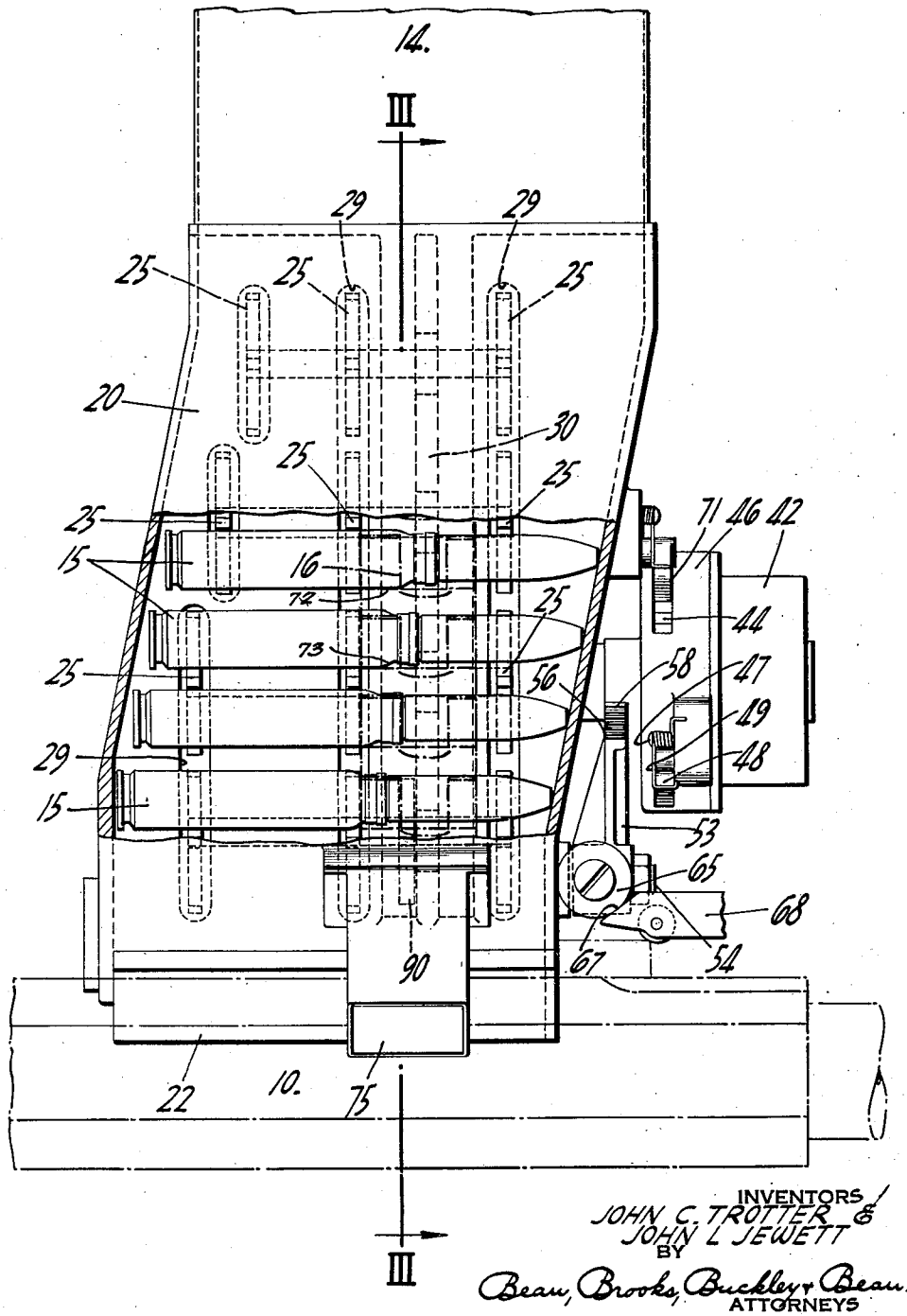
June 5, 1945. J. C. TROTTER ET AL 2,377,828

GUN FEED ACCESSORY DEVICE

Filed Sept. 5, 1941 2 Sheets-Sheet 1

FIG. 1.



INVENTORS
JOHN C. TROTTER &
JOHN L JEWETT
BY
Beau, Brooks, Buckley & Beau.
ATTORNEYS

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FIG. 2.

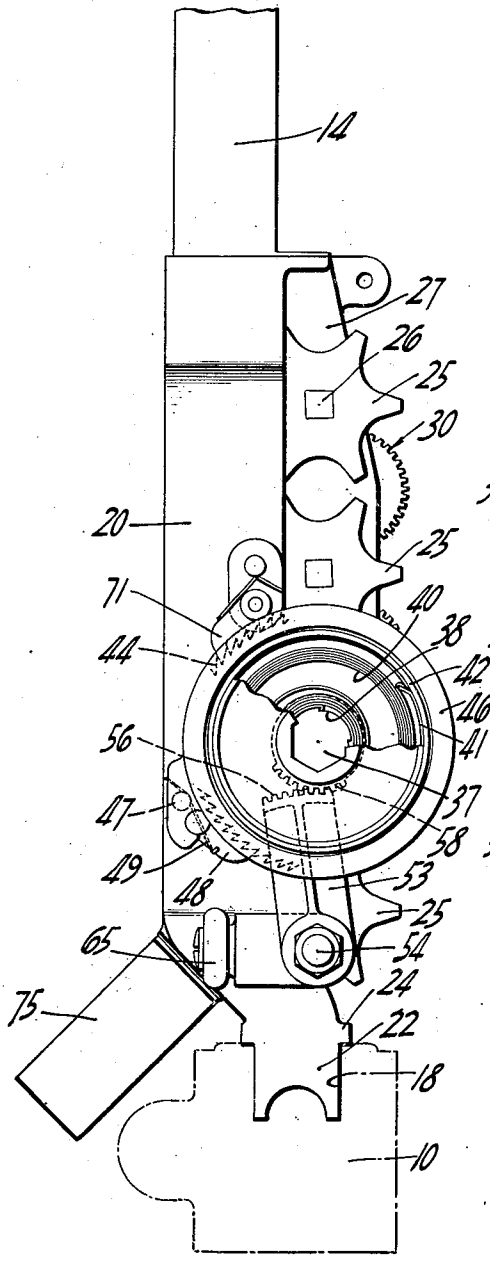
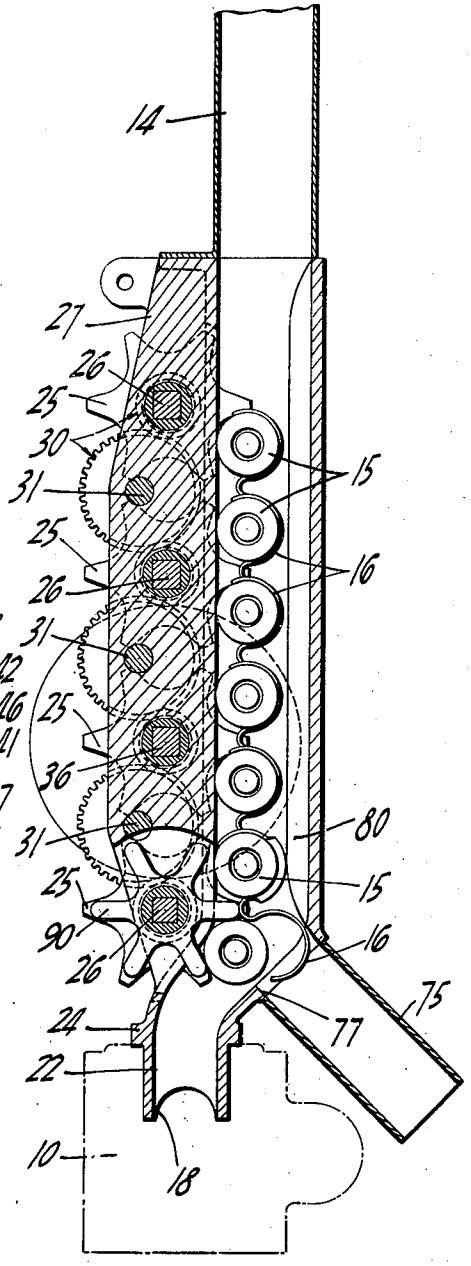


FIG. 3.



INVENTORS
JOHN C. TROTTER &
JOHN L. JEWETT
BY
Beau, Brooks, Buckley & Beau.
ATTORNEYS

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GUN FEED ACCESSORY DEVICE

John C. Trotter, Williamsville, and John L. Jewett, Buffalo, N. Y., assignors to Bell Aircraft Corporation, Buffalo, N. Y.

Application September 5, 1941, Serial No. 409,700

7 Claims. (Cl. 89—33)

This invention relates to rapid firing guns, and more particularly to an improved means for feeding ammunition thereto. One of the objects of the invention is to provide an improved ammunition feed accessory device adapted to be mounted in conjunction with a rapid fire gun or cannon or the like when situated within a relatively restricted space, such as in a tank or an airplane wing, or the like. Another object of the invention is to provide a cartridge belt automatic feed device which is adapted to segregate cartridges and cartridge connecting links prior to entrance of the cartridges into the gun feedway, in an improved manner. Another object of the invention is to provide an improved cartridge belt feed accessory device for automatic guns which is adapted to feed the cartridge belt to the gun in an improved manner. Other objects and advantages of the invention will be apparent from the specification hereinafter.

In the drawings:

Fig. 1 is a fragmentary side elevation of a cannon and an ammunition feed accessory device of the invention with portions of the covering structure thereof broken away to show the interior thereof;

Fig. 2 is an end elevation of Fig. 1 with a cover portion of the driving mechanism broken away to show the interior thereof, and

Fig. 3 is a section taken substantially along line III—III of Fig. 1.

The invention is illustrated in the drawings in conjunction with a rapid fire gun 10 of the cannon type. An ammunition magazine throat 14 is arranged above the gun 10 so as to be adapted to provide a continuous supply of cartridges 15 for the gun. The shells 15 are connected in articulated manner by means of conventional open side type links 16, so as to form a continuous ammunition belt adapted to be folded and nested within the magazine above the throat 14 preparatory to feeding to the gun. The gun 10 is provided with an ammunition feedway 18 in registry with the breech mechanism thereof, and it will be understood that the gun 10 will include any suitable usual type of cartridge feed pawl mechanism (not shown) in conjunction with the feedway 18.

The accessory feed device comprises a feed throat 20 which is in the general form of a closed sleeve of rectangular sectional form for guiding the movement of the cartridges 15 from the magazine 14 into the gun feedway 18. Because the cartridge feedway 18 of the gun 10 faces upwardly, the throat 20 is provided with a reduced end portion 22 and a stop shoulder 24 for slidably fitting into detachable connection relation with the gun 10, while the opposite end of the throat 20 is disposed in registry with the ammunition outlet portion of the magazine 14. Consequently, the general arrangement of the parts enables the gun and the magazine and the feed assist mechanism to be compactly nested within relatively restricted spaces such as are provided interiorly of tanks, airplanes, or the like.

To motivate the shells or cartridges 15 from the magazine 14 and into the gun ammunition feedway, a train of sprocket wheels 25 is provided adjacent a side wall portion of the throat 20; each of the wheels 25 being rotatably mounted by means of suitable shafting 26 upon a bracket 27 extending from the structure of the throat 20. The adjacent wall portion of the throat 20 is slotted as at 29 in the regions of the star wheels 25, and the star wheels are so mounted upon the bracket 27 as to have their finger portions extending inwardly through the slotted portions 29 of the throat 20 for geared engagement with the cartridges disposed within the throat 20. The star wheels 25 are arranged to be rotated in the necessary direction for propulsion of the shells 15 toward the gun feedway end portion of the throat 20 by means of a train of meshed gears indicated generally at 30. The gear train 30 comprises alternate gears carried upon and keyed to the star wheel shafts 26 and intermediate gears carried by shafts 31 which also bear upon the bracket 27. Thus, the star wheels 25 are arranged to rotate simultaneously.

To drive the gear train 30 one of the star wheel shafts 36 is extended and enlarged at 37 and coupled by means of a ratchet formation 38 to the inner end of a flat clock-type coil spring 40. The outer end of the spring 40 is bent to abut against an end portion of a split ring type friction plate 41 which is normally frictionally fixed to a housing 42. The housing 42 is rotatably carried upon the shaft 36 and is peripherally toothed at 44 entirely therearound in the manner of a ratchet wheel. A casing 46 is rotatably carried at one of its ends upon the shaft 36 so as to partially enclose the housing 42 and carries at its outer portion a pin 47 which supports a ratchet pawl 48 for driving the ratchet 44 in response to oscillation of the casing 46. A spring 49 mounts upon the pin 47 so as to urge the pawl into ratchet engagement and thus completes the ratchet pawl device.

A bell crank 53 is mounted upon a pin 54 extending from the throat 20 and is formed with a gear segment portion 56 concentric of the axis of

rotation about the shaft 54 for meshed engagement with a gear segment portion 58 of the casing 46. At its opposite end the crank 53 carries a roller 65 for engagement with an inclined track portion 67 of a cam bar 68 extending from a portion of the gun 10 which reciprocates in response to recoil forces when the gun is firing. Hence, upon firing of the gun 10 the cam 68 reciprocates in synchronism with the gun firing operation to cause the crank 53 to oscillate in such manner as to intermittently drive the spring motor casing 46 in counter-clockwise direction as viewed in Fig. 2 through the ratchet-pawl mechanism 48. A spring pressed pawl 71 is mounted upon a stationary portion of the throat casing for operative connection with the ratchet teeth 44 to stop the housing 42 against return movements intermediately of driving operations of the pawl 48. Thus, upon firing of the gun the outer end of the driving spring 40 is rotated in counter-clockwise direction as viewed in Fig. 2, and there is thus transmitted to the drive shaft 36 spring-loaded forces tending to rotate the sprocket wheel mechanism in the required direction of movement for propulsion of the cartridges 15 into the gun feedway. The cam 68 is arranged to be adjustable relative to the gun mechanism so that the throw imparted by the cam 68 to the rocker 53 may be modified as required to provide approximately the correct amount of driving action of the sprocket wheel assembly to suit the cartridge feeding requirements of the gun. However, it will be understood that the cam adjustment will be preferably so arranged that the rocker operation provides slightly more than the required star wheel driving action, and that as the spring 40 becomes overloaded with the star wheels under full torque, the friction clutch plate 41 will slip relative to the housing 42 to absorb the overrunning operation of the cam and rocker mechanism.

The links 16 normally engage the shells 15 intermediately of their ends at enlarged portions 72 of the shells and adjacent shouldered portions 73 thereof (Fig. 1) so that relatively slight endwise movements of the shells relative to the corresponding links dispose reduced diameter portions of the shells in the region of the clamping finger portions of the links 16.

As illustrated in Fig. 1, the throat 20 is laterally distorted in side view in such manner that the opposed end wall portions of the throat member 20 are adapted to cam the shells or cartridges 15 endwise as they approach the gun feedway whereby the enlarged body portions of the cartridges are displaced out of connection with the corresponding curved finger portions of the connecting link devices 16. The sprocket wheels 25 are relatively arranged so as to be in spaced opposed relation at opposite sides of the links 16 as the cartridge belt moves through the guide throat 20. Thus, the sprocket wheels 25 function simultaneously to drive the cartridge belt and to maintain the links 16 in unchanged alignment while passing through the mechanism of the invention, thus preventing lateral shifting of the links 16 coincident with shifting of the cartridges 15 for disengaging purposes under the camming action of the oblique side walls of the feed throat. Thus, the links 16 become freed to fall into a link ejection chute 75 disposed below the throat 20 and in registry with an apertured wall portion 77 thereof; it being understood that the links 16 are of the conventional open side type and adapted to remain engaged only upon the larger diameter portions of the shells which are dimensioned to fit the link recesses snugly. Thus, just prior to arrival of each successive cartridge into registry with the aperture 77 in the side wall of the throat 20, the cartridges engaging each successive link 16 will be cammed endwise out of engagement with the link so that the latter is free to be pivoted laterally into the chute 75.

A sprocket wheel 90 is rotatably mounted by means of the lower of the shafts 26 within a suitably apertured portion of the outer wall of the throat 20 substantially opposite the position of the leading edge of the link receiving aperture 77 at the opposite wall portion of the throat 20. The sprocket device 90 is arranged to register with the links 16 as they move into registry with the chute 75 so as to bear against the central body portion of each succeeding link after it becomes freed from its carrying cartridges and to forcibly displace it laterally into the chute 75. Thus, the links are prevented from following the cartridges 15 as they proceed toward the gun feedway as would otherwise cause jamming of the cartridge feeding operation, and are positively segregated from the shells in an improved manner. A track 89 is provided to firmly guide the links 16 as they move through the throat 20 and into registry with the chute 75.

Thus, the invention provides a simple and rugged and automatically operating device in the form of an easily attached accessory for use in conjunction with any type of automatic gun or cannon or the like, whereby the oscillative movement of actuating parts of the gun are automatically translated and transmitted to the feed accessory mechanism for feeding the cartridge belt to the gun in an improved manner. It will also be understood that the mechanism of the invention is particularly advantageous and of improved form because of its compactness and close adherence to the associate gun; whereby minimum space is required for installation of the device of the invention, and marked advantages in connection with machine guns and cannons or the like are made available. Although only one form of the invention has been shown and described in detail it will be apparent to those skilled in the art that the invention is not so limited but that various changes may be made therein without departing from the spirit of the invention or the scope of the appended claims.

What is claimed is:

1. An ammunition feed accessory device for use in conjunction with a gun having a cartridge feedway adapted to receive unconnected cartridges in succession, said feed accessory device comprising a guide member adapted to be mounted upon said gun in registry with said cartridge feedway and to extend therefrom to receive belts of cartridges articulated by means of links having portions encircling said cartridges and maintaining said cartridges in successive spaced apart relation, said guide member having guide means thereon adapted to engage and slidably guide the links of said cartridge belts in constant direction alignment as they move through said guide member, cam means carried by said guide member to slidably engage and force said cartridges to move in endwise direction out of alignment with the direction of link movement through said guide member and out of encircled engagement relative to said links, said guide member having a perforated side wall portion at a position in registry with the path of said links subsequent to disconnection from said cartridges,

said perforated wall portion being formed to provide a restricted opening so as to prevent movement of said cartridges therethrough, and a thrust device mounted upon said guide member to extend between adjacent of said cartridges as they become disconnected from said links to substantially maintain the original spaced relation of said cartridges and to simultaneously force the disconnected links through said perforated wall portion.

2. An ammunition feed accessory device for use in conjunction with a gun having a cartridge feedway adapted to receive unconnected cartridges in succession, said feed accessory device comprising a guide member adapted to be mounted upon said gun in registry with said cartridge feedway and to extend therefrom to receive belts of cartridges articulated by means of links having portions encircling said cartridges and maintaining said cartridges in successive spaced apart relation, said guide member having guide means thereon adapted to engage and slidably guide the links of said cartridge belts in constant direction alignment as they move through said guide member, said guide member having sloping side wall means adapted to slidably engage and force said cartridges to move in endwise direction out of alignment with the direction of link movement through said guide member and out of encircled engagement relative to said links, said guide member having a perforated side wall portion at a position in registry with the path of said links subsequent to disconnection from said cartridges, said perforated wall portion being formed to provide a restricted opening so as to prevent movement of said cartridges therethrough, and a thrust device mounted upon said guide member to extend between adjacent of said cartridges as they become disconnected from said links to substantially maintain the original spaced relation of said cartridges and to simultaneously force the disconnected links through said perforated wall portion.

3. An ammunition feed accessory device for use in conjunction with a gun having a cartridge feedway adapted to receive unconnected cartridges in succession, said feed accessory device comprising a guide member adapted to be mounted upon said gun in registry with said cartridge feedway and to extend therefrom to receive belts of cartridges articulated by means of links having portions encircling said cartridges and maintaining said cartridges in successive spaced apart relation, said guide member having guide means thereon adapted to engage and slidably guide the links of said cartridge belts in constant direction alignment as they move through said guide member, cam means carried by said guide member to slidably engage and force said cartridges to move in endwise direction out of alignment with the direction of link movement through said guide member and out of encircled engagement relative to said links, said guide member having a perforated side wall portion at a position in registry with the path of said links subsequent to disconnection from said cartridges, said perforated wall portion being formed to provide a restricted opening so as to prevent movement of said cartridges therethrough, and a sprocket wheel mounted upon said guide member to rotate freely in meshed relation with the cartridge belt passing thereinto and having finger portions adapted to extend between adjacent of said cartridges as they become disconnected from said links to substantially maintain the original spaced relation of said cartridges and to simultaneously force the disconnected links through said perforated wall portion.

4. An ammunition feed accessory device for use in conjunction with a gun having a cartridge feedway adapted to receive unconnected cartridges in succession, said feed accessory device comprising a guide member adapted to be mounted upon said gun in registry with said cartridge feedway and to extend therefrom to receive belts of cartridges articulated by means of links having portions encircling said cartridges and maintaining said cartridges in successive spaced apart relation, said guide member having sprocket means thereon adapted to mesh with said cartridge belts to regulate the feeding thereof and to engage and slidably guide the links of said cartridge belts in constant direction alignment as they move through said guide member, cam means carried by said guide member to slidably engage and force said cartridges to move in endwise direction out of alignment with the direction of link movement through said guide member and out of encircled engagement relative to said links, said guide member having a perforated side wall portion at a position in registry with the path of said links subsequent to disconnection from said cartridges, said perforated wall portion being formed to provide a restricted opening so as to permit movement of said links therethrough but to prevent movement of said cartridges therethrough, motor means coupled to said sprocket means for actuating the latter to propel said cartridges toward said gun feedway, and a thrust device mounted upon said guide member to extend between adjacent of said cartridges as they become disconnected from said links to substantially maintain the original spaced relation of said cartridges and to simultaneously force the disconnected links through said perforated wall portion.

5. An ammunition feed accessory device for use in conjunction with a gun having a cartridge feedway adapted to receive unconnected cartridges in succession and having a part thereof adapted to reciprocate in response to recoiling operation of the gun, said feed accessory device comprising a guide member adapted to be mounted upon said gun in registry with said cartridge feedway and to extend therefrom to receive belts of cartridges articulated by means of links having portions encircling said cartridges and maintaining said cartridges in successive spaced apart relation, said guide member having a train of sprockets rotatably mounted thereon adapted to engage and slidably guide the links of said cartridge belts in constant direction alignment as they move through said guide member, cam means carried by said guide member to slidably engage and force said cartridges to move in endwise direction out of alignment with the direction of link movement through said guide member and out of encircled engagement relative to said links, said guide member having a perforated side wall portion at a position in registry with the path of said links subsequent to disconnection from said cartridges, said perforated wall portion being formed to provide a restricted opening so as to permit movement of said links therethrough but to prevent movement of said cartridges therethrough, motion transmitting means coupled to said train of sprockets and adapted to extend into engagement with said reciprocating gun part for translating reciprocative movements

thereof into rotation of said sprockets, and a thrust device mounted upon said guide member to extend between adjacent of said cartridges as they become disconnected from said links to substantially maintain the original spaced relation of said cartridges and to simultaneously force disconnected links through said perforated wall portion.

6. An ammunition feed accessory device for use in conjunction with a gun having a cartridge feedway adapted to receive unconnected cartridges in succession and having a part thereof adapted to reciprocate in response to recoiling operation of the gun, said feed accessory device comprising a guide member adapted to be mounted upon said gun in registry with said cartridge feedway and to extend therefrom to receive belts of cartridges articulated by means of links having portions encircling said cartridges and maintaining said cartridges in successive spaced apart relation, said guide member having a train of sprockets rotatably mounted thereon adapted to engage and slidably guide the links of said cartridge belts in constant direction alignment as they move through said guide member, cam means carried by said guide member to slidably engage and force said cartridges to move in endwise direction out of alignment with the direction of link movement through said guide member and out of encircled engagement relative to said links, said guide member having a perforated side wall portion at a position in registry with the path of said links subsequent to disconnection from said cartridges, said perforated wall portion being formed to provide a restricted opening so as to permit movement of said links therethrough but to prevent movement of said cartridges therethrough, motion transmitting means coupled to said train of sprockets and adapted to extend into engagement with said reciprocating gun part for translating reciprocative movements thereof into rotation of said sprockets, said motion transmitting means including an elastic coupling member, and a sprocket wheel rotatably mounted upon said guide member and having teeth portions adapted to extend between adjacent of said cartridges as they become disconnected from said links to force the disconnected links through said perforated wall portion.

7. An ammunition feed accessory device for use in conjunction with a gun having a cartridge feedway adapted to receive unconnected cartridges in succession, and having a part thereof adapted to reciprocate in response to recoiling operation of the gun, said feed accessory device comprising a guide member adapted to be mounted upon said gun in registry with said cartridge feedway and to extend therefrom to receive belts of cartridges articulated by means of links having portions encircling said cartridges and maintaining said cartridges in successive spaced apart relation, said guide member having a train of sprockets rotatably mounted thereon adapted to engage and slidably guide the links of said cartridge belts in constant direction alignment as they move through said guide member, cam means carried by said guide member to slidably engage and force said cartridges to move in endwise direction out of alignment with the direction of link movement through said guide member and out of encircled engagement relative to said links, said guide member having a perforated side wall portion at a position in registry with the path of said links subsequent to disconnection from said cartridges, said perforated wall portion being formed to provide a restricted opening so as to permit movement of said links therethrough but to prevent movement of said cartridges therethrough, motion transmitting means coupled to said train of sprockets and adapted to extend into engagement with said reciprocating gun part for translating reciprocative movements thereof into rotation of said sprockets, said motion transmitting means including an elastic coupling member and a friction clutch member, and a thrust device mounted upon said guide member to extend between adjacent of said cartridges as they become disconnected from said links to substantially maintain the original spaced relation of said cartridges and to simultaneously force disconnected links through said perforated wall portion.

JOHN C. TROTTER.
JOHN L. JEWETT.