,
15 stationary with relation to said traveling member and parallel to said passages, to prevent the cartridges from tipping over as they are moved into said passages, substantially as described.

25. In a machine for packing cartridges into boxes, the combination with arranging devices to arrange a number of cartridges in shape to fit a box; of a forwarding device to receive the cartridges thus arranged and
20 forward the same to the box; means for transferring the cartridges from the arranging device to the forwarding device; feed mechanism for said forwarding device and means for locking said forwarding device
25 stationary at the end of each feed movement, substantially as described.

26. In a machine for packing cartridges into boxes, the combination with arranging devices to arrange a number of cartridges in
35 such shape as to fit a box; of a forwarding device to receive the cartridges thus arranged and forward the same to the box; means for transferring the cartridges from the arranging device to the forwarding device; feed
40 mechanism for said forwarding device, means for locking said forwarding device stationary at the end of each feed movement; and means for frictionally retarding said forwarding device when not so locked, substantially as de-
45 scribed.

27. In a machine for packing cartridges into boxes, the combination with means for arranging said cartridges to fit the boxes; of a transferring device to receive the cartridges
50 thus arranged; said transferring device comprising a traveling member provided with open-ended recesses into which the cartridges are pushed after being arranged; guards adjacent to said member to prevent the cartridges from leaving the recesses in the travel
55 thereof; a box-chute adjacent to the path of said recesses; and means for yieldingly supporting a box in said chute in position to receive cartridges projecting from the recesses
60 in said traveling member, substantially as described.

28. In a machine for packing cartridges into boxes, the combination with means for arranging the cartridges to fit the boxes, of
65 a forwarding device comprising a rotatable member having one or more recesses adapted to receive the cartridges arranged for inser-

tion into a box, the said recesses being of such depth that the cartridges project therefrom, and a box-chute adjacent to said mem- 70
ber adapted to present a box in such position that the projecting cartridges will engage the inner wall thereof, substantially as described.

29. In a machine for packing cartridges into boxes, the combination with means for 75
arranging the cartridges to fit the boxes, of a forwarding device comprising a rotatable member having one or more recesses adapted to receive the cartridges arranged for insertion into a box, the said recesses being of 80
such depth that the cartridges project therefrom, a box-chute following the periphery of said member and terminating below the same, the distance between the supporting-wall of said chute and the periphery of said member 85
being substantially equal to the depth of the box, and means for yieldingly supporting the box in position to be engaged by the projecting cartridges and carried along thereby until the cartridges settle into the box by force of 90
gravity, substantially as described.

30. In a machine for packing articles into boxes, a supplemental arranging device comprising a member having convergent walls and being adapted to receive a predetermined 95
number of articles arranged in parallel lines; and means for pushing the lines of articles endwise from said member to compact the articles through the action of the convergent walls, as set forth. 100

31. A receptacle for lines or columns of cartridges having converging side walls, combined with traveling means for engaging both ends of each line or column of cartridges to slide said columns endwise from the said receptacle, and to thereby condense or compact 105
the articles for insertion into a package, substantially as described.

32. In a machine for packing articles into boxes, the combination with a receiver substantially equal in size to the box to be filled; a receptacle for lines or columns of articles, the walls of which receptacle converge toward the walls of said receiver; and means for sliding said columns endwise from the receptacle, 110
the converging walls condensing or compacting the articles as they enter the receiver, substantially as described. 115

33. In an apparatus for packing cartridges, the combination with a receptacle having 120
convergent walls and longitudinal division-strips; of traveling members movable parallel to said division-strips and adapted respectively to engage opposite ends of the lines or columns of cartridges therein, substantially as described. 125

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

PAUL BUTLER.

Witnesses:

HENRY J. LIVERMORE,
NANCY P. FORD.