Feb. 27, 1968 S. ALTSCHULER ETAL 3,370,506

AMMUNITION FEEDER AND BOOSTER

Filed Oct. 13, 1955

3 Sheets-Sheet 1

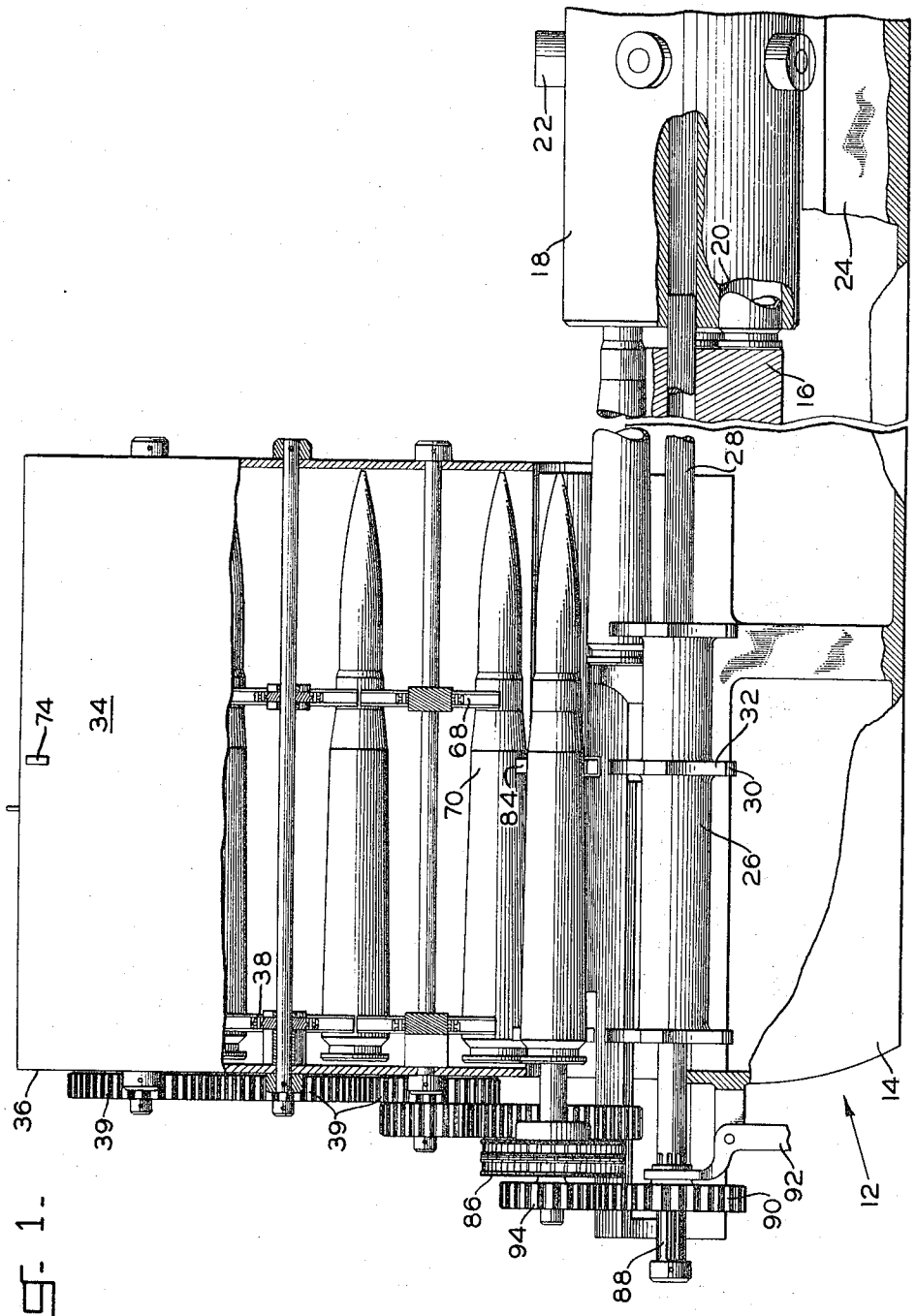

Fig. 1.

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Fig. 2.

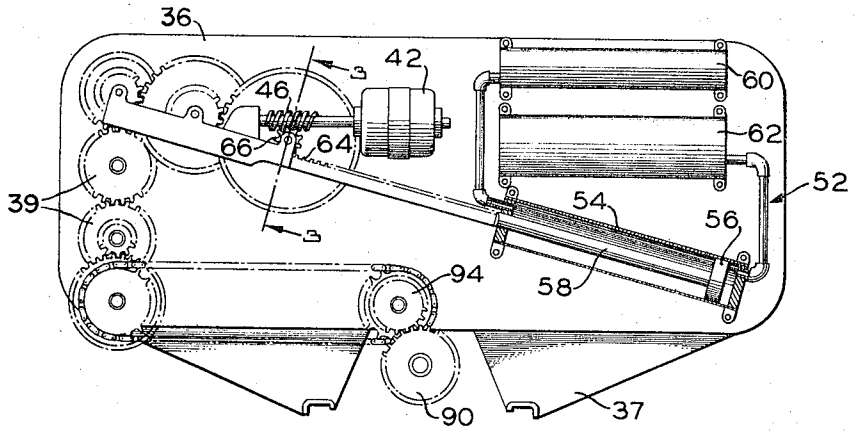
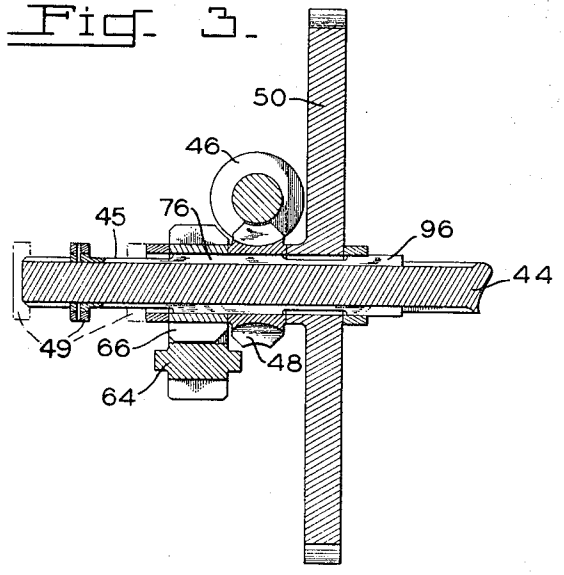


Fig. 3.



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3 Sheets-Sheet 3

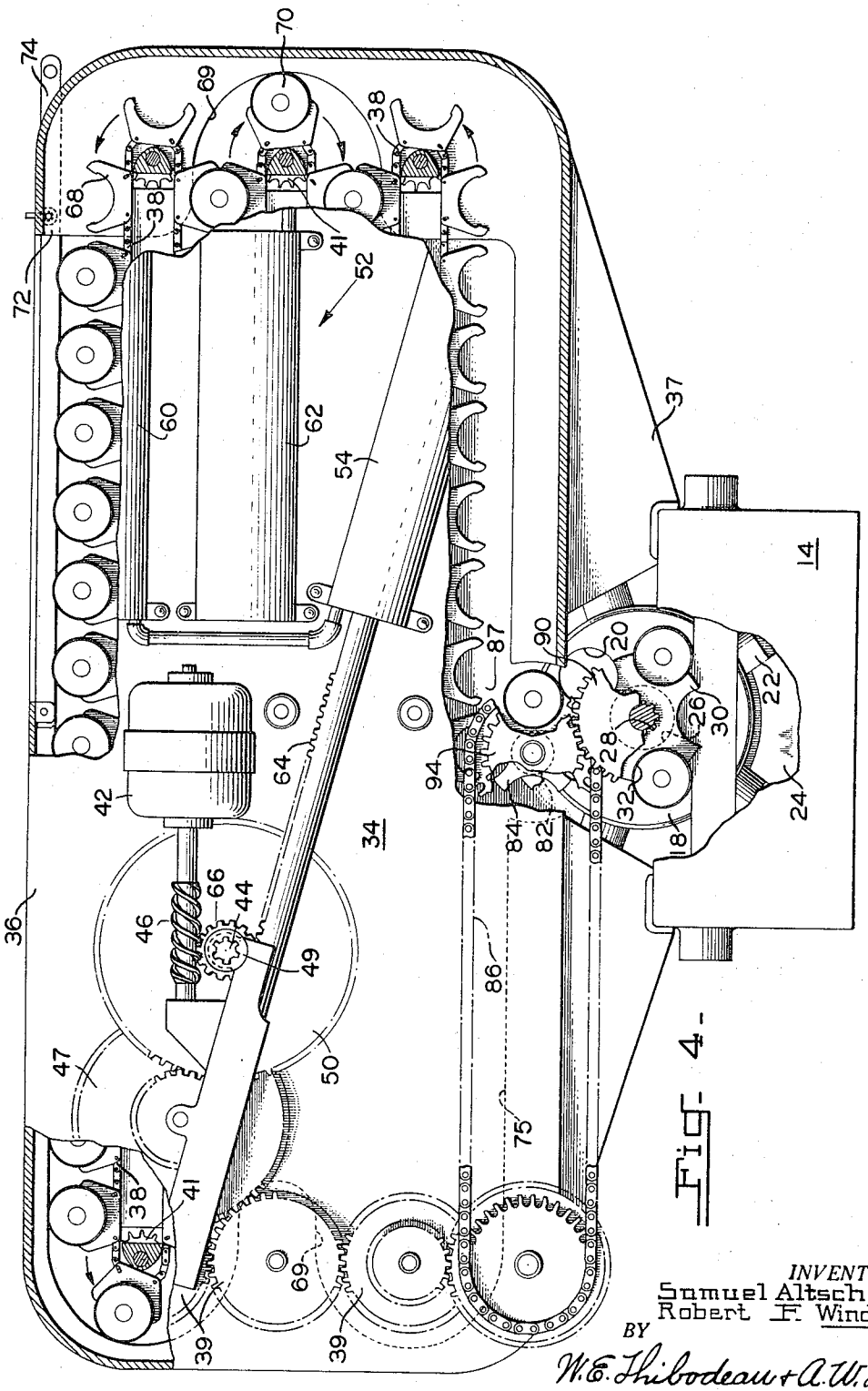

Fig. 4.

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AMMUNITION FEEDER AND BOOSTER

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1 Claim. (Cl. 89—33)

Our invention relates to a large caliber revolver-type automatic gun and more particularly to a boosted feed mechanism for supplying individual cartridges thereto.

Revolver-type guns in present use are of comparatively small caliber and the ammunition therefor is stored and fed to the guns in belts. The cartridges of the present gun are too heavy for belted application and they must be supplied to the gun individually.

The gun includes a receiver having a cam and a unit for supporting a barrel having a drum with chambers and corresponding index rollers engageable with the cam. The unit is biased to a battery position and slidably disposed for recoil and counterrecoil operation in the receiver to successively rotate the chambers through the cooperation of the rollers and cam to a firing station in axial alignment with the barrel, responsive to discharge of cartridges chambered in the firing station.

A wheel clutched to the drum includes a pair of sprockets with tooth spaces corresponding to the chambers to convey the cartridges to the stations preceding the firing station for projection of the cartridges into the drum responsive to a separate rammer.

It is an object of our invention, therefore, to provide a feeder for supplying individual cartridges to the sprocket wheel of the weapon.

Another object of our invention is to provide a conveyor-type feeder with a motor for loading thereof independently of the weapon.

A further object of our invention is to provide such a feeder having a pneumatic booster chargeable by the motor for powering the conveyor in proportion to the number of cartridges in the feeder.

A still further object of our invention is to provide such a feeder having a chute for lateral ejection of the cases of cartridges discharged in the weapon.

Further aims and objects of our invention will appear from the ensuing explanation.

In carrying out our invention a container secured to the top of the gun includes parallel pairs of synchronously operable endless chains disposed in parallel relation and geared together for simultaneous operation. The chains are provided with lugs for carrying cartridges, and guides provided in the container retain the cartridges in the lugs. A feed wheel geared to a drum wheel is connected for rotation with the endless chains by a chain drive and a port is provided in the container for access to the endless chains.

A motor supplied with energy from an outside source is provided with a worm and a worm wheel for speed reduction and the worm wheel is connectable through a first gear of a set of reduction gears for operating the chains to load the weapon.

A booster disposed on the feeder includes a cylinder for respective communication of the ends thereof with a pair

of cylindrical accumulators. The cylinder includes a piston with a piston rod secured thereto and such piston rod is provided with a rack for engagement with a pinion disposed coaxially with the first gear. The worm wheel is connectable through the pinion for operation of the motor to charge the booster. As the booster is charged, the pressures in the respective acumulators are increased and decreased.

The pinion is connectable to the gear train to assist the drum in operating the chains as the gun is fired and the force applied to the chains by the booster is proportionate to the number of cartridges stored in the feeder and, therefore, decreases as the container is emptied of cartridges.

For a more complete understanding of our invention reference is made to the following description and the accompanying drawings of a gun incorporating one embodiment of our invention in which:

FIG. 1 is a side elevation of the gun partly broken away;

FIG. 2 is a rear elevation of the feeder;

FIG. 3 is a view along the line 3—3 of FIG. 2; and

FIG. 4 is an enlarged rear elevation of the gun partly broken away.

Shown in the figures is a revolver-type automatic gun 12 having a receiver 14. A unit 16 for supporting a barrel is slidably disposed in receiver 14 and is actuated for reciprocation by means, such as a gas motor, (not shown) for which the power is supplied from the energy produced by the discharge of cartridges in gun 12. Drum 18 is rotatably mounted to unit 16 and includes a plurality of chambers 20 and radially projecting index rollers 22 corresponding to the number of chambers. A cam 24 is disposed in receiver 14 for engagement by successive ones of the rollers 22 during reciprocation of unit 16 to rotate the chambers 20 successively to a firing station in axial alignment with the gun barrel.

A feedwheel 26 is rotatably mounted on a shaft 28 which is coaxially splined to drum 18 for rotation therewith, and such feedwheel includes a pair of sprockets 30 provided with a plurality of tooth spaces 32 which correspond to the chambers 20 and are coaxial therewith.

A feeder 34 is provided to store a supply of cartridges 70 and serially feed such catridges to feedwheel 26 for projection therefrom into the corresponding chambers of drum 18 by a ramming mechanism (not shown). Feeder 34 includes a substantially rectangular container 36 secured to the top side of receiver 14 by a pair of brackets 37. Included within container 36 are six endless conveyor chains 38, which are arranged in three pairs, disposed for supporting the cases of the cartridges 70 at the front and rear portions thereof with such pairs being cooperatively superimposed to progressively carry the cartridges 70 from the top of container 36 to the bottom thereof and in position to be fed to feedwheel 26, as hereinafter described. The conveyor chains 38 are disposed between engaging pairs of sprockets 41 mounted respectively at the right and left sides of container 36 whereby the linear portions of such chains, disposed between the mounting pairs of sprockets, are disposed parallel to corresponding portions of the other conveyor chains, as best shown in FIG. 4. The sprockets 41 are rotated for concerted operation by means of cooperating gears 39 each of which is mounted outside container 36 on a common axle with one of each of the pairs of sprockets 41.

A reversible electric motor 42 is fixedly mounted to the outside of container 36 with a worm 46 mounted to the shaft thereof for meshing engagement with a worm-gear 48 rotatably mounted on a sleeve 45 slidably disposed on a transverse shaft 44. Also rotatably mounted on sleeve 45 are a pinion gear 66 and a gear 50, which is connected with the gears 39 by means of a series of reduction gears, such as noted at 47. Provided on the outer end of sleeve 45 is a knob 49 whereby such sleeve may be manually actuated along shaft 44 to one of three predetermined positions. Also provided on sleeve 45 is a key portion 96 which is slidably engageable with a mating keyway in gear 50, for rotatably joining such gear to the sleeve, when such sleeve is in the first of the three positions. Another key portion 76 is provided on sleeve 45 to similarly engage pinion 66, when such sleeve is in the first position, to jointly engage worm-gear 48 and pinion 66, when such sleeve is in the second of the three positions, as is shown in FIG. 3, and such worm-gear to gear 50 when sleeve 45 is in the third position.

Mounted to the outside of container 36 is a booster device 52 including a cylinder 54 in which there is slidably mounted a piston 56. A rod 58 extends axially from piston 56, and a rack 64 is disposed on such rod for engagement with pinion gear 66 to provide rotation thereof as the piston is reciprocated in cylinder 54. The front end of cylinder 54 communicates by pipe means with an accumulator 62, and the rear end of such cylinder communicates similarly with an accumulator 60 whereby, when piston 56 is moved to the front end of the cylinder to a charged position, the pressure in accumulator 62 is increased while the pressure in accumulator 60 is decreased and the piston is actuatable to the rear end of cylinder 54, to a retracted position, by the difference in the pressures of the two accumulators.

Each of the chains 38 is provided with lugs 68 for gripping individual ones of the cartridges 70 therebetween and moving such cartridges with the chains, as hereinafter described, through container 36. The cartridges are retained in engagement with the cooperating lugs 68, when rotated around the sprockets 41, by means of arcuate guides 69, as best shown in FIG. 4. Movement of the chains 38 is synchronized so that the cartridges 70 are jointly gripped by the lugs 68 on the adjacent pairs of chains 38 during movement of such cartridges between the opposite sides of container 36. Container 36 is provided with an open port 72 in the top side thereof for loading a supply of cartridges 70 onto the uppermost pair of chains 38, and a pair of rails 74 are pivotally mounted for longitudinal disposition across port 72 to retain the cartridges on such uppermost pair of chains when moved thereby.

A guide 75 slidably retains the cartridges 70 between the lugs 68 when in the lowermost position in container 36 until the cartridges are removed from such lugs by a sprocket wheel 82. Sprocket wheel 82 is provided with a pair of sprockets 84 disposed to engage the cases of the cartridges, when such cartridges reach the end of guide 75, and is connected to the gears 39 by means of a chain drive 86 and by gears 90 and 94 to drum 18. Gear 90 is slidably mounted by spline means to a shaft 88 and is movable into selective engagement with gear 94 by a lever 92. A circular ramp 87 retains the cartridges in engagement with sprockets 84 while being rotated thereby and such sprockets are disposed in relation to feedwheel 26 so that the cartridges are removed thereby from such sprockets during the actuation thereof.

Thus, to load container 36, the rails 74 are pivoted to open port 72 and sleeve 45 is actuated to the first position thereof whereby motor 42 is connected to gear 50 through the joint engagement of such gear with worm-gear 48 by key portion 96. Motor 42 is energized to rotate the chains 38 and, as such chains are rotated, cartridges 70 are passed through port 72 into engagement with the lugs 68.

When the cartridges 70 are moved through container 36 until the two leading cartridges are engaged by the sprockets 84, feeder 34 is fully loaded. Next, the rails 74 are locked in position and sleeve 45 actuated to the second position thereof whereby key portion 96 jointly engages worm-gear 48 with pinion 66 so that, when motor 42 is reenergized, the engagement of such pinion with rack 64 moves piston 56 in cylinder 54 to charge accumulator 62 and discharge accumulator 60. Then, sleeve 45 is actuated to the third position thereof whereby gear 50 is joined to pinion 66 by key portion 96 being received by the mating slot therefor in such gear and key portion 76 being received in a mating slot therefor in such pinion. Thereby, motor 42 is disconnected from the chains 38 which are connected for actuation by drum 18, when gun 12 is fired, through chain drive 86 and the gears 90 and 94, and by piston 58 through the difference in the pressures of the accumulator 58 and 60 applied thereagainst to assist in moving the cartridges through container 36.

It is obvious that more energy is required to move the chains 38 when container 36 is full and that proportionately less energy is required as the cartridges are moved from the chains to gun 12. It is also obvious that when piston 56 is moved to the charged position in cylinder 54, when feeder 34 is loaded, the differential pressure between the accomulators 60 and 62 is the greatest, and thereby such piston applies the most energy to the chains 38, and as the belts are rotated to deliver the cartridges therefrom and the piston is moved along the cylinder to the retracted position, the energy applied by such piston is proportionately decreased. Thereby, it is readily apparent that through the assistance of booster device 52 the energy required of gun 12 to actuate feeder 34 is substantially constant to maintain a constant firing rate of the gun.

Although a particular embodiment of the invention has been described in detail herein, it is evident that many variations may be devised within the spirit and scope thereof and the following claim is intended to include such variations.

We claim:

1. For a gun having a receiver, a rotatable drum provided with chambers indexable to a firing station and means for rotating the drum powered by the explosion of cartridges in the gun, a feeder comprising a container mounted at one end to the receiver and provided with a port in an end opposite said one end for loading a supply of cartridges into said container, a plurality of endless chains movably mounted in said container and cooperably disposed for storing a supply of said cartridges therein and for moving said cartridges from said port to the receiver, means for connecting said chains to the drum for actuation thereby, a booster device to assist the drum in actuating said chains proportionate to the number of cartridges loaded in said container, said booster device being comprised of a cylinder with a cooperating piston slidingly mounted therein for reciprocation between a charged and a retracted position and a pair of accumulators communicating respectively with the opposite ends of said cylinder for producing a differential pressure in said pair of accumulators when said piston is moved to the charged position to energize said piston for movement to the retracted position proportionate to the position thereof in said cylinder, a rod extending from said piston out of said cylinder, a rack provided on said rod, a motor mounted to said container, a worm mounted to said motor for actuation thereby, a shaft rotatably mounted to said container, a sleeve slidingly disposed on said shaft for actuation to one of three predetermined positions, a worm-gear rotatably mounted to said sleeve for meshing engagement with said worm, a pinion rotably mounted to said sleeve for meshing engagement with said rack, a gear rotatably mounted to said sleeve and connected to said chains for operation therewith, a first key portion disposed on said sleeve for sliding engagement with said gear when said sleeve is in the first of said

three positions, a second key portion disposed on said sleeve to slidingly engage said pinion when said sleeve is in the first position for transferring the force applied against said piston by said pair of accumulators to said chains, to jointly engage said pinion with said worm-gear when said sleeve is in the second of said three positions for connecting said motor to said piston for actuation thereof and to jointly engage said worm-gear with said gear when said sleeve is actuated to the third of said three positions to connect said motor to said chains for actuation thereof.

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