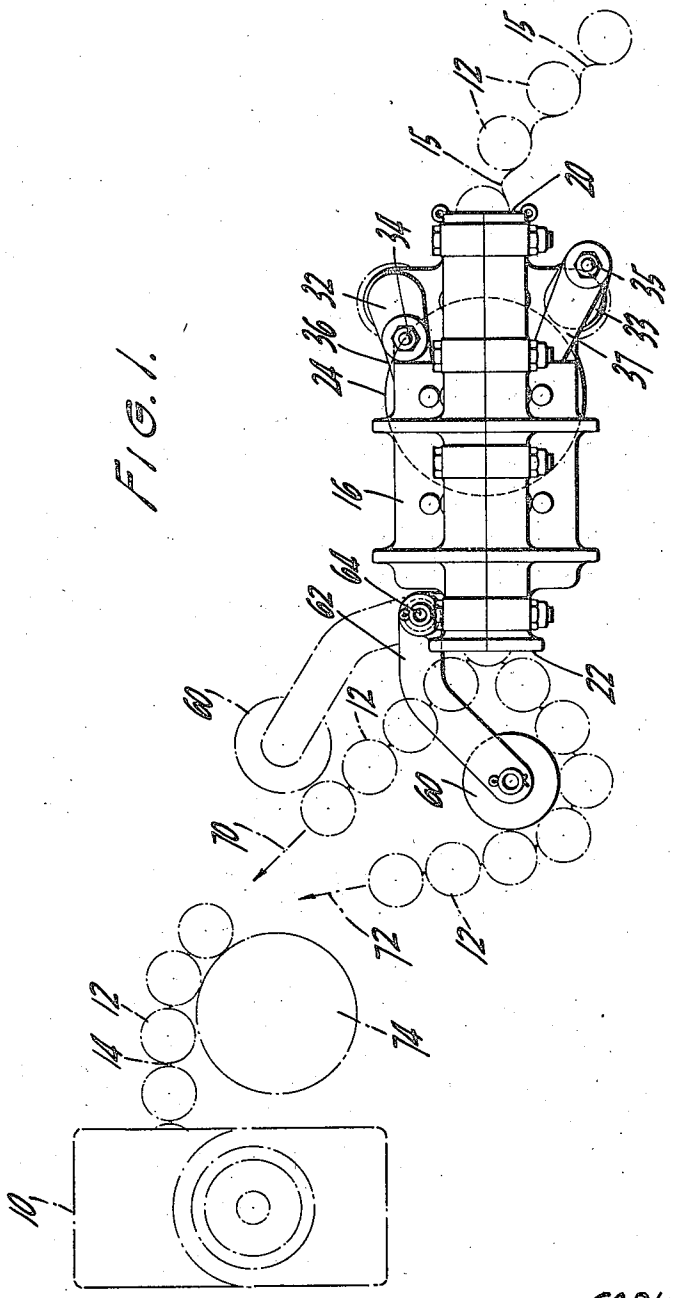
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FIG. 1.



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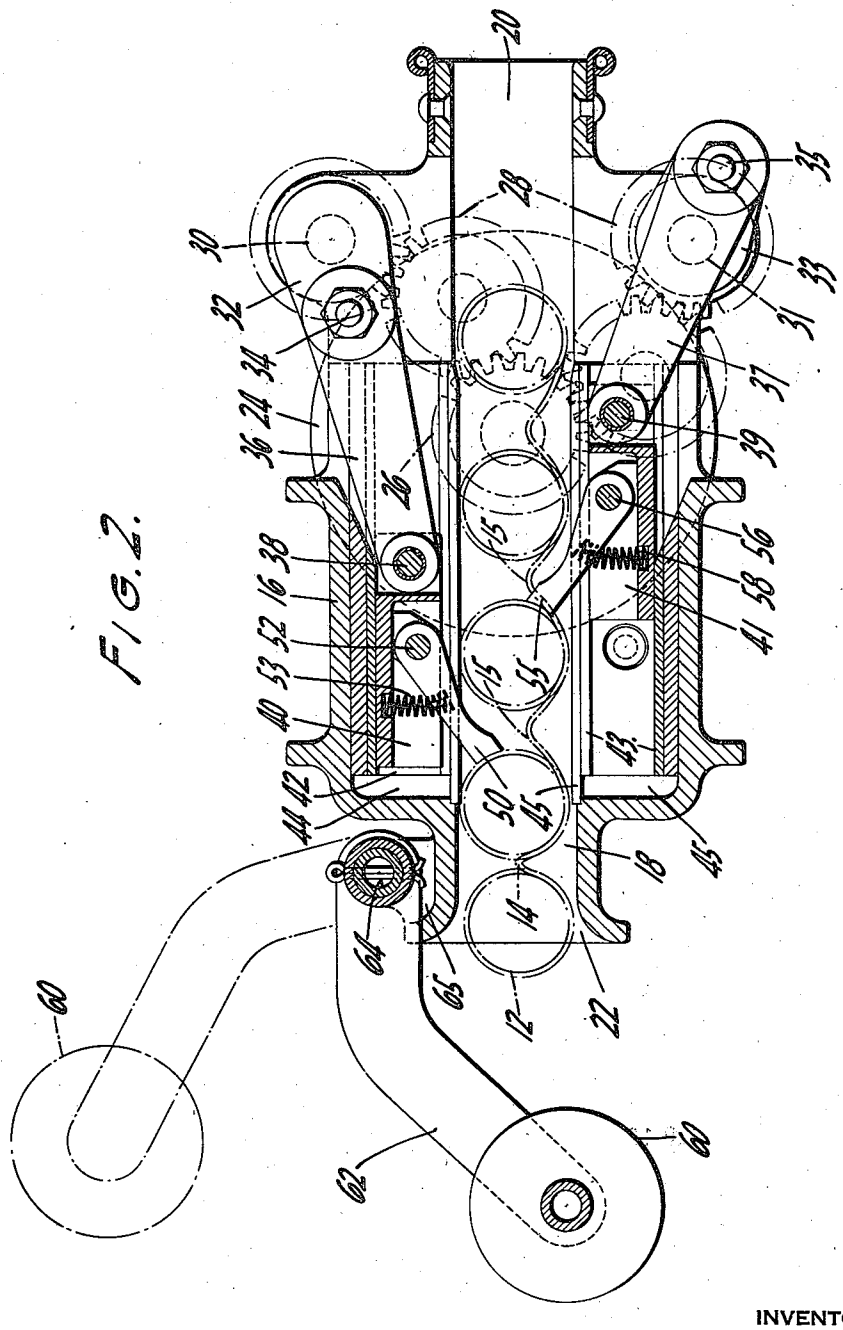


FIG. 2.

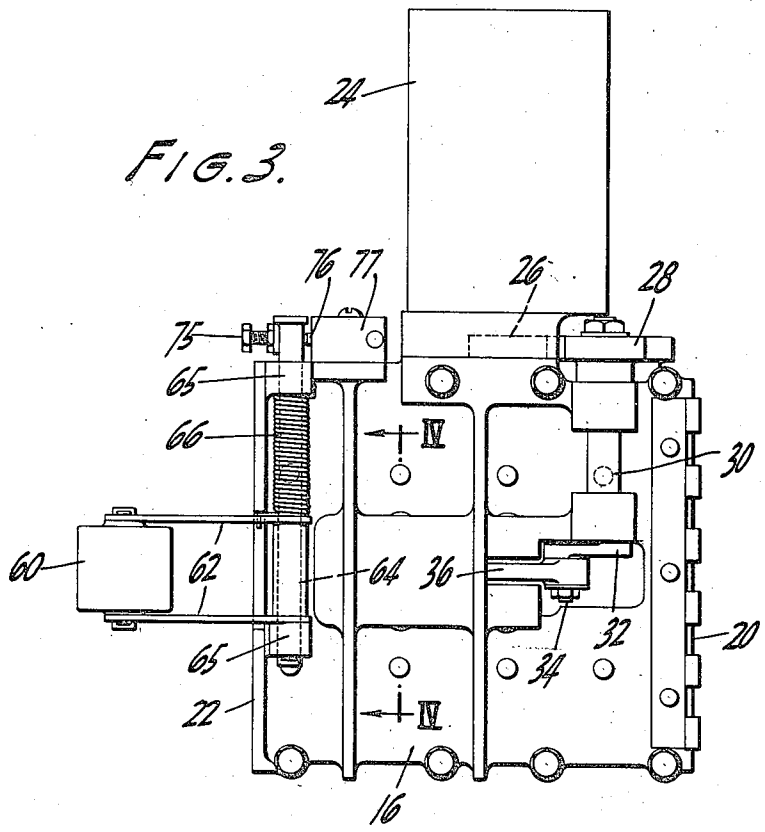
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FIG. 3.



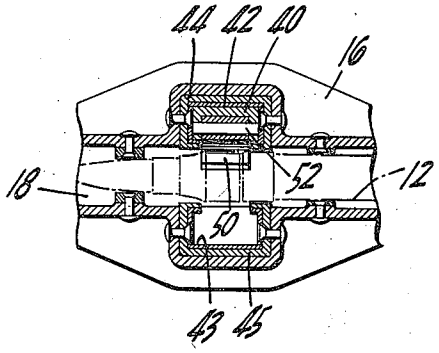


FIG. 4.

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Application September 11, 1942, Serial No. 457,990

4 Claims. (Cl. 89—33)

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This invention relates to ordnance and more particularly to improvements in ammunition feed mechanisms adapted to be employed as devices accessory to machine guns or the like for supplementing the action of the customary gun feed pawl mechanism whereby ammunition rounds of increased weight may be fed to the gun from positions remote from the gun and at increased rates of ammunition feeding and in otherwise improved manner.

The primary object of the present invention is to provide an improved gun feed mechanism of the character described. Another object of the invention is to provide a mechanism of the character described which is particularly adapted to operate in an improved manner in conjunction with an ammunition belt comprising relatively heavy rounds of ammunition interconnected by means of links which tend to stretch under extreme loads, whereby the spacings of the ammunition rounds will be caused to vary from time to time. Other objects and advantages of the invention will appear in the specification hereinafter.

In the drawings:

Fig. 1 is an elevation of an ammunition feed assist mechanism of the invention shown in conjunction with a cartridge belt arranged to feed a machine gun;

Fig. 2 is a sectional view, on an enlarged scale, corresponding to Fig. 1 and showing the interior of the feed assist mechanism thereof;

Fig. 3 is a top plan of the feed assist mechanism; and

Fig. 4 is a fragmentary section taken along line IV—IV of Fig. 3.

Although several forms of ammunition feed assist mechanisms have been previously devised for purposes similar to the general purpose of the present invention, such prior art devices have customarily employed star wheel mechanisms or the like for operating in geared relation with the cartridge belt to be fed. However, in accord with modern ordnance design trends, the caliber and weight of ammunition rounds being handled by automatic guns are of constantly increasing order, and the guns are being designed for constantly increasing rates of fire. Hence, the loads upon the gun feeding mechanisms and upon the portion of the cartridge belt engaged thereby are of increasingly greater order, with the result that the ammunition belts are more inclined to "stretch" due to inherent elasticity characteristics of the link devices which interconnect adjacent ammunition rounds. Consequently, the distances between adjacent ammunition rounds will vary at different stages of each gun firing operation; and therefore it will be appreciated that for such purposes it is impracticable to attempt to employ a star wheel or the like having fixed-pitch teeth for engaging between adjacent rounds because of the tendencies of the cartridge belt to climb up on top of the sprocket teeth and to jam the mechanism under such circumstances. The present invention contemplates employment of a plurality of cooperating pitman devices arranged for alternatively propelling the cartridge belt toward the region of the gun ammunition feedway; said pitman devices being arranged to oscillate with movement amplitudes greater than any possible "stretched" pitch distance between successive rounds, whereby variations in the spaces between adjacent rounds will have no deleterious effect upon the operation of the mechanism.

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In the drawings the feed assist mechanism of the invention is illustrated as being arranged in conjunction with a machine gun indicated generally at 10, which is being fed by a belt of linked cartridges indicated at 12. The ammunition rounds are linked together by any suitable type links which are normally in the condition indicated at 14, but which may stretch under severe load conditions, as indicated at 15 (Fig. 1). The feed assist mechanism of the invention is indicated generally as comprising a housing 16 having an ammunition conveying throat 18 of rectilinear sectional form extending therethrough from the side adjacent the machine gun to the side opposite thereto. The throat 18 is so dimensioned and formed as to accommodate the cartridge belt in free-sliding relation when threaded through the feed assist device. Hence, it will be understood that the cartridge belt will be adapted to enter the feed assist device at the inlet portion 20 of the ammunition conveying throat thereof, and that the ammunition will issue from the assist mechanism at the outlet port 22 thereof on its way to feed the gun.

To motivate the ammunition belt through the feed throat 18 an electric motor as indicated at 24 is mounted upon the housing 16; and the armature shaft of the motor 24 mounts a spur gear 26 which meshes with a pair of gear trains indicated at 28—28 leading from the spur gear 26 in diverging directions into driving connections with a pair of parallel shafts 30—31 which are rotatably carried upon the housing 16. A crank 32 is carried by the shaft 30 and a simi-

lar crank 33 is carried by the shaft 31 for pivotal engagements at their outer end portions through means of corresponding pivot pins 34—35 with corresponding pitman rods 36—37. The pitmans 36—37 are of similar formation and pivotally connect through means of connecting pins 38—39 with corresponding slideheads 40—41. The slideheads 40—41 are of block-like formation and are mounted to reciprocate freely in parallel directions within the housing 16 by bearing upon bushings 42—43 which are mounted within the housing 16 by means of corresponding cages 44—45. Thus, it will be understood that upon operation of the motor 24, the gear trains 28—28 will operate the crank-pitman systems to reciprocate the slide-heads 40—41 in directions parallel to the direction of cartridge belt movement through the feed assist device; and the gear train and crank mechanisms are so arranged that the slide-heads 40—41 reciprocate simultaneously in opposite directions.

The upper slide head 40 carries an ammunition belt driving pawl 50 by means of a pivotal connection at 52; and a compression spring 53 is arranged in conjunction therewith to bias the pawl 50 downwardly to engage against the cartridge belt links at positions behind successive rounds of ammunition, as illustrated in Fig. 2. A similar pawl 55 is pivotally mounted at 56 to the bottom slide-head 41, and a compression spring 58 is arranged in conjunction therewith to bias the pawl 55 upwardly into similar geared relation with respect to the cartridge belt. As illustrated in Fig. 2, the driving pawls 50—55 are inclined toward the ammunition rounds in the direction of movement of the cartridge belt through the feed assist device, whereby the pawls are adapted to press against the rear sides of links which encompass alternate successive ammunition rounds to drive the latter through the feed assist device in connection with forward movements of the corresponding slide-head members 40—41. It will be appreciated that in connection with each return or rearward sliding movement of the slideheads the corresponding driving pawl will be cammed against the action of its spring so as to slide by the next succeeding ammunition round.

The gear train and crank mechanisms are so proportioned and arranged that as one of the driving pawls moves from its backward position toward its forward position to drive the cartridge belt toward the gun, the other of the driving pawls is moving in reverse direction so as to fall in behind the next succeeding ammunition round as the first mentioned driving pawl reaches its foremost driving position. Thus, it will be understood that the driving pawls operate alternately to motivate the cartridge belt through the feed assist mechanism, and that the cartridge belt is thereby motivated toward the associated machine gun so long as the driving motor 24 is energized.

To control the operation of the driving motor 24 and to permit adjustment of the intermittent driving motions of the feed assist mechanism pawls to the feeding requirements of the gun feed pawl mechanism proper, the cartridge belt is arranged to be conducted from the discharge port 22 of the feed assist mechanism around an intermediary control roller prior to entrance into the feedway port of the gun. To this end, a cartridge belt engaging roller 60 is rotatably carried by means of a pair of arms 62—62 which extend from and pivotally connect to the assist device housing through means of a bearing shaft

64 which is supported by lugs 65 extending from the housing structure. A coil spring 66 (Fig. 3) is mounted upon the shaft 64 to engage at one of its ends with the roller arms 62 and at the other of its ends to a fixed housing lug portion 65; and the spring 66 is so arranged as to normally bias the roller 60 to the downwardly deflected solid line position thereof shown in Figs. 1 and 2.

The cartridge belt is arranged to train out of the discharge port 22 of the assist mechanism and thence under and around the roller 60 and upwardly therefrom into the ammunition feedway port of the gun 10 (Fig. 1); and the spring 66 is so provided as to be adapted to be overcome by the pull upon the cartridge belt by the ammunition feed pawl mechanism of the gun proper in connection with commencement of each gun firing operation. Thus, the cartridge belt will be thereby tensioned to be disposed tautly between the positions of the discharge port 22 of the feed assist mechanism and the ammunition feedway of the gun, as indicated diagrammatically at 70 as distinguished from the attitude of the cartridge belt indicated diagrammatically at 72 (Fig. 1). A guide roll 74 may be employed next to the gun ammunition feedway if desired to insure easy feeding of the cartridge belt to the gun.

A set screw 75 (Fig. 3) is threaded upon the shaft 64 so as to extend therethrough to engage the control finger 76 of a switch 77 mounted upon the housing 16 and arranged to control the electric power circuit of the motor 24 in such manner that whenever the roller 60 is lifted by the pull of the cartridge belt, as to the position indicated at 70, the micrometer switch 77 is actuated to close the circuit of the motor 24 whereby the latter is energized to drive the reciprocating pawl mechanism of the feed assist device as explained hereinabove. Thus, the feed assist device will be put into operation automatically upon need of ammunition feeding operation; and it will be understood that upon cessation of each gun firing operation and accompanying stoppage of the feed pawl mechanism of the gun proper, the pull upon the cartridge belt between the positions of the gun 10 and the outlet port 22 of the feed mechanism will be relaxed, whereby the control roller 60 will be permitted to lower in response to the action of the spring 66 and the motor 24 will be thus automatically deenergized. Preferably, the motor and gear mechanisms will be so arranged as to normally provide driving of the pawls 50—55 at a speed slightly in excess of the normal rate of ammunition belt movement required to satisfy the feed requirements of the gun, whereby the assist device will never lag behind the gun operation. Hence, the assist device may occasionally exceed the feeding requirements of the gun, in which case the assist device will be momentarily deenergized pending its being overtaken by the feed mechanism of the gun, whereby the feed assist mechanism will be operated automatically at all times in consonance with the ammunition feeding requirements of the gun.

It will be understood that as a special feature of the invention the looping of the cartridge belt between the positions of the discharge port 22 of the feed assist mechanism and the ammunition feedway of the gun will permit therein absorption of differentials of movements of the cartridge belt at the positions of the feed assist mechanism and at the feed mechanism of the gun proper. It will also be understood that in any case of use the arrangement and operation

of the driving pawl members 50—55 will be so provided to enable the driving pawls to reciprocate with sufficient amplitude to insure engagement thereof behind successive ammunition rounds as they enter the throat of the feed assist mechanism irrespective of any elongating of the interconnecting cartridge belt links such as may occur as a result of opposition by forces of gravity and inertia to the belt lifting movement of the feed assist mechanism. Inasmuch as the speeds of the slide-heads decelerate to zero toward the end of each reciprocation stroke and then initially accelerate slowly at the beginning of the following opposite stroke, the impacts of the driving pawls as they engage behind the cartridges are of very minor order, and the acceleration loads upon the assist mechanism and upon the cartridge belt are of optimum characteristics.

Hence, it will be appreciated that the feed assist mechanism of the invention will operate at all times to provide in a uniform rate of cartridge belt feeding, and that the mechanism will function smoothly and without difficulty irrespective of changes in the distances between successive cartridges such as normally result from stretching of the cartridge belt links.

I claim:

1. An ammunition feed assist mechanism for use in conjunction with a machine gun or the like, comprising a cartridge belt conveying throat member having an ammunition outlet port portion adapted to be arranged in spaced relation from the ammunition feedway port of the gun, a pair of driving pawls mounted upon said throat member and arranged to engage opposite faces of a cartridge belt when disposed in feeding position in said throat, motor means connected to said pawls to reciprocate the latter simultaneously in opposite directions, a control arm adapted to bear against the carriage belt intermediately of its positions of exit from said throat member and entrance into said gun, and means operated by movement of said control arm to cause said motor to be energized upon movement of said control arm in response to tightening of said cartridge belt between the positions of said feed assist device and said machine gun and to be deenergized upon opposite relaxation of said belt.

2. An ammunition feed assist mechanism for use in conjunction with a machine gun or the like, comprising a cartridge belt conveying throat member having an ammunition outlet port portion adapted to be arranged in spaced relation from the ammunition feedway port of the gun, a pair of driving pawls mounted upon said throat member and arranged to engage opposite faces of a cartridge belt when disposed in feeding position in said throat, motor means mounted upon said throat member, gear means extending from said motor means and connected to said pawls to reciprocate the latter simultaneously in opposite directions, a control arm adapted to bear against the cartridge belt intermediately of its positions of exit from said throat member and entrance into said gun, and means operated by movement of said control arm to cause said motor to be energized upon movement of said control arm in response to tightening of said cartridge belt between the positions of said feed assist device and said machine gun.

3. An ammunition feed assist mechanism for use in conjunction with a machine gun or the like, comprising a cartridge belt conveying housing having a throat and an ammunition outlet port portion adapted to be arranged in spaced relation from the ammunition feedway port of the gun, a pair of slide-head members mounted upon opposite sides of said housing for sliding reciprocation relative thereto, a driving pawl extending from each of said slide-heads, said pawls being arranged to engage opposite sides of a cartridge belt when disposed in feeding position in said throat, elastic means connecting said pawls and said driving heads to bias said pawls into driving engagement relative to the cartridge belt, crank means connected to said slide heads for reciprocating the latter, motor means mounted upon said housing, separate gear train means extending from said motor means in diverging relation and connected to said crank means, a control arm pivoted to said housing to extend therefrom in the direction of issuance of said cartridge belt from said housing and adapted to bear against the cartridge belt intermediately of its positions of exit from said housing and entrance into said gun, and motor control means adapted to be actuated by said control arm to cause said motor to be energized upon movement of said control arm in response to tightening of said cartridge belt between the positions of said feed assist device and said machine gun and to be deenergized upon opposite relaxation of said cartridge belt.

4. An ammunition feed assist mechanism for use in conjunction with a machine gun or the like, comprising a cartridge belt conveying housing having a throat and an ammunition outlet port portion adapted to be arranged in spaced relation from the ammunition feedway port of the gun, a pair of slide-head members mounted upon opposite sides of said housing for sliding reciprocation relative thereto, a driving pawl pivoted to each of said slide-heads, said pawls being arranged to engage opposite sides of a cartridge belt when disposed in feeding position in said throat, elastic means connecting said pawls and said driving heads to bias said pawls into driving engagement relative to the cartridge belt, crank means connected to said slide heads for reciprocating the latter, motor means connected to said crank means, a control arm pivoted to said housing to extend therefrom in the direction of issuance of said cartridge belt from said housing and adapted to bear against the cartridge belt intermediately of its positions of exit from said housing and entrance into said gun, and motor control means adapted to be actuated by said control arm to cause said motor to be energized upon movement of said control arm in response to tightening of said cartridge belt between the positions of said feed assist device and said machine gun.

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