Sept. 13, 1949. E. C. M. D'ASSIS-FONSECA 2,481,726

AMMUNITION BELT FEED MECHANISM FOR AUTOMATIC FIREARMS

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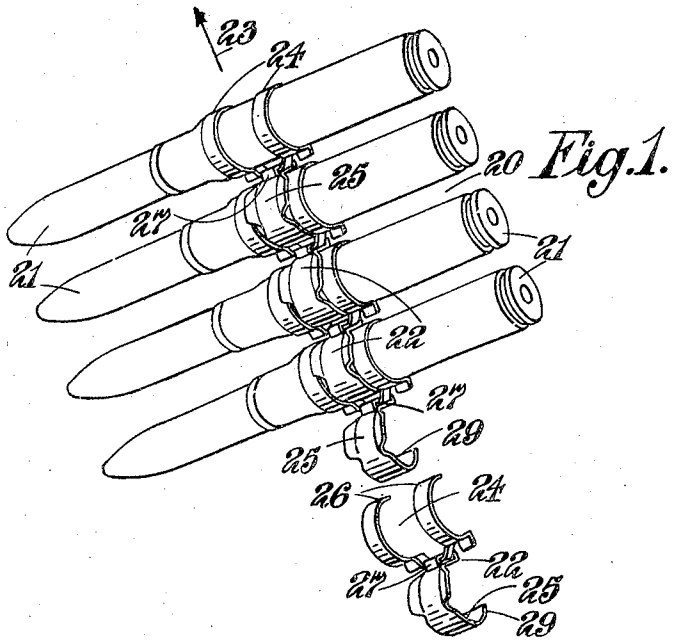


Fig. 1.

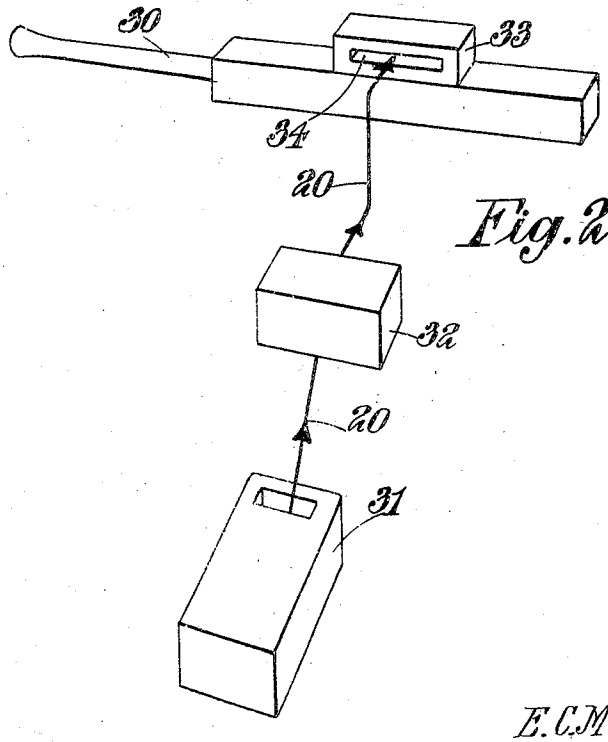


Fig. 2.

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Fig. 3.

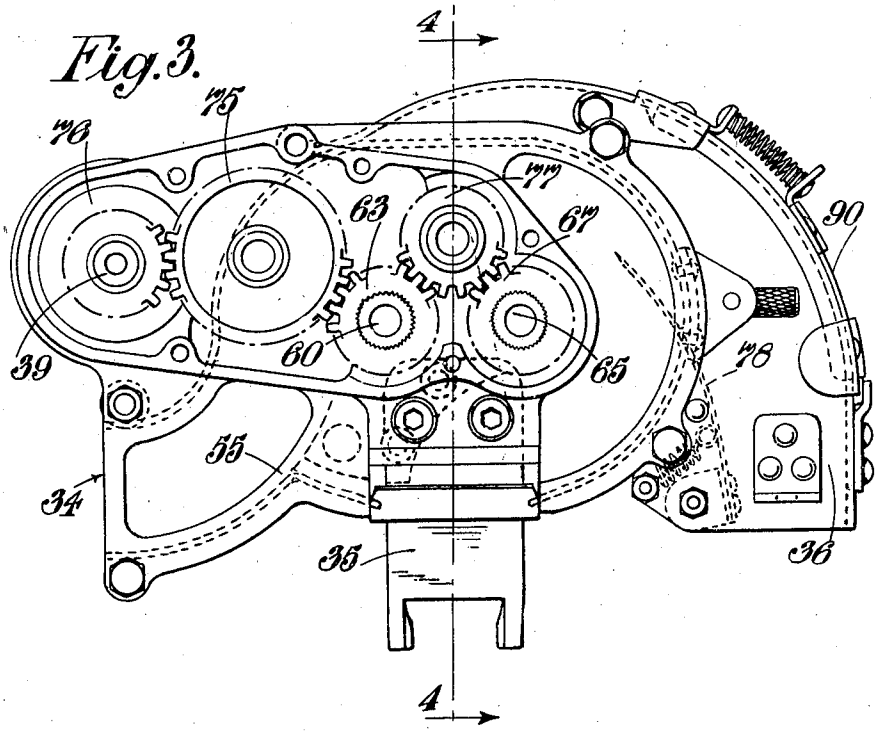
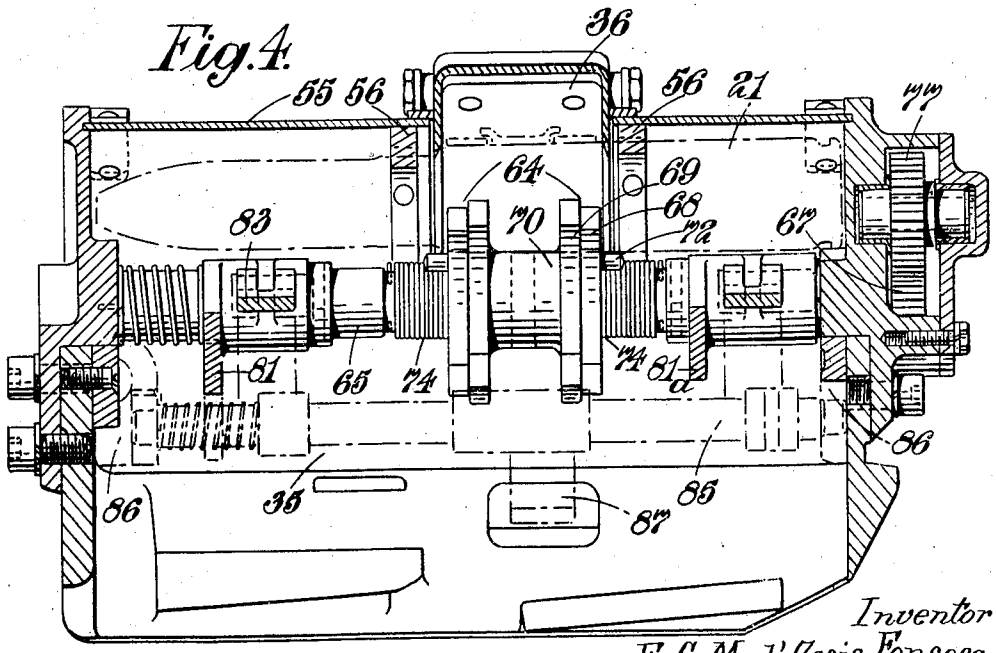


Fig. 4.



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AMMUNITION BELT FEED MECHANISM FOR AUTOMATIC FIREARMS

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Fig. 8.

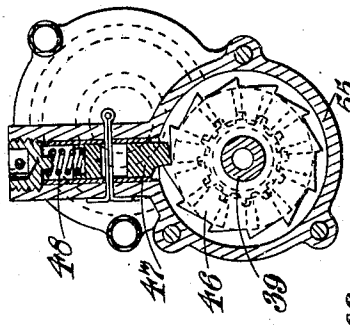


Fig. 10.

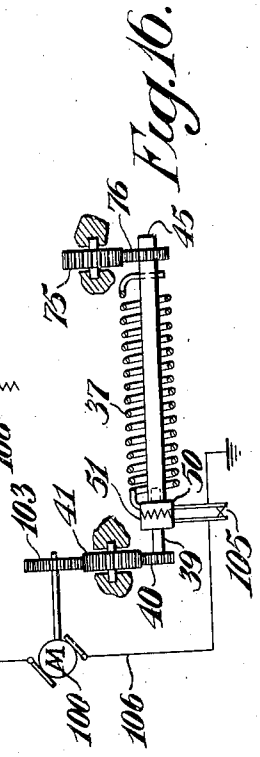
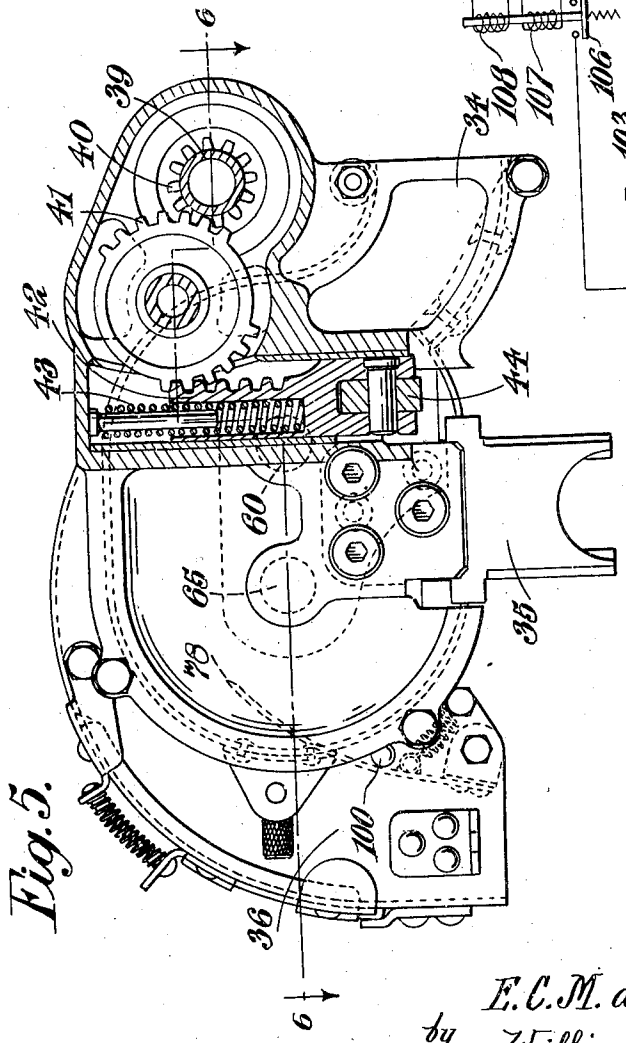


Fig. 5.



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AMMUNITION BELT FEED MECHANISM FOR AUTOMATIC FIREARMS

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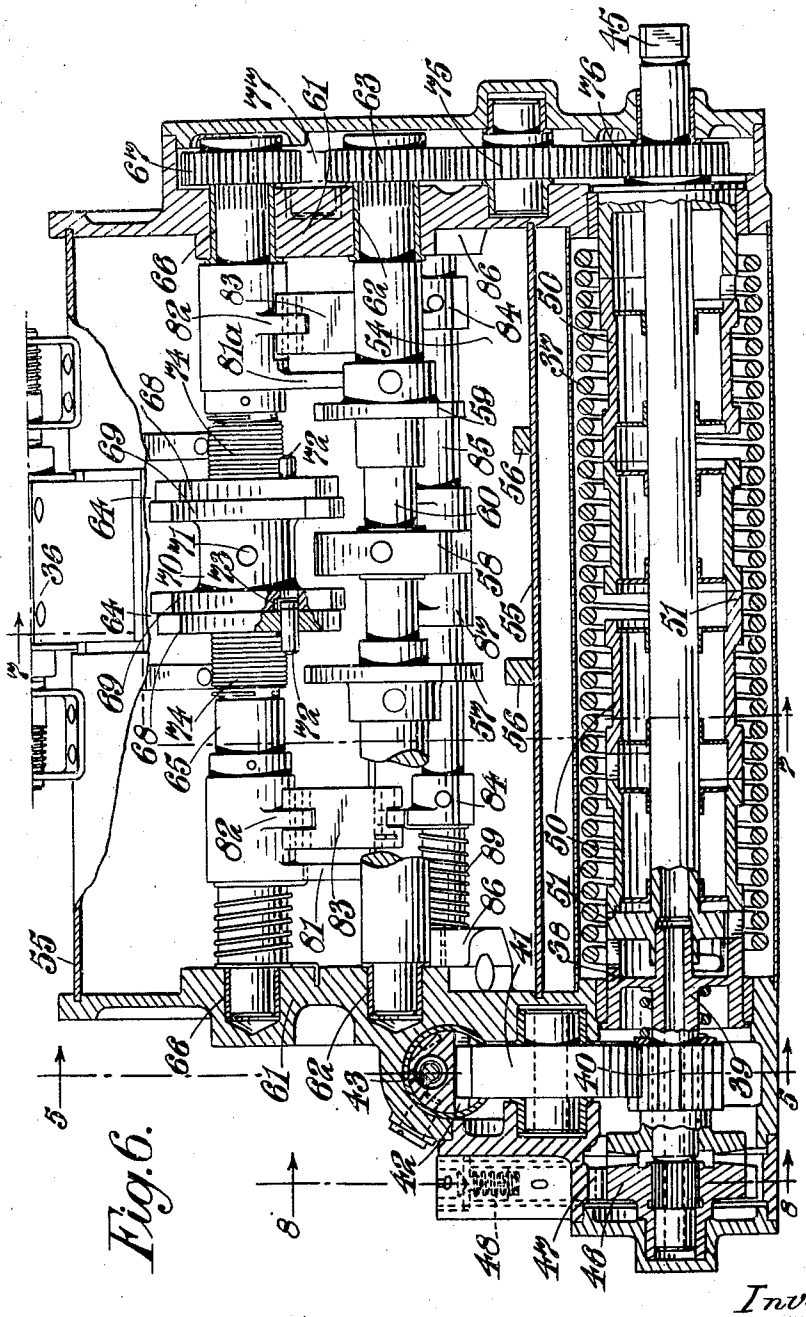


Fig. 6.

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AMMUNITION BELT FEED MECHANISM FOR AUTOMATIC FIREARMS

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Fig. 9.

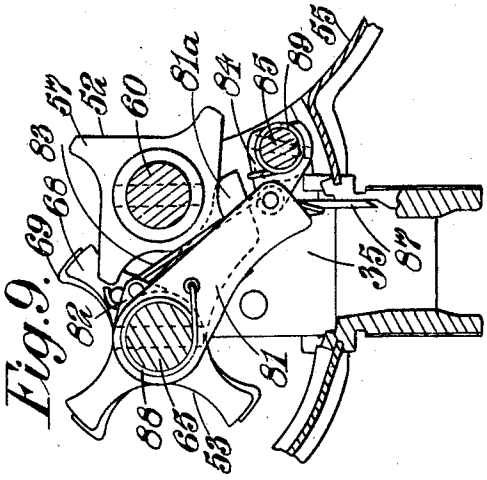


Fig. 10.

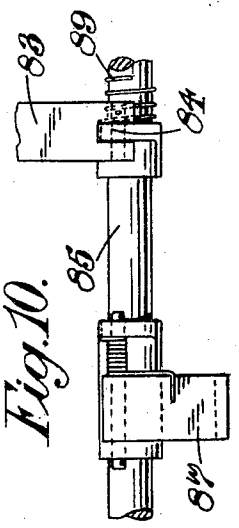
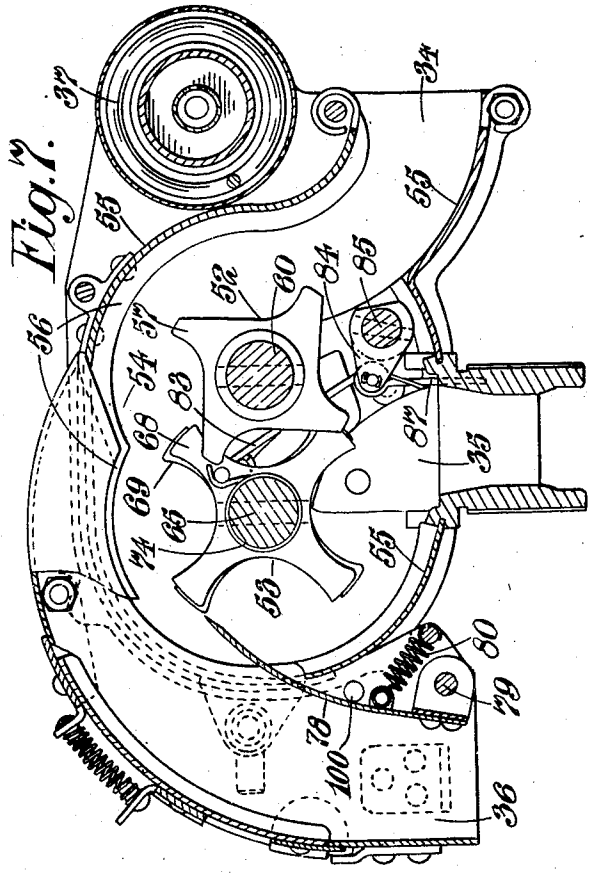


Fig. 7.



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AMMUNITION BELT FEED MECHANISM FOR AUTOMATIC FIREARMS

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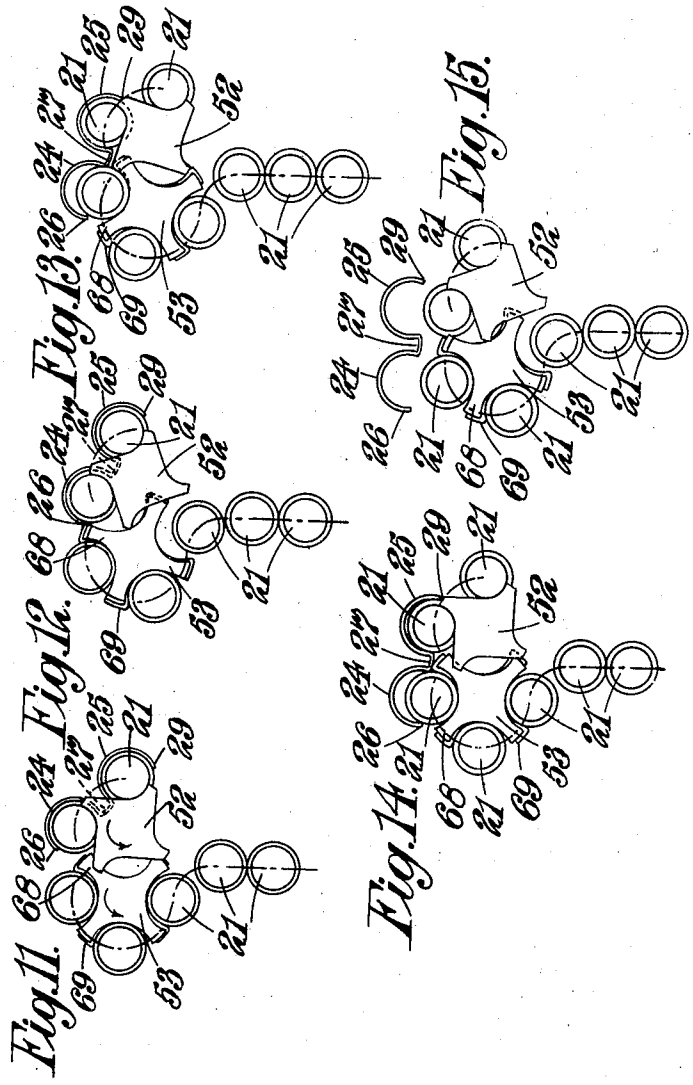


Fig. 11.

Fig. 12.

Fig. 13.

Fig. 14.

Fig. 15.

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UNITED STATES PATENT OFFICE

2,481,726

AMMUNITION-BELT FEED MECHANISM FOR AUTOMATIC FIREARMS

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Application October 9, 1945, Serial No. 621,261
In Great Britain October 11, 1944

9 Claims. (Cl. 89—33)

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This invention concerns improvements in or relating to ammunition-belt feed-mechanisms for automatic firearms of the kind which separate the rounds of ammunition and the links connecting them together in the ammunition-belt and feeds the separated cartridges towards the firearm.

The standard type of link connecting cartridges adapted for use with small calibre cannon comprises two part-circular clips to receive adjacent rounds of the belt and the present invention relates to feed mechanism of the kind referred to which are adapted to separate the rounds in ammunition-belts incorporating links of this type. In practice, links of the type referred to are constructed so that one clip is constituted by a single arm in the central plane of the belt and the other by two arms spaced apart such a distance as to receive between them the single arm clip of the next adjacent link. Each cartridge in the ammunition-belt is therefore engaged by a single-arm clip of one link and a double-arm clip of another link.

Heretofore feed-mechanisms of the kind referred to have comprised a scroll cam past which the ammunition-belt is fed so that the noses of the projectiles engage the cam surface. The cam forces each cartridge out of its pair of engaging clips by displacing the cartridge relatively to the links in the direction of the long axis of the cartridge. For satisfactory operation of this mechanism a cam of considerable length must be provided. As a consequence it is a characteristic of such feed-mechanisms that they have considerable bulk. Furthermore with ammunition-belts having armour-piercing projectiles the cam surface is rapidly spoiled.

It is an object of the present invention to provide a feed-mechanism of the kind set forth which possesses small bulk and is free from the disadvantage associated with known feed-mechanism when using belts incorporating armour-piercing projectiles.

For convenience throughout the specification the terms "leading clip of a link" and "leading extremity of a clip" are to be understood as referring to the clip of a link, or the extremity of the clip, which first passes into the feed-mechanism whilst the clip of a link, or the extremity of a clip, which follows on into the feed-mechanism will be respectively referred to as the "trailing clip" and "trailing extremity."

According to the present invention a feed-mechanism of the kind set forth which is adapted for separating links of the type referred to is

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characterised in that the leading clip of each link which connects a pair of cartridges together is first separated by said mechanism, and thereafter the trailing clip of said link is separated by said mechanism both said clips being removed from their associated cartridges in a direction laterally of the cartridges.

It is preferred that clips of adjacent links which engage a common cartridge be successively removed in said lateral direction, the trailing clip associated with said cartridge being removed and thereafter the leading clip associated therewith.

According to another aspect of the present invention a feed-mechanism of the kind set forth, which is adapted for separating links of the type referred to, is characterised in that the leading and trailing clips of each link are removed from their cartridge in a direction laterally thereof, the leading clip of each link being removed by means which engages said clip at its leading extremity and the trailing clip of the link being removed by means which engages said clip at its leading and trailing extremities.

Preferably the means referred to comprises a pair of sprockets which are adapted to engage the cartridges of the ammunition-belt and feed it along a guideway towards the firearm, each cartridge in passing along said guideway being engaged on the one side by a tooth of the one sprocket and on the other side by a tooth of the other sprocket so that said teeth engage the extremities of the leading and trailing clips associated with each cartridge and successively remove them in a direction laterally of the cartridge.

A specific embodiment of the present invention will now be described, by way of example, with reference to the accompanying drawings, whereof:

Figure 1 is a perspective view of a part of an ammunition-belt the rounds of which are connected together by links of the type referred to above;

Figure 2 is a diagrammatic perspective view of a machine-gun installation incorporating a feed-mechanism of the kind referred to;

Figure 3 is an end view of the feed-mechanism with part of the outer casing removed so as clearly to show the means for driving the mechanism;

Figure 4 is a section on the line 4—4 of Figure 3;

Figure 5 is a section on the line 5—5 of Figure 6;

Figure 6 is a section on the line 6—6 of Figure 5;

Figure 7 is a section on the line 7—7 of Figure 6;

Figure 8 is a section on the line 8—8 of Figure 6;

Figures 9 and 10 are views showing in detail a part of the feed-mechanism,

Figures 11–15 are diagrammatic views of the feed-mechanism showing the operation of separating the links from the rounds of ammunition, and

Figure 16 is a circuit diagram illustrating the firing and ammunition feeding circuits and showing in detail a form of spring ammunition belt driving motor.

Referring first to Figure 1: the ammunition belt is generally indicated by the reference numeral **20** and comprises a plurality of rounds of ammunition **21** which are connected together by the links **22**. A belt of ammunition is adapted to be fed towards the gun in the direction of the arrow **23**. Each link comprises a pair of clips one of which (**24**) has two spaced arms and the other of which (**25**) has a single arm disposed centrally between the spaced arms. As is clear from Figure 1, the double-arm clip **24** surrounds the shell of the round of ammunition and connects it with the next adjacent shell by the single-arm clip **25** which overlaps the next succeeding double-arm clip engaging said adjacent shell.

For the sake of convenience the term "leading clip" of a link is to be understood as referring to the clip **24** since it is clear from Figure 1 that this link is disposed in front of the link **25** during the passage of the belt of ammunition to the gun. The term "leading extremity" of a clip is to be understood as referring to the edges **26** of clip **24** or the junction-piece **27** of the two clips, this being also one edge of the clip **25**. It will be appreciated that in the passage of the ammunition belt to the gun the edges **26** and **27** will be those parts of the corresponding clips **24, 25** which first pass into the feed-mechanism and the gun.

Similarly, the clip **25** will be referred to for convenience as the "trailing clip" of a link whilst the junction-piece **27** of clip **24** will be referred to as the "trailing extremity" of said clip and the end **29** of clip **25** will be referred to as the "trailing extremity" of the trailing clip.

As shown in Figure 2, a machine-gun **30** has associated with it an ammunition box **31** and a power-driven mechanism **32** disposed between the ammunition box and the machine-gun, said power-driven mechanism being adapted to deliver the ammunition belt **20** from the ammunition box and deliver it towards the machine-gun. The belt of ammunition passes from the power-driven mechanism **32** to a feed-mechanism **33** constructed in accordance with the present invention and mounted upon the gun **30**. The feed-mechanism is provided with a mouth **34** to receive the ammunition-belt from the power-driven mechanism **32** (see also Figure 3) and with a downwardly-extending chute **35** through which the separated rounds of ammunition are passed to the feed port of the gun. The separated links are expelled from the feed mechanism **33** through a channel **36**.

In use, the ammunition-belt **20** is fed towards the feed-mechanism **33** by the power-driven mechanism **32** and in passing through mechanism **33** the belt **20** is disintegrated. The separated rounds are fed through the chute **35** towards the gun whilst the separated links are ejected along the channel **36** into a suitable receptacle.

The feed-mechanism **33** is driven (as will be hereinafter described in detail) by the recoil of the gun **30** through the intermediary of a spring **37** (Figure 6). The spring **37** is normally preloaded so that the mechanism continues to operate to draw the ammunition-belt into the feed mechanism and pass the separated rounds towards the gun. This, however, is prevented until the gun fires and the gun port is opened to permit a separated round to pass from the feed-mechanism into the gun. The purpose of thus preloading the spring **37** is to ensure that immediately upon the gun being fired a separated round will be supplied to the gun since it is well known that there is a certain lapse of time from the firing of the gun to the feeding of the belt through mechanism **33**. The provision of spring **37** therefore ensures that there is no appreciable time lag between the gun being fired and the rounds being replaced.

In order to maintain the spring **37** in tension it is automatically wound by the recoil of the gun **30**, for which purpose the spring is secured at one end to an attachment **38** having a shaft-extension **39** which carries a pinion **40** the latter being in mesh with a gear **41** which is associated with a rack **42** (see Figures 5 and 6).

As is clear from Figure 5, the rack **42** is urged by a spring **43** to its lower position but is capable of being raised against the spring action by means of a cam surface (not shown) carried by the gun and engageable with a roller **44** carried by the rack **42**. The arrangement is that upon the gun **30** recoiling the cam surface engages the roller **44** to raise the rack **42** against the action of spring **43** thereby rotating gear **41**, pinion **40**, the attachment **38** and the spring **37**.

It is to be appreciated from what has been said that immediately upon the gun being fired the spring **37** partly uncoils to draw the ammunition-belt into the feed-mechanism and deliver a separated round to the gun and that upon the gun recoiling the spring is rewound to its initial tension.

The spring **37** may be initially wound (when the feed mechanism is incorporated in the gun installation) by means of a spanner or handwheel applied to the end **45** of the spring-driving shaft **39**. During this operation it is necessary to ensure that the spring does not unwind and to this end the shaft **39** is provided with a ratchet-wheel **46** which is engaged by a pawl **47** (see Figure 8). The pawl **47** is carried within the casing of the feed mechanism and is urged by a spring **48** into engagement with the ratchet **46**. With the arrangement described when a handle is applied to the end **45** of the shaft **39** and rotated the initial tension will be applied to the spring **37**. During this operation the ratchet **46** moves idly past the pawl **47**. The tension of the spring **37** is applied through the shaft **39** to the ratchet **46** in the opposite direction and the ratchet being engaged by the pawl **47** is prevented from turning so that the initial tension is maintained in the spring.

It is considered desirable to ensure that the spring **37** be incapable of being wound beyond a predetermined number of turns and accordingly one end of the spring is secured to the attachment **38** as mentioned above whilst the other end is secured to a composite tube comprising a number of cylindrical members **50** the abutting faces of which are formed as the teeth **51** of a dog clutch. The members **50** are assembled end-to-end so that the teeth **51** of adjacent members are spaced angularly from one another and the arrangement is that upon winding the spring **37**,

members 50 relatively rotate a predetermined number of turns until the teeth 51 of the dog clutches abut thereby preventing the spring from being further tensioned.

The feed-mechanism comprises a belt-feed roller 52 which engages the ammunition belt immediately after its entry into the feed mechanism by way of mouth 34, a cartridge-feed roller 53 which engages the separated rounds and directs them along the ammunition chute 35 towards the gun port, and a guideway, generally indicated by the reference number 54 along which the ammunition-belt passes towards the two rollers 52, 53 and along which the separated rounds pass from the rollers towards the gun (Figure 7). The guideway is constituted by the walls of the casing 55 of the feed-mechanism whilst that portion of the guideway 54 which extends from the cartridge-feed roller 53 towards the gun is the ammunition chute 35 mentioned above. Associated with the guideway 54 are a pair of spaced rails 56 carried by the casing 55 of the feed-mechanism, the arrangement being that the rails 56 extend in the direction of movement of the rounds of ammunition through the feed-mechanism (that is, as the ammunition passes along the guideway 54 it lies at right angles to the rails 56). The cartridge cases are adapted to engage with the rails 56 the spacing of which is such that the links 22 travel between the pair of rails (Figure 4).

The belt-feed roller 52 comprises three spaced sprockets 57, 58, 59 which are carried upon a shaft 60 extending across the feed-mechanism and supported in the end cover plates 61 thereof by bearings 62. The shaft 60 is provided at one end with a gear 63 the purpose of which will be hereinafter described.

As the cartridge case of each round of ammunition enters the feed-mechanism by the mouth 24 and travels along the guideway 54 it is brought into engagement with the sprockets 57, 58, 59 of the belt-feed roller 52, the ammunition-belt being drawn into the mechanism by said sprockets as will be fully described hereinafter. The sprocket 58 of the belt-feed roller 52 is disposed so that it lies between the guide rails 56 and so that it will engage each cartridge along the centre line of the ammunition belt. Since it is along this centre line that the single-arm clips 25 of the links 22 are placed it follows that sprocket 58 is in a position to engage the single-arm clip of each connecting link as the ammunition belt passes into the feed-mechanism. The lateral sprockets 57, 59 of the belt-feed roller 52 are adapted to support the upper and lower portions of the cartridge cases respectively and maintain them in contact with the rails 56.

The cartridge-feed roller 53 comprises a pair of spaced members generally indicated by the reference numeral 64 which are mounted upon a shaft 65 that extends across the feed-mechanism and is supported in bearings 66 formed in the end cover plates 61 of the casing, the shaft 65 being also provided with a gear wheel 67 whose function will be described later. The members 64 are adapted to engage each cartridge as it passes through the feed-mechanism to assist in stripping the links 22 from the ammunition-belt and subsequently to feed the separated rounds of ammunition towards the ammunition chute 35 and thence to the gun breech. Each member 64 is located so as to engage the ammunition-belt 22 as the latter passes through the feed-mechanism along the line of extension of an arm of the double arm clip 24 of the connecting links 22. Each feed member 64 comprises a pair of sprockets 68, 69 (Figures 4, 6 and 7) which are disposed side by side and are of similar construction. The sprockets 69 are connected together by a tubular member 70 which is secured to the shaft 65 by means of a pin 71. As a consequence the sprockets 69 are rigidly attached to said shaft. The sprockets 68 are mounted upon the shaft 65 so as to be capable of rotational movement relative thereto (that is sprockets 68 are capable of angular adjustment relative to sprocket 69). To limit the extent of this angular adjustment each sprocket 68 is provided with a stop pin 72 which extends from the face of its associated sprocket 68 and enters a groove 73 in the associated sprocket 69. The length of the groove 73 is such as to permit a limited relative movement between the adjacent sprockets 68, 69 in the spring-urged direction. Each sprocket 68 is associated with a torsion spring 74 which is carried upon the shaft 65 and engages the stop pin 72, the arrangement being that each torsion spring urges its associated sprocket 68 to assume a displaced position relative to the sprocket 69. This displaced position is shown in Figure 7 from which it will be noted that although the associated sprockets 68, 69 are of similar construction in their displaced position the teeth of the sprockets are offset from one another. With this arrangement the floating sprockets 68 will first engage the rounds of ammunition as they pass from the belt-feed roller 52 to the cartridge-feed roller 53. Furthermore, because the floating sprockets 68 are urged by springs 74 to rotate in a clockwise direction as viewed in Figure 7 the teeth of the sprocket which engage the rounds of ammunition of the ammunition-belt will be urged towards said belt so that they are incapable of taking part in feeding the separated rounds of ammunition towards the gun. This operation is performed by the other sprockets of the feed members 52, 53 and accordingly said other sprockets will be referred to hereinafter for convenience as the "feed sprockets."

During the operation of the feed-mechanism the sprockets of the belt and cartridge-feed rollers 52, 53 respectively serve the dual function of feeding the ammunition-belt and separated rounds through the mechanism and of stripping the links from the rounds of ammunition. For the purpose of feeding the rounds through the feed-mechanism to the gun it is necessary that the rollers 52, 53 be rotatably driven. With this end in view gear wheel 63 of the belt-feed roller 52 meshes with an idler gear 75 which is driven by gear 76 carried upon the output end of the shaft 39. The gear wheel 63 also meshes with an idler gear 77 (Figure 3) which transmits drive from the gear wheel 63 to the gear wheel 67 of the cartridge-feed roller 53.

As has been indicated above, when the gun is fired the spring 37 will rotate the output end of shaft 39 and this rotation will be transmitted through the gear train 76, 75, 63 to the belt-feed roller 52 and furthermore through gears 77, 67 to the cartridge-feed roller 53. In this way the belt-feed roller 52 is urged by spring 37 to draw the ammunition belt 20 into the feed mechanism and the cartridge-feed roller 53 is urged also by spring 37 to press separated rounds of ammunition towards the gun when the latter is fired.

The operation of the mechanism is as follows: let it be assumed that the ammunition chute 35 is filled with separated rounds of ammunition and

therefore that the latter extend from the cartridge-feed roller 53 to the chute 35 and that the ammunition-belt 20 extends into the feed-mechanism along the guideway 54 and over the belt feed roller 52. The first round of ammunition of the belt will be presumed to be lying in a trough between the teeth of the sprockets 57, 58 and 59 of the belt feed roller 52. (Actually some of the rounds between this one and the port of the gun will have links at progressively different stages of removal.)

The sequence of events in stripping the link which connects the first and second rounds of ammunition-belt will now be described, it being assumed that the gun fires two rounds during this operation. When the round in the breech is fired the next separated round of ammunition is pressed towards the gun by the cartridge-feed roller 53. This is ensured by the spring mechanism 37 which rotates the cartridge-feed roller and belt-feed roller shafts 65, 60 respectively. Consequent upon the firing of the round the recoil operated gear-and-rack device 41, 42 is brought into operation to maintain the loading of the spring mechanism.

The rotation of the belt-feed roller 52 by the spring 37 will result in the ammunition-belt being drawn into the feed-mechanism and at the same time will move the first round of the belt towards the cartridge-feed roller 53 (Figure 11). When this movement has proceeded to a certain extent the leading extremities 26 of the double-arm clip 24 which embraces the first round is engaged by the floating sprockets 68 (Figure 12). The peripheral edge of a tooth of each floating sprocket engages one arm of the double-arm clip. Thereafter, as said movement continues the floating sprockets 68 push the double-arm clip 24 laterally away from the round which it embraces (Figure 13) the round being prevented from partaking of the movement by the guide rails 56. In removing the double-arm clip as described the link is rotated around the second cartridge since the single-arm clip of the link embraces this round (Figure 13). The separated double-arm clip is maintained with its leading and trailing extremities in juxtaposition to the first round by the casing 55 of the feed mechanism.

When the double-arm clip is thus disengaged from the round of ammunition the latter lies between a pair of teeth of the cartridge-feed roller 53. As the movements of rotation of the belt and cartridge-feed rollers 52, 53 proceeds the round of ammunition from which the double-arm clip has been removed is fed towards the ammunition chute 35. At the same time a tooth of the centrally disposed sprocket 58 of the belt-feed roller 52 is brought into engagement with the trailing edge 29 of the single-arm clip 25 of the link (Figure 13). Thereafter the peripheral edge of said tooth pushes the single-arm clip 25 laterally away from the round of ammunition which it embraces. As this lateral displacement is taking place, a tooth of each of the feed sprockets 69 is brought into engagement with the leading edge 27 of said single-arm clip 25 (Figure 14). Thereafter, the single-arm clip is laterally removed from the cartridge which it embraces by the continued and conjoint action of the teeth of the feed sprockets 69 of the belt-feed roller 52. It is to be understood that the round of ammunition is prevented from lateral movement during the separation of the single-arm clip by the rails 56 under which the round passes. The link connecting the two rounds of ammunition is thus separated and is then discharged from the feed mechanism along a suitably disposed channel 36.

The round of ammunition from which the single-arm clip has been removed (Figure 15) is connected with the succeeding round of ammunition by another link so that whilst the separation of the link as described above is taking place the ammunition belt is being simultaneously drawn into the feed-mechanism. Immediately following upon the removal of the single-arm clip 25 the various parts of the feed mechanism, the rounds of ammunition and the links connecting them together assume the same relative positions as existed when the stripping operation described above commenced. The sequence of operations is then repeated when the gun is again fired, commencing with the removal of the double-arm clip 24 which embraces the round of ammunition from which the single-arm has been removed as described above.

The stripping and feed operations will continue whilst the gun is being fired and the gear-and-rack device 41, 42 continues to maintain the loading of the spring 37 whilst firing is taking place. When the gun stops firing at the end of a burst of fire leaving more than one round of ammunition unexpended and is stationary after recoil following firing of the last round of the burst the rack device will have driven the spring mechanism so that the spring 37 is fully loaded. When spring 37 is thus loaded the ammunition chute from the cartridge-feed roller 53 to the port of the gun will be re-filled with separated rounds.

The provision of the floating sprockets 68 is made necessary because when the teeth of the feed sprockets 69 are on the side of the cartridge case which is engaged by the leading extremities 26 of the double-arm clip 24 said teeth are moving away from the cartridge case. Accordingly, it is impossible for the teeth of the feed sprockets 69 to engage with and remove the double-arm clips from the rounds. The floating sprockets 68, however, can be maintained by their associated torsion springs 74 in engagement with the cartridge case until such time as the double-arm clip 24 has been removed.

In an alternative construction each feed sprocket 69 is formed with double teeth, one such tooth portion being movable relative to the other and spring urged to assume the displaced position. With such a construction the floating sprockets 68 are dispensed with.

It will be noted that in Figures 5 and 7 there is shown a plate 78 which is pivotally mounted at 79 and urged by spring 80 towards the cartridge-feed roller 53. The plate 78 is associated with the channel 36 and its purpose is to ensure that the separated links do not pass towards the gun but are forced into said channel. It assumes the position shown in Figures 5 and 7 due to the fact that rounds of ammunition are not present in the feed-mechanism. The plate 78 is held in the position shown in Figures 5 and 7 by a stop 100 and the tip of the plate will be engaged by each round as it is carried towards the gun. The point of contact of the tip of the plate 78 with each round is some distance above the centre of the round so that the round, in travelling towards the gun, will displace plate 78 outwardly against spring 80. The plate 78 will be held firmly against each round by its spring and will therefore ensure that the separated links are deflected into channel 36. Being spring pressed

into such engagement it will effectively deflect the separated links into the channel 36.

It is desirable in using the feed-mechanism as described above that the last round of ammunition be prevented from passing out of the feed-mechanism into the feed mouth of the gun as this renders it easier to reload the mechanism with a new belt. Accordingly, means are provided for automatically ensuring that the last round of ammunition of an ammunition-belt is stopped as it passes from the chute 35 into and towards the gun port. The means referred to comprises fingers 81, 81a, (Figures 6, 9 and 10) which are pivotally mounted upon shaft 65, a lug 82 carried by each finger, a strap 83 connecting the lug 82 with an arm 84, a shaft 85 which carries the arm 84 and extends across the feed-mechanism being supported in bearings 86 and a locking plate 87 carried upon shaft 85. A torsion spring 88 engages the finger 81 and urges it and finger 81a through the mechanism described above towards the separated rounds of ammunition which are passing along the chute 35. A further torsion spring 89 is associated with the arm 84 and tends to rotate said arm so that the locking plate is lowered towards the gun port as will be described shortly. As the rounds of ammunition are passed into the gun they will engage the fingers 81 and 81a and maintain them in a position against the action of spring 88 so that the locking plate is in its raised position as shown in Figure 9. When the last round of ammunition has passed from the chute 35 and enters into the passage-way leading to the gun no restraint is then imposed upon the rotation of fingers 81 and 81a in a clockwise direction and accordingly the spring 88 effects such rotation and the motion thereby produced is transmitted to the arm 84 with the result that the locking plate 87 is lowered. The effect of lowering the locking plate 87 as described is to reduce the width of the passage through which the round of ammunition may pass to the gun, such reduction being sufficient to effect the jamming of the last round of ammunition within the passage-way. When another ammunition-belt is fed into the feed-mechanism the first round of ammunition of such a belt will engage with the finger 81 and reset it in the position shown in Figure 9. The effect of this being to raise the locking plate 87 and permit the last round of ammunition from the previous belt to pass into the feed mouth of the gun.

When switch 102 is closed to complete the firing circuit 101, coil 108 is simultaneously energised whereby switch 106 is closed. The latter completes the circuit to motor 100 so that spring 37 is wound through gears 103, 41, 40 whilst the gun is being fired. When the motor circuit is completed the holding coil 107 is energised to maintain the switch 106 closed. Accordingly when the switch 102 is opened to stop the gun firing and consequently coil 108 becomes de-energised the switch 106 remains closed. The switch 106 and the circuit to motor 100 remain effective until switch 105 is opened. This occurs when the clutch members 50, 51 separate due to the spring 37 having been fully wound. When the switch 105 opens, coil 107 is de-energised and normally open switch 106 is opened. The motor circuit is therefore broken and the motor 100 stops. Subsequently if the switch 105 is closed the motor circuit is not completed unless the switch 106 is closed consequent upon the firing switch 102 having been closed.

A spring-loaded inspection cover 90 is provided on the outer surface of the channel 36.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:

1. For an installation comprising an automatic firearm which is fed with belted ammunition the cartridges of which are connected together by links each comprising a leading clip having a pair of spaced-apart part-cylindrical co-axial elements and a trailing clip having a single part-cylindrical element at one side of and between the leading-clip elements and means to connect the leading and trailing clips together, a storage for the belted ammunition located at a distance from the firearm and a chute to convey the belt of ammunition from the storage to the firearm, a feed mechanism comprising a casing, a channel member for directing the belt of ammunition into the casing, a delivery chute for conveying separated rounds of ammunition from the casing to the gun, a belt-feed roller for drawing the belt through the channel into the casing, a cartridge-feed roller for delivering the separated rounds through the delivery chute, mechanism for driving the belt-feed and cartridge-feed rollers in synchronism, a guideway within the casing to hold the rounds of ammunition going through the casing against movement in a lateral and in the endwise directions of the cartridges, means for disconnecting the leading clips of the ammunition links from the cartridges, and separate means for disconnecting the trailing clips of said links from the cartridges, both said clips being disconnected solely by movements radially from the longitudinal axes of the cartridges.

2. For an installation comprising an automatic firearm which is fed with belted ammunition the cartridges of which are connected together by links each comprising a leading clip having a pair of spaced-apart part-cylindrical co-axial elements and a trailing clip having a single part-cylindrical element at one side of and between the leading-clip elements and means to connect the leading and trailing clips together, a storage for the belted ammunition located at a distance from the firearm and a chute to convey the belt of ammunition from the storage to the firearm, a feed mechanism comprising a casing, a channel member for directing the belt of ammunition into the casing, a delivery chute for conveying separated rounds of ammunition from the casing to the gun, a belt-feed roller for drawing the belt through the channel into the casing, a cartridge-feed roller for delivering the separated rounds through the delivery chute, mechanism for driving the belt-feed and cartridge-feed rollers in synchronism, a guideway within the casing to hold the rounds of ammunition going through the casing against movement in a lateral and in the endwise directions of the cartridges, means for disconnecting the leading clips of the ammunition links from the cartridges, and separate means for disconnecting the trailing clips of said links from the cartridges, both said clips being disconnected solely by movements radially from the longitudinal axes of the cartridges.

3. For an installation comprising an automatic firearm which is fed with belted ammunition the cartridges of which are connected together by links each comprising a leading clip having a pair of spaced-apart part-cylindrical co-axial elements and a trailing clip having a single part-cylindrical element at one side of and between

the leading-clip elements and means to connect the leading and trailing clips together, a storage for the belted ammunition located at a distance from the firearm and a chute to convey the belt of ammunition from the storage to the firearm, a feed mechanism comprising a casing, a channel member for directing the belt of ammunition into the casing, a delivery chute for conveying separated rounds of ammunition from the casing to the gun, a belt-feed roller for drawing the belt through the channel into the casing, a cartridge-feed roller for delivering the separated rounds through the delivery chute, mechanism for driving the belt-feed and cartridge-feed rollers in synchronism, a guideway within the casing to hold the rounds of ammunition going through the casing against movement in a lateral and in the endwise directions of the cartridges, means for disconnecting the leading clips of the ammunition links from the cartridges, and separate means for disconnecting the trailing clips of said links from the cartridges, both said clips being disconnected solely by movements radially from the longitudinal axes of the cartridges.

4. For an installation comprising an automatic firearm which is fed with belted ammunition the cartridges of which are connected together by links each comprising a leading clip having a pair of spaced-apart part-cylindrical co-axial elements and a trailing clip having a single part-cylindrical element at one side of and between the leading-clip elements and means to connect the leading and trailing clips together, a storage for the belted ammunition located at a distance from the firearm and a chute to convey the belt of ammunition from the storage to the firearm, a feed mechanism comprising a casing, a channel member for directing the belt of ammunition into the casing, a delivery chute for conveying separated rounds of ammunition from the casing to the gun, a belt-feed roller for drawing the belt through the channel into the casing, a cartridge-feed roller for delivering the separated rounds through the delivery chute, mechanism for driving the belt-feed and cartridge-feed rollers in synchronism, a guideway within the casing to hold the rounds of ammunition going through the casing against movement in a lateral and in the endwise directions of the cartridges, means to engage the leading extremity of the leading clips of the ammunition links and disconnect said clips from the cartridges solely by movement of the clips in the lateral direction of the cartridges, a separate means to engage the leading and trailing extremities of the trailing clips of said links and disconnect said clips from the cartridges also by movement solely laterally of the cartridges.

5. A feed mechanism according to claim 1 wherein the belt-feed and cartridge-feed rollers each comprises a shaft and at least a pair of sprockets mounted thereon in spaced relationship, said sprockets engaging the cartridges to pass them through the casing and constituting the link-disconnecting means for which purpose the teeth of the sprockets engage the clips of the links.

6. A feed mechanism as claimed in claim 5 in which a link-engaging sprocket of the cartridge-feed roller comprises a pair of sprocket gear-wheels co-axially mounted side-by-side and a spring angularly displacing one wheel relatively to the other wheel.

7. A feed mechanism as claimed in claim 6 in which the mechanism for driving the belt-feed and cartridge-feed rollers comprises gearing connecting the rollers together, a spring mechanism to drive the gearing, and apparatus, operated by the firearm, to maintain the loading of said spring mechanism.

8. A feed mechanism according to claim 7 wherein said loading apparatus comprises an electric motor, a clutch, a connection from the clutch to the spring mechanism, and switch means which is closed when the firearm is fired.

9. A feed mechanism according to claim 8 wherein a clutch is provided to limit the maximum loading which may be applied to the spring mechanism, said clutch normally connecting the spring mechanism with the driving mechanism for the belt-feed and cartridge-feed rollers.

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