March 14, 1944. A. C. McCORD ET AL 2,344,443

CARTRIDGE CLIP LOADING MACHINE

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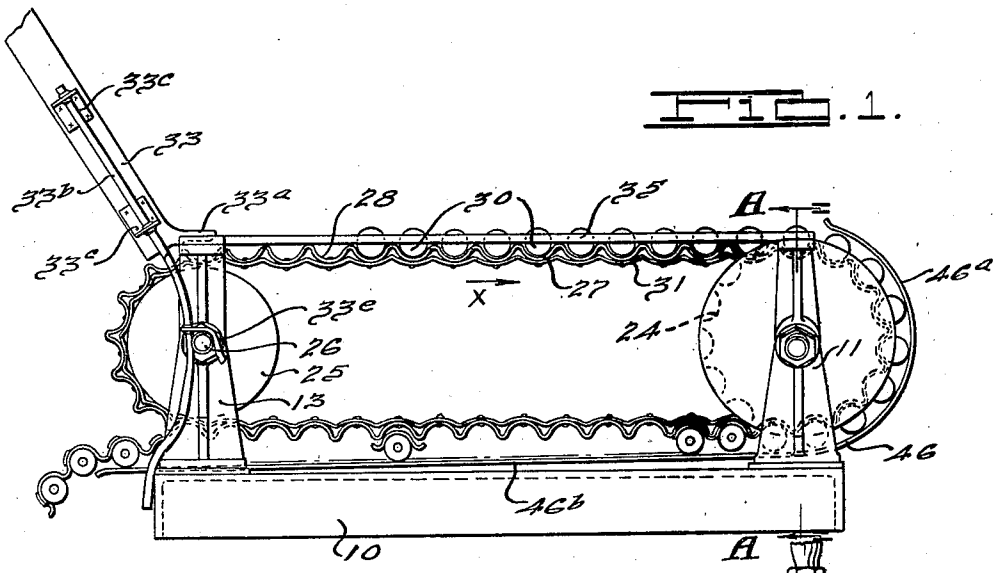

FIG. 1.

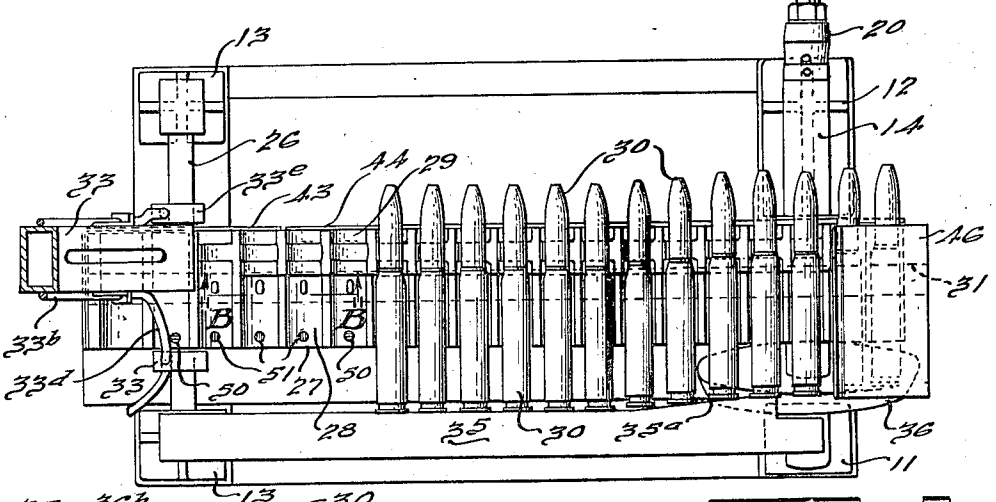

FIG. 2.

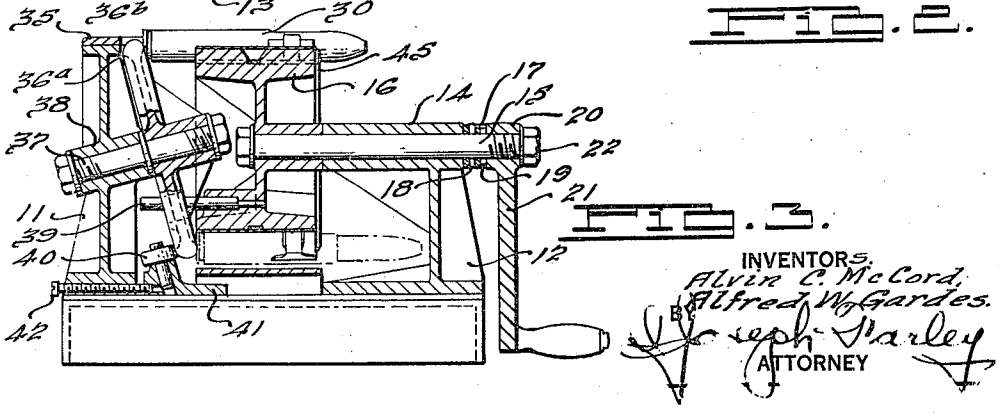

FIG. 3.

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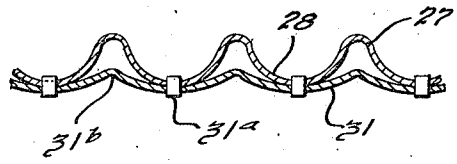
Fig. 4.



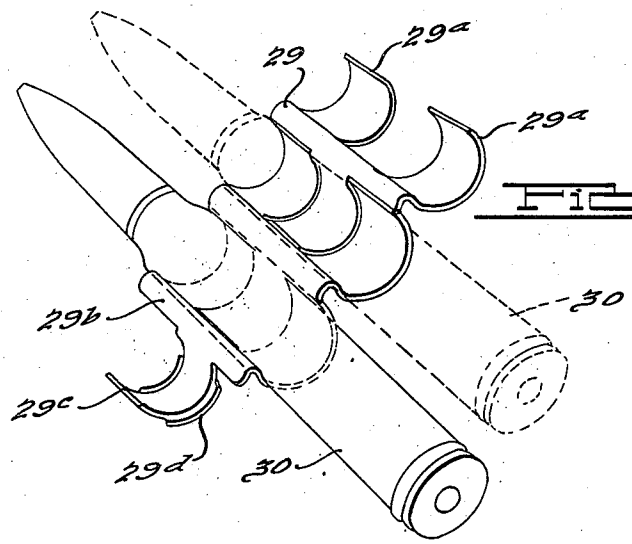


Fig. 5.

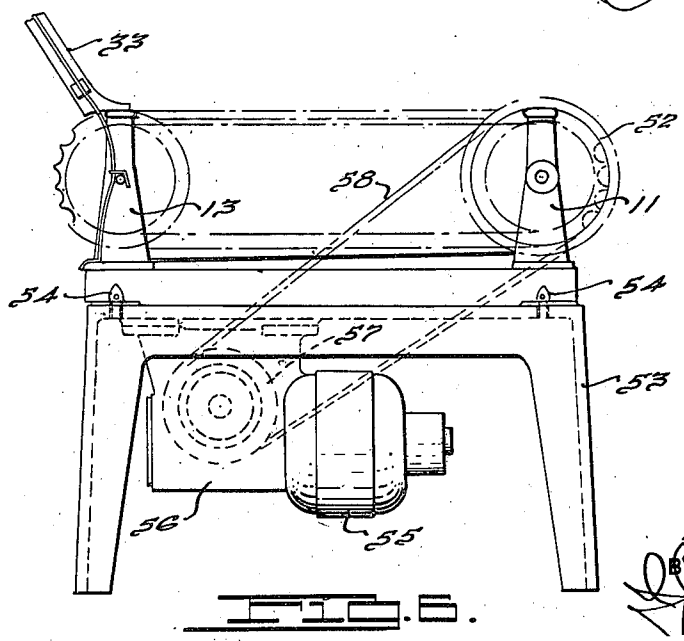


Fig. 6.

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FIG. 1.

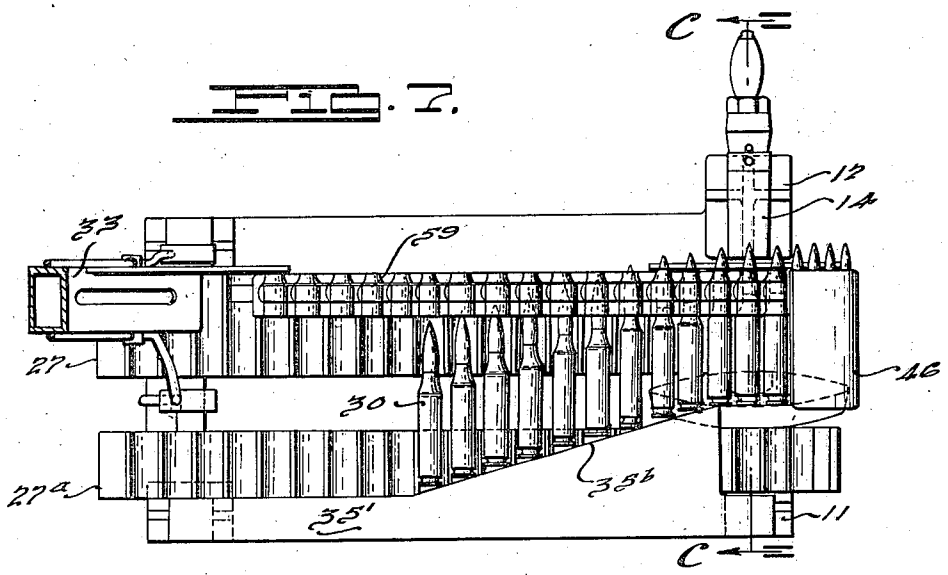


FIG. 2.

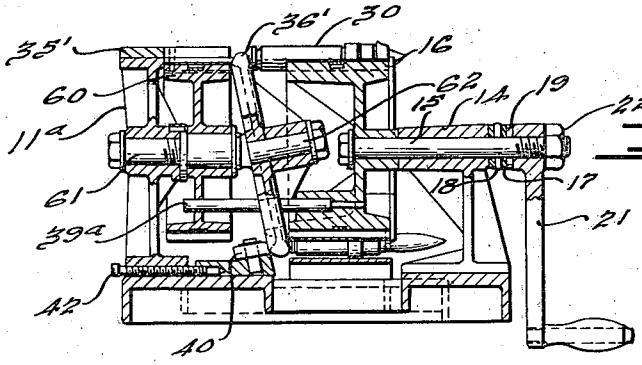
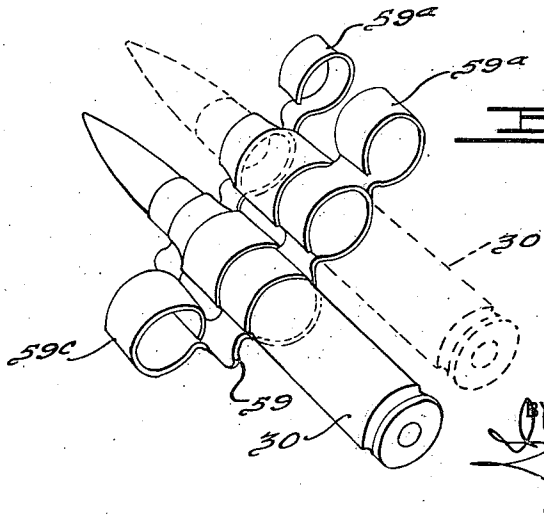


FIG. 3.



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UNITED STATES PATENT OFFICE

2,344,443

CARTRIDGE CLIP LOADING MACHINE

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Application June 30, 1942, Serial No. 449,134

20 Claims. (Cl. 86—48)

It is the practice to supply cartridges for rapid fire machine guns to the gun with the cartridges arranged in the form of a belt that is fed by a suitable automatic mechanism to the breech-loading apparatus of the gun. In machine guns, the cartridges are secured together in the desired spaced relationship in belt form by means of a plurality of metal clips which in effect form the links of a continuous chain; the cartridges being inserted into the clips or links and functioning with respect to the links in a manner similar to the connecting pins of an ordinary conveyor chain.

It was the practice to insert the cartridges into the links at main supply depots or arsenals and to ship the assembled cartridges in belt form to the field of military operation. In order to meet the demands for the enormous quantities of ammunition used in the present day warfare, automatic machines have been devised for feeding the cartridges and metal connecting links and inserting the cartridges into the links. Such machines, however, are complicated, costly and cumbersome and consequently can be used only at main supply depots or arsenals.

The development of modern warfare necessitates different arrangements, or patterns, as they are termed, of the cartridges in the connecting links to form the cartridge belts in accordance with the particular military operation or task to be performed. This is especially true of airplane operations where tracer bullets are largely employed for the machine guns carried by the planes. For example, the particular operation or task to be performed may make it desirable to employ one type of bullets, for example, incendiary bullets, in combination with tracer bullets. Another operation may make it desirable to use explosive bullets while for still another operation or task ball-cartridges may be used. If the cartridges are assembled in belt form, according to certain patterns at a main supply depot or arsenal, naturally there must of necessity be a considerable time interval between requisitioning and actual supplying of the ammunition to the field of operation, during which time interval radical changes in the nature of the military operations may occur. It has been found, therefore, that when the cartridges are assembled at a main base, the system is not flexible enough to meet the ever changing conditions of present day warfare. It is, therefore, highly desirable to have readily available some relatively light and comparatively inexpensive portable machines that can be supplied in quantity and for ready availability by combat groups in the field and by means of which the cartridges may be rapidly assembled into the connecting links to form the cartridge belts in accordance with the particular pattern best suited for such military operations as may be required or dictated by the ever changing conditions.

The principal object of the present invention is to supply a simple, inexpensive, light, portable machine for assembling the cartridges into the connecting links and capable of filling the desirable requirements as above outlined.

A further object is to supply a portable cartridge assembling machine of the type above set forth that can be operated either manually or by power.

These and other objects will appear more fully from the following detailed description and by reference to the accompanying drawings forming a part hereof wherein

Fig. 1 is a side elevation of a machine constructed in accordance with the principles of the present invention;

Fig. 2 is a plan view of the machine shown in Fig. 1;

Fig. 3 is a vertical cross-section taken on the line A—A of Fig. 1;

Fig. 4 is a cross-sectional detail of the conveying belt of the machine taken on the line B—B of Fig. 2;

Fig. 5 is a perspective showing the manner in which the cartridges are assembled into the connecting links by the operation of the machine;

Fig. 6 is a side elevation showing the manner in which the machine may be assembled upon a motor support or bracket for operating the machine by any suitable or available power means;

Fig. 7 is a plan view of a modified form of construction;

Fig. 8 is a vertical cross-section taken on the line C—C of Fig. 7, and

Fig. 9 is a perspective view of the cartridges as assembled into the links by the operation of the machine shown in Figs. 7 and 8.

As shown in Figs. 1 to 3 of the drawings, the machine comprises a supporting base 10 consisting of a simple rectangular frame preferably constructed of angle iron. Suitably secured at one end of the base 10 is a pair of supporting brackets 11 and 12. Mounted on the other end of the frame is a pair of brackets 13. The bracket 12 at its upper end is provided with an elongated bearing boss 14 in which is rotatably carried an

actuating shaft 15. Fixedly secured to the inner end of the shaft 15 is a sprocket wheel 16, the sprocket wheel having a boss portion which abuts the inner face of the boss 14 of the bracket 12, and is held against movement longitudinally of the shaft by a collar 17 suitably secured to the shaft 15, as by means of a tapered pin 18. The shaft 15 exteriorly of the collar 18 is provided with a driving pin 19, the projecting ends of which are adapted to be seated within, and be engaged by, suitable grooves formed on the inner end of the boss 20 of a crank handle 21, a nut 22 preferably being provided to hold the crank handle in proper position upon the actuating shaft 15.

The periphery of the sprocket 16 (see Fig. 1) is provided with a plurality of teeth 24*a* and recesses 24, shaped to conform to the size of the cartridges for which the machine is designed to be used. Trained about the sprocket 16 and an idler wheel 25 carried by the shaft 26 supported in the brackets 13 is a conveyor belt 27. The conveyor belt 27 preferably consists of a thin sheet of flexible, resilient metal pre-formed or corrugated to provide a plurality of recesses 28 which form, in effect, troughs to receive the connecting links 29 and cartridges 30. The belt 27 is so pre-formed that the troughs 28 thereof and the teeth like projections 28*a* thereof are substantial replicas of the recesses 24 and teeth 24*a* of the sprocket 16, the troughs and projections of the belt having the same pitch and tooth contours as the sprocket teeth when the belt is travelling around the sprocket. This insures perfect engagement of the belt and sprocket as the teeth of the latter come into engagement with the belt as it starts around the sprocket and therefore prevents the belt from riding up on the sprocket teeth as well as any possibility of any jamming of the cartridges as they enter into that part of the belt's travel where it is engaged by the sprocket. As any section of the belt, however, is travelling along its upper or lower straight runs there will be a slight deviation from the ideal or pre-formed tooth contour resulting from its deformation from the curved into what might be termed the developed or planar form.

In order to insure the maintenance of the constant pitch between the conveyor belt 27 and the sprocket 16 and for resisting any tendency towards undue deformation of the conveyor belt, the latter is reinforced by a thin strip of spring material 31 preferably made of beryllium copper and suitably secured along the longitudinal center line of the conveyor belt 27. The reinforcing spring strip 31 is secured to the bottom of each of the troughs 28 by any suitable means such as the stapling or stitching indicated by the reference character 31*a*. In between each of the points of attachment 30 of the spring strip 31 to the conveyor 27, the strip is preferably preformed with an indentation 31*b* which serves to facilitate the close contact of the belt troughs 28 to the configuration of the teeth formed in the sprocket wheel 16 as the belt 27 is carried around the sprocket; the gear teeth, however, being cut away as indicated at 16*a* (Fig. 3) to provide clearance for the strip 31. It will also be noted that as no links or cartridges are carried by the belt 27 as it passes around the idler wheel 25, the latter is not provided with sprocket teeth, thus permitting the belt and reinforcing strip 31 to be self-adjusting, as it were, about the idler as the belt and strip are locally deformed in passing around the sprocket 16.

Means are preferably provided for feeding the links 29 automatically to the conveyor belt and such means in the constructional example illustrated, consists of a hopper 33 in the form of a chute suitably shaped to the configuration of the links and having its lower end terminating adjacent the top face of the conveyor belt as the latter moves around the idler roll 25, the end of the chute terminating in a position such that the lowermost link will drop into one of the recesses 28 to be carried thereby along the upper horizontal reach or run of the conveyor belt.

The links 29, as shown most clearly in Fig. 5, are stamped out of a single piece of metal to form a pair of spaced clip portions 29—*a*, a connecting bridge portion 29—*b* and a third clip portion 29—*c* which projects from the central part of the bridge portion 29—*b* and so that when the links are placed within the trough and the cartridges are inserted therein the clip portion 29—*c* of one link projects into the space between the pair of spaced clip portions 29—*a*. The clip portion 29—*c* is provided with small off-set flanges 29—*e* against which the clip portions 29—*a* of the adjacent link seat so as to prevent accidental disengagement of any one of the links after the cartridges have been inserted into them to form a continuous belt-like structure. The links are placed in the hopper end to end in substantially the same relationship with respect to each other that they have when the cartridges are inserted into the links, but with the clip portion 29—*a* of each link lowermost and resting on the flanges 29—*d* of the next lower link. As two clip portions 29—*a* and one portion 29—*c* engage in each one of the troughs 28 of the conveyor, the links are swung from the vertically inclined position which they occupy in the hopper towards a horizontal position; this movement obviously being performed by the travel of the conveyor belt from left to right in Fig. 1. At its lower end the hopper has a flared lip portion 33—*a* which serves as a guide to insure that the links will not be pushed upwardly in their turning movement from the substantially vertical to the horizontal position which they naturally assume in the conveyor as it moves from left to right.

As the machine of the present invention is primarily designed for use as a portable machine, the hopper 33 is detachably connected to the machine in any suitable way. A convenient simple way for this, as shown in Fig. 1, consists in a pair of rods 33—*b* fixed one to each side of the hopper in angle brackets 33—*c*, one of the rods being flared outwardly as indicated in Fig. 2 at 33—*d* to clear the conveyor belt 27, and each of the rods 33—*b* being provided with a U-shaped web portion 33—*e* to straddle the shaft 26. The rods 33—*b* project downwardly past the shaft 26 to engage with the supporting framework, thereby to hold the hopper against rotation about the shaft 26 and in proper position relative to the troughs of the conveyor.

As the crank handle 21 is rotated to actuate the conveyor in the direction indicated by the arrow X in Fig. 1, the links will be carried towards the driving sprocket 16, and as the conveyor moves along, an operative places a cartridge in each of the troughs 28 with the bullet end thereof seated within the clips 29*a*—29*c*, as shown in Fig. 2 of the drawings. The links 29 being of the type wherein the clip arms are not a fully closed annulus or ring but are but slightly more than a semi-circle with the top portions

thereof open, the cartridges may be placed vertically from above to be seated within the clips.

A cam plate 35 extends along one side of the machine and is suitably secured to the top of the bracket 11 and the top of one of the brackets 13 at the other end of the machine and as the cartridges are placed in position within the troughs 28, the rear ends of the cartridge are placed in position on the troughs so that the shell end of the cartridge rests against the inner vertical wall of the cam plate 35.

As shown most clearly in Fig. 2, the cam plate is provided with an inclined cam face 35—*a* which extends at a suitable inclination such that as the cartridges are carried along by the belt 27, the engagement of the rear end of the shell of the inclined camming face 35—*a* moves the cartridge inwardly towards the belt 27 until the enlarged shell part of the cartridge is just about to enter into the links 29. The camming face 35—*a* terminates at the right hand end thereof (Fig. 2) adjacent the inner face of a pusher wheel 36. The wheel 36 is carried by an inclined shaft 37 suitably supported in a boss 38 formed integral with the bracket 11. The wheel 36 is driven by means of a driving pin 39 carried by the sprocket wheel 16, which pin 39 projects into a suitable hole formed in one of the webs of the pusher wheel 36. As a result of the construction just described, the pusher wheel 36 is driven at the same angular velocity as the sprocket wheel 16. As the pusher wheel 36 is rotated, the engagement of the inner side face thereof with the shell end of the cartridge causes the shell portion of the cartridge to be pushed through into the arms of the spring clip portions of the links 29 until the cartridge is accurately located in proper position within, and longitudinally of, the spring clips. The diametral dimensions of the loop or clip portions relative to the diameter of the shell portion of the cartridge is such that the clip portions 29—*a* of the links engage the cartridge in a very snug, tight engagement while the clip portions 29—*c* are a few thousandths larger than the shell portion of the cartridge, thus permitting the assembled belt of cartridges to flex readily to facilitate, not only handling of the belts of cartridges, but the feeding of the cartridges to the machine gun. As quite some pressure is required to thrust the cartridges home to their proper position within the spring clips 29—*c*, a backing roll 40 is provided for engagement with the bottom of the pusher wheel as shown in Fig. 3, the face 36—*a* of the pusher wheel being preferably made flat for more effective engagement of the periphery of the backing roll 40 while the opposed face 36—*b* of the wheel is curved to compensate for the different positions this face of the pusher wheel takes relative to the shell end of the cartridge as it is moved from its point of engagement with the wheel at the top and bottom thereof.

In order that the cartridges will be fed to the firing or loading mechanism of the gun in which they are to be used, they must be positioned longitudinally of the links with great precision, only a few thousandths of an inch tolerance being permitted for this purpose. To insure this required accuracy the backing roll 40 is mounted in a bracket 41 bolted to the framework of the machine by bolts passing through customary elongated slots, not shown, an adjusting screw 42, screwed into the base of the bracket 11 being provided to adjust the bracket 41 and backing roll 40 laterally of the machine.

For the purpose of holding the links in proper position in their travel along the conveyor, a guide plate 43 is mounted at one side of the conveyor belt 27 adjacent to the delivery end of the hopper 33. A second guide plate 44 also extends along the main length of the conveyor's upper run and serves as a backing for the links to prevent movement thereof sidewise of the conveyor as the cartridges are given their longitudinal initial movement into the clips thereof by the inclined cam 35—*a*. The guide plate 44 aligns with a similar guide or backing plate 45 secured to the sprocket 16 (see Fig. 3). As the cartridges are carried around the sprocket 16 and are shoved home to proper position by the action of the pusher wheel 36, the plate 45 holds the links against displacement and insures the proper, precise and accurate positioning of the cartridges relatively to the links.

For the purpose of holding the cartridges properly seated within the troughs 28 as the cartridges pass around the periphery of the sprocket 16, and as they are being shoved home into the links by the action of the pusher wheel 36, a guide plate 46 is provided having an arcuate portion 46—*a* extending around in concentrically spaced relationship to the sprocket wheel such that the cartridges will be held snugly within the troughs. The backing plate 46 is also provided with an inclined portion 46—*b* extending along the lower run of the conveyor belt's travel and so that as the cartridges are carried along from right to left, they rest upon the inclined plate 46—*b* and are gradually disengaged from the troughs 28 of the conveyor whereby as the cartridges pass to the left beyond the idler roll 25 they are completely disengaged from the conveyor belt and are permitted to travel downwardly out of the machine as indicated in Fig. 1.

As it is of vital importance, as heretofore pointed out, that the cartridges be arranged relative to each other in accordance with a definite predetermined pattern depending upon the nature of the combat operations, the present invention contemplates the use of suitable indicia, preferably in the nature of small colored blocks properly placed in the troughs of the conveyor. If, for example, the pattern is a 1–3–1 pattern, to represent say, one tracer bullet, three incendiaries and one tracer, the color blocks 50 may be blue as indicated in Fig. 2, while the color blocks 51 may be red, the pattern being repeated along the belt. These color blocks may be in the form of detachable stickers, or the colors may be indicated in any suitable manner.

The operation of the machine so far described will be readily understood. The hopper 33 being filled with a plurality of clips, the crank handle 21 is rotated to cause the upper run of the conveyor belt 27 to move from left to right as indicated by the arrow X in Fig. 1 of the drawings. The clips 29 are engaged within the troughs 28 of the belt 27 and are carried along towards the sprocket wheel 16.

The present machine being, what might be termed, semi-automatic and intended primarily as a portable machine, the cartridges are placed in position on the conveyor belt manually, two operatives preferably being used, one standing on one side of the machine having a supply, for example, of incendiary bullet cartridges, will place three of the cartridges in three adjacent troughs, as indicated by the red color blocks 51 while the operative on the other side of the machine having a supply of tracer bullets to be used in combination with the incendiaries would place a cartridge in each of the troughs having a blue color block

50 therein. As the upper run of the conveyor belt travels towards the right of the machine, the inclined cam face 35—*a* pushes the cartridge part way into the links and brings the shell end thereof in proper position for engagement by the pusher wheel 36. The pusher wheel 36 then takes over and completes the job of shoving the cartridges home to their proper position within the links as the cartridges travel from the top to the bottom of the sprocket wheel. The cartridges then being fully assembled in belt-like form, travel from the right to the left of the machine along the lower run of the conveyor but resting on the plate 46—*b* and, as heretofore pointed out, after they have passed beyond the bottom of the idler wheel 25 they are fully disengaged from the troughs 28 of the conveyor and pass out of the machine at the left hand side thereof.

Although the machine is capable of loading any number of cartridges into the links by purely manual operation, there may, however, be times when it will be desirable to have power means for actuating the machine at bases where power is readily available. The crank handle 21, as heretofore pointed out, is therefore made readily detachable and in place of the handle wheel 21 a belt pulley 52 may readily be substituted for the crank handle, the pulley, of course, having suitable slots in the hub thereof for engagement with the driving pin 19. A motor base 53, as shown in Fig. 6, is provided for power operation, the base preferably having a pair of upwardly projecting dowel pins 54 adapted to engage within suitable apertures in the base 10 of the machine. The motor bracket is designed so as to accommodate any desired or readily available type of motor. As shown in Fig. 6, an electric motor 55 is carried by the base and drives, through suitable reduction gearing housed within the gear casing 56, a driving pulley 57 about which and the pulley 52 a suitable driving belt 58 is trained.

The machine shown in Figs. 7 and 8 operates on the same principles as in the machine shown in Figs. 1 to 3, there being slight differences in constructional details necessitated by the different characteristics of the links shown in Fig. 9. As shown in Fig. 9, the links 59 are of the type wherein the clip portions 59—*a* and 59—*c* are in the form of substantially complete rings. As a result, the cartridges cannot have the bullet ends thereof inserted vertically from above into the clips as with the machine of Figs. 1 to 3, but the cartridges must be placed on the conveyor belts with the bullet end thereof spaced from the clips as indicated in Fig. 7 of the drawings.

For the purpose of properly supporting the cartridges for the greater extent of movement required, the machine of Fig. 7 is provided with a conveyor belt 27 the construction of which is identical in all respects with the conveyor belt 27 of the machine just described. An additional conveyor belt 27—*a*, however, is provided which is spaced laterally from the conveyor belt 27 a sufficient distance to permit the pusher wheel 36 to project up into the spaces between the two conveyor belts for proper and effective engagement with the shell ends of the cartridges as they pass to the right hand side of the machine to be engaged within the sprocket 16. Due to the necessity for greater travel of the cartridges into the closed type of links, the cam plate 35' has the inclined cam face thereof 35—*b* much longer than the cam face 35—*a* and at a greater angle of inclination. Due also to the spacing of the conveyor belts 27 and 27—*a*, the machine of Figs. 7 and 8 is provided with a second sprocket wheel 60 suitably carried upon a shaft 61 mounted in the bracket 11—*a*. The shaft 61 has an inclined projecting stub end 62 upon which the pusher wheel 36' is rotatably mounted.

Driving of the sprocket wheel 60 from the sprocket wheel 16 is effected by means of a pin 39—*a* similar to the pin 39, but long enough to pass through the pusher wheel 36' and into a suitable hole provided in the web of the sprocket 60.

The construction of the machine of Figs. 7 and 8 in all other respects is the same as that of Figs. 1 to 3, a backing roll 40 and adjusting screw 42 therefor, being provided for accurately adjusting the position to which the pusher wheel 36' locates the cartridges relative to the links.

The operation of the machine of Figs. 7 and 8 will be readily apparent from an inspection of the drawings, and in view of the foregoing description of the machine of Figs. 1 to 3.

As it is of the utmost importance that there be no deformation of the shell or firing pin end of the cartridge during the loading operation, the machine of the present invention is particularly designed to prevent such deformation. During the initial travel of the cartridges into the links as effected by the cam surface 35—*a* of Fig. 2, or the cam surface 35—*b* of Fig. 7, the cartridges are pushed into the links only far enough to the point where the enlarged shell portions of the cartridges are about to engage with the spring clip portions 29—*a* or 59—*a*, as the case may be, and the only resistance offered to this movement of the cartridge is that of the weight of the cartridges. At the point where the cartridges are engaged by pusher wheel 36 or 36', the enlarged shell end of the cartridge is just about to enter into the spring clip portions 29—*a* and 59—*a*, and must then be moved longitudinally against the spring pressure of the said clip portions. The design and construction of the machine is such, however, that the pusher wheel 36 and 36' move with precisely the same angular velocity as the sprocket wheel 16 and there is, therefore, no sliding contact, or sliding action, between the shell end of the cartridge and the face of the pusher wheel which engages said shell end, but the pusher wheel merely exerts a straight, longitudinal pressure on the ends of the cartridges as they are forced into tight engagement with the spring clips 29—*a* or 59—*a*.

It will be readily understood that when conditions require, any variation of the pattern may be quickly and readily effected by changing the color blocks 50 and 51 and the specific arrangement thereof as desired. If certain colors are used at all times to designate the different types of bullets, for example, red for incendiaries, black for ball cartridges, yellow for explosives and blue for tracers, suitable colored indicia may be put on the cartridges and then the corresponding indicia placed on the belt 27 in accordance with the predetermined pattern.

As will be seen from the foregoing, the machine is very simple and inexpensive in its construction and can very readily be adapted to loading cartridges of various sizes into cartridge holding clips of different characteristics, such slight modifications in details of construction as might be required for adapting the machine to different sizes of cartridges and shapes of links being well within the ability of those skilled in the art without necessitating any departure from the principles of the invention.

We claim:

1. A machine of the character described comprising a continuous flexible sheet metal conveyor belt having a plurality of open troughs into which a plurality of cartridges are adapted to be seated, means for feeding cartridge holding links to said troughs, a rotatable drum having a plurality of alternate grooves and projections in its periphery conforming to the contour of said belt for engaging and driving said conveyor belt and cam means for pushing said cartridges to a pre-determined position into said clips as said cartridges are carried along by said conveyor belt.

2. In a machine of the character described, a conveyor belt comprising a continuous sheet of flexible material formed to provide a plurality of open troughs into which a plurality of cartridges are adapted to be seated, a rotatable drum having a plurality of gear teeth shaped to conform to the contour of the said conveyor for driving engagement therewith, means for feeding a plurality of cartridge holding links into the troughs of said conveyor and cam means for engaging the shell ends of said cartridges as they are carried around by said sprocket wheel on said conveyor to push said cartridges longitudinally to a proper pre-determined position longitudinally of said links.

3. A portable machine for loading cartridges into cartridge holding links to hold said cartridges in belt form for feeding to a machine gun, comprising a continuous flexible sheet metal conveyor belt having a plurality of open troughs into which the cartridges are adapted to be placed, each of said troughs being provided with suitable indicia for indicating the nature of the cartridge to be placed therein in accordance with a definite pre-determined firing pattern.

4. A portable machine for loading cartridges into cartridge holding links to hold said cartridges in belt form for feeding to a machine gun comprising a conveyor belt having a plurality of open troughs into which the cartridges are adapted to be placed, a sprocket wheel having a plurality of driving teeth and recesses therein, said recesses being shaped to conform to the troughs of said conveyor belt and cooperating with said teeth for driving engagement with said conveyor belt, means for driving said sprocket, cam means adjacent said sprocket for engaging the ends of said cartridges and for pushing the same longitudinally into said links to a proper pre-determined position relatively thereto and means for driving said cam means at the same angular velocity as said sprocket to exert longitudinal pressure only on the shell ends of said cartridges thereby to avoid sliding contact and resulting deformation of said shell ends.

5. A portable machine for loading cartridges into cartridge holding links to hold said cartridges in belt form for feeding to a machine gun comprising a conveyor having a plurality of open troughs adapted to receive said links and the cartridges to be inserted therein, a sprocket wheel in driving engagement with said conveyor belt, means for driving said sprocket wheel, cam means at one side of said sprocket wheel for engaging the cartridges and moving the same longitudinally to a proper pre-determined position relative to said links, means for driving said cam means at the same angular velocity as said sprocket wheel, and additional cam means for engaging said cartridges to effect initial entry thereof into said links and for locating the said cartridge in proper position for engagement by said cam means.

6. A portable machine for loading cartridges into cartridge holding links to hold said cartridges in belt form for feeding to a machine gun, comprising a conveyor having a plurality of open troughs adapted to receive said links and the cartridges to be inserted therein, a sprocket wheel in driving engagement with said conveyor belt, means for driving said sprocket wheel, cam means at one side of said sprocket wheel for engaging said cartridges and pushing the same to a proper pre-determined position relative to said links, backing means located at the other side of said sprocket wheel for engaging said links and preventing movement thereof laterally of said conveyor as said cartridges are pushed into said links, means for driving said cam means at the same angular velocity as said sprocket wheel and additional cam means for engaging said cartridges to effect initial entry thereof into said links and for locating said cartridges in proper position for engagement by said cam means.

7. A portable machine for loading cartridges into cartridge holding links to hold said cartridges in belt form for feeding to a machine gun, comprising a conveyor having a plurality of open troughs adapted to receive said links and the cartridges to be inserted therein, a sprocket wheel in driving engagement with said conveyor belt, means for driving said sprocket wheel, cam means at one side of said sprocket wheel for engaging said cartridges and pushing the same to a proper pre-determined position relative to said links, backing means located at the other side of said sprocket wheel for engaging said links and preventing movement thereof laterally of said conveyor as said cartridges are pushed into said links, means for driving said cam means at the same angular velocity as said sprocket wheel, additional cam means for engaging said cartridges to effect initial entry thereof into said links and for said cartridges in proper position for engagement by said cam means, and an arcuate backing plate extending in concentrically spaced relationship to said sprocket wheel to hold the cartridges seated within the troughs of said conveyor as the latter is carried around said sprocket wheel.

8. A portable machine for loading cartridges into cartridge holding links to hold said cartridges in belt form for feeding to a machine gun, comprising a conveyor having a plurality of open troughs adapted to receive said links and the cartridges to be inserted therein, a sprocket wheel in driving engagement with said conveyor belt, means for driving said sprocket wheel, cam means at one side of said sprocket wheel for said cartridges and pushing the same to a proper pre-determined position relative to said links, backing means located at the other side of said sprocket wheel for engaging said links and preventing movement thereof laterally of said conveyor as said cartridges are pushed into said links, means for driving said cam means at the same angular velocity as said sprocket wheel, additional cam means for engaging said cartridges to effect initial entry thereof into said links and for locating the shell ends of said cartridges in proper position for engagement by said first named cam means, an arcuate backing plate extending in concentrically spaced relationship to said sprocket wheel to hold the car-

tridges seated within the troughs of said conveyor as the latter is carried around said sprocket wheel and guide means for directing the assembled links and cartridges towards a delivery point of the machine while disengaging the cartridge and the links from the troughs of said conveyor.

9. A portable machine for loading cartridges into cartridge holding links to hold said cartridges in belt form for feeding to a machine gun, comprising a conveyor belt having a plurality of open troughs into which the cartridges are adapted to be placed, a hopper for delivering the links to be loaded automatically into the open troughs of said conveyor, guide means for holding said links in proper position in said troughs, a sprocket wheel for driving said conveyor, means for engaging said cartridges to effect initial entry thereof into said links as they are carried by said conveyor towards said sprocket wheel, and rotatable cam means at one side of said sprocket wheel for engaging said cartridges and effecting final movement thereof to a proper pre-determined position relative to said links as the latter are carried around said sprocket by said conveyor.

10. A portable machine for loading cartridges into cartridge holding links to hold said cartridges in belt form for feeding to a machine gun, comprising a conveyor belt having a plurality of open troughs into which the cartridges are adapted to be placed, a hopper for delivering the links to be loaded automatically into the open troughs of said conveyor, guide means for holding said links in proper position in said troughs, a sprocket wheel for driving said conveyor, means for engaging the cartridges to effect initial entry thereof into said links as they are carried by said conveyor towards said sprocket wheel, rotatable cam means at one side of said sprocket wheel for engaging the shell ends of said cartridges and effecting final movement thereof to a proper pre-determined position relative to said links as the latter are carried around said sprocket by said conveyor, and means for driving said last named cam means at the same angular velocity as said sprocket wheel to exert longitudinal pressure only on the shell ends of said cartridges thereby to avoid sliding contact between said cam means and shell ends and prevent deformation of the latter.

11. A portable machine for loading cartridges into cartridge holding links to hold said cartridges in belt form for feeding to a machine gun, comprising a conveyor belt having a plurality of open troughs into which the cartridges and links are adapted to be placed, a sprocket wheel about which said conveyor is trained for driving engagement, a rotatable pusher cam located at one side of said sprocket wheel for engagement with the shell ends of said cartridges and inclined at an angle to said sprocket for pushing said cartridges into said links, and a driving connection between said sprocket and cam to drive said cam at the same angular velocity as said sprocket.

12. A portable machine for loading cartridges into cartridge holding links to hold said cartridges in belt form for feeding to a machine gun, comprising a conveyor belt having a plurality of open troughs into which the cartridges and links are adapted to be placed, a sprocket wheel about which said conveyor is trained for driving engagement, a rotatable pusher cam located at one side of said sprocket wheel for engagement with the shell ends of said cartridges and inclined at an angle to said sprocket, a driving connection between said sprocket and cam to drive said cam at the same angular velocity as said sprocket, backing means on the other side of said sprocket to engage said links and prevent lateral movement thereof as said cartridges are pushed into said links by said cam means and a backing roll for engaging said cam and holding the same at a pre-determined distance from said backing means to insure accurate positioning of said cartridges longitudinally of said links.

13. A portable machine for loading cartridges into cartridge holding links to hold said cartridges in belt form for feeding to a machine gun, comprising a conveyor belt having a plurality of open troughs into which said cartridges and said links are adapted to be placed, a sprocket wheel about which said conveyor is trained for driving engagement, a rotatable pusher cam located at one side of said sprocket wheel for engagement with the shell ends of said cartridges and inclined at an angle to said sprocket, a driving connection between said sprocket and cam to drive said cam at the same angular velocity as said sprocket, backing means on the other side of said sprocket to engage said links and prevent lateral movement thereof as said cartridges are pushed into said links by said cam means, a backing roll for engaging said cam and holding the same at a pre-determined distance from said backing means to insure accurate positioning of said cartridges longitudinally of said links, and means for adjusting said backing roll to vary the spacing of said cam means from said backing means.

14. A portable machine for loading cartridges into cartridge holding links to hold said cartridges in belt form for feeding to a machine gun, comprising an endless conveyor belt having a plurality of spaced open troughs into which the cartridges are adapted to be placed, a sprocket wheel having a plurality of teeth and recesses shaped to conform to the configuration of the cartridges to be loaded, said conveyor being provided with toothed portions between said troughs and said toothed portions and troughs being preformed to the same pitch and contour as the teeth and recesses of said sprocket and means for maintaining said portions and troughs at a constant pitch.

15. A portable machine for loading cartridges into cartridge holding links to hold said cartridges in belt form for feeding to a machine gun, comprising a conveyor belt, a toothed sprocket wheel about which said conveyor belt is trained, said conveyor belt being pre-formed to provide a plurality of spaced open troughs into which the cartridges and links are adapted to be placed with toothed portions therebetween shaped to conform to the contour and pitch of the teeth of said sprocket and spring means interposed between said conveyor and said sprocket to hold said conveyor in driving engagement with said sprocket, and to maintain the troughs and toothed portions thereof at constant pitch, said spring means comprising a narrow strip of pre-formed spring material projecting into the toothed portions of said conveyor and means for securing said strip to the bottom of each of said troughs.

16. A portable machine for loading cartridges into cartridge holding links to hold said cartridges in belt form for feeding to a machine

gun, comprising a conveyor belt having a plurality of open troughs into which the cartridges and links are adapted to be placed, a sprocket having a plurality of gear teeth and recesses shaped to conform to, and engage with, the troughs of said conveyor and means for insuring tight driving engagement between said conveyor and sprocket to hold the troughs of said conveyor at a constant pitch and to prevent movement of the conveyor laterally of said sprocket comprising a strip of resilient material interposed between said sprocket and conveyor, said strip of material being of shorter longitudinal linear dimension than said conveyor.

17. A portable machine for loading cartridges into cartridge holding links to hold said cartridges in belt form for feeding to a machine gun, comprising a conveyor belt having a plurality of open troughs into which the cartridges and links are adapted to be placed, a sprocket having a plurality of gear teeth and recesses shaped to conform to, and engage with, the troughs of said conveyor, means for insuring tight driving engagement between said conveyor and sprocket, to hold the troughs of said conveyor at constant pitch and to prevent movement of the conveyor laterally of said sprocket comprising a strip of resilient material interposed between said sprocket and conveyor, said strip of material being of shorter longitudinal linear dimension than said conveyor, and means for securing said strip of material to the bottom of the troughs of said conveyor, said strip having pre-formed portions extending into the valleys formed by said troughs but spaced therefrom.

18. A portable machine for loading cartridges into cartridge holding links to hold said cartridges in belt form for feeding to a machine gun, comprising a conveyor belt having a plurality of open troughs into which the cartridges and links are adapted to be placed, a sprocket having a plurality of gear teeth and recesses shaped to conform to, and engage with, the troughs of said conveyor, means for insuring tight driving engagement between said conveyor and sprocket, for holding said troughs at a constant pitch and to prevent movement of the conveyor laterally of said sprocket comprising a strip of resilient material interposed between said sprocket and conveyor, said strip of material being of shorter longitudinal linear dimensions than said conveyor, means for securing said strip of mateiral to the bottom of the troughs of said conveyor, and an arcuate backing plate extending in spaced concentric relationship to said sprocket for engagement with the cartridges, thereby to hold the troughs of said conveyor in snug engagement with said sprocket against the action of said resilient strip.

19. A portable machine for loading cartridges into cartridge holding links to hold said cartridges in belt form for feeding to a machine gun, comprising a conveyor belt having a plurality of open troughs into which the cartridges and links are adapted to be placed, a supporting framework, a sprocket wheel and an idler wheel about which said conveyor is trained and means for supporting said wheels from said framework, a motor supporting frame, means for detachably connecting said supporting framework to said motor frame, a motor carried by said frame, and driving connections between said motor and sprocket.

20. A portable machine for loading cartridges into cartridge holding links to hold said cartridges in belt form for feeding to a machine gun, comprising a conveyor belt having a plurality of open troughs into which the cartridges and links are adapted to be placed, a hopper for feeding links to the troughs of said conveyor and means for connecting said hopper to said machine for quick detachability and means for holding said hopper when in operative position with its delivery end properly positioned to feed the clips to the open troughs of said conveyor.

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