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ELECTRIC AMMUNITION FEEDER

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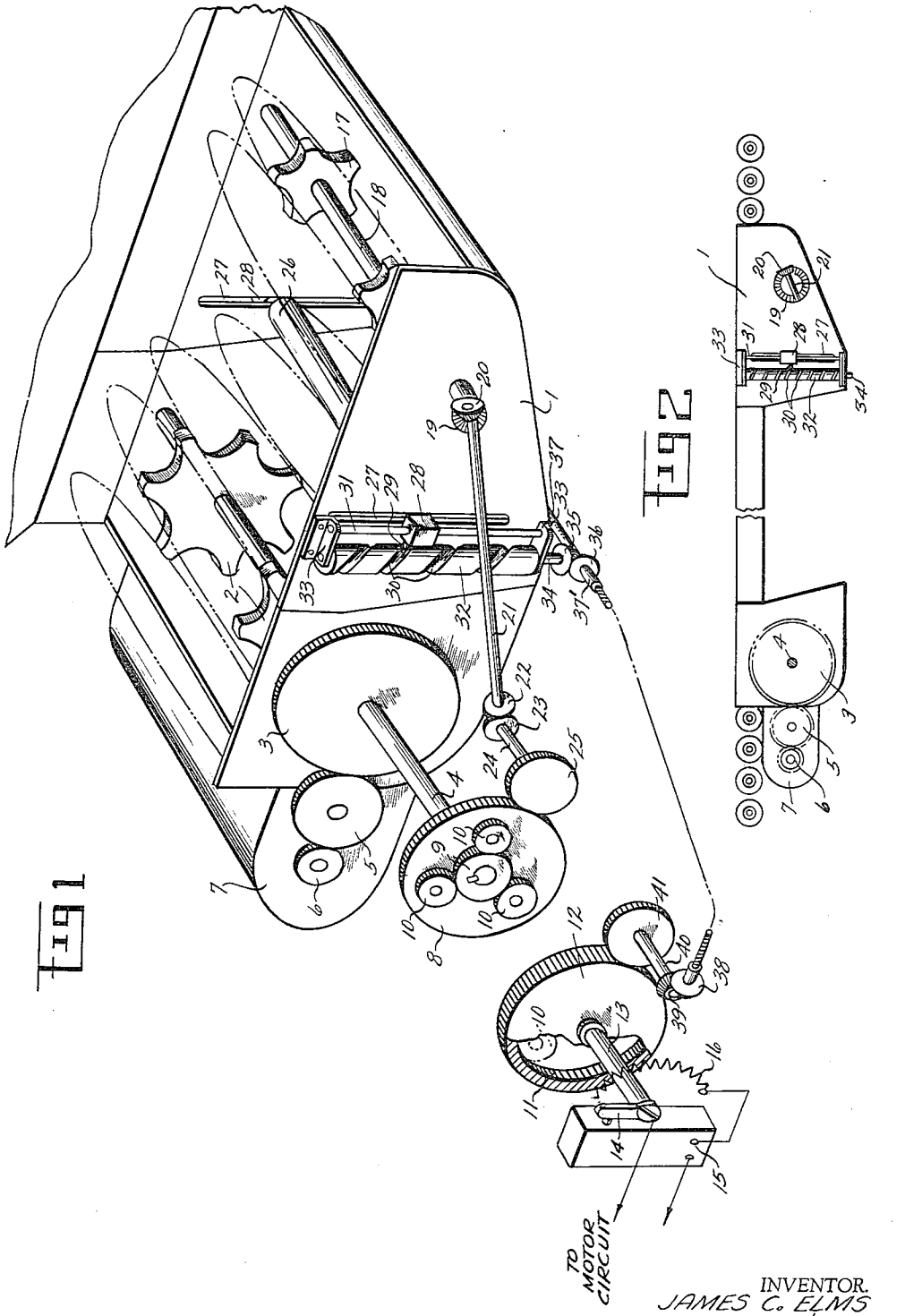

INVENTOR.
JAMES C. ELMS

BY Clade Koontz and Ransler O. Wyatt
ATTORNEYS

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ELECTRIC AMMUNITION FEEDER

James C. Elms, Dayton, Ohio

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4 Claims. (Cl. 89—33)

(Granted under Title 35, U. S. Code (1952), sec. 266)

The invention described herein may be manufactured and used by or for the Government for governmental purposes without payment to me of any royalty thereon.

This invention relates to an ammunition feed booster.

An object of this invention is to provide an ammunition feed boster for use in supplying ammunition to machine guns where the gun is located in a position far enough away from the source of ammunition supply to make the load of the ammunition belt too great for the proper function of the gun. In employing boosters in such instances, it has been found that the type now in general use tends to force the ammunition into the gun faster than the gun is designed to fire, often resulting in malfunction of the gun. It is an object of this invention to provide an ammunition feed booster that will carry the entire load of the belt of ammunition but that will not place any impetus on the ammunition at the point of entry into the gun.

It is another object of the invention to provide an ammunition feed booster that may be placed in sections in the line of ammunition feed to provide both push and pull to the line between sections without injury to the links of the machine gun belt.

The above and other objects will be apparent from the following description and illustrated in the accompanying drawings wherein:

Fig. 1 is a perspective view showing the differential gear assembly in exploded relation and partially in section, and

Fig. 2 is a side elevation of another embodiment of the invention.

Referring now more particularly to the drawings, numeral 1 designates the casing in which is mounted the drive sprockets 2. Extending through the casing 1 and axially connected to the drive sprockets 2 is the elongated shaft 4. Axially mounted on shaft 4 outside of the casing 1 is the drive gear 3, whose toothed periphery is meshed with the toothed periphery of an idler gear 5 which in turn is in mesh with the motor gear 6. Mounted adjacent one end of the casing 1 is the motor 7 which may be of any conventional design and which is adapted to drive the booster mechanism. Axially mounted on the shaft 4 is a differential gear assembly having the main gear 8 free to turn on the shaft. Keyed to the shaft 4 is the sun gear 9 and the planetary gears 10, 10, 10 in mesh therewith are rotatably mounted on the side wall of the gear 8. The planetary gears 10 are in mesh with the annular ring gear 11 in the cooperating gear 12. Axially mounted on the gear 12 is the elongated shaft 13 having a motor speed control rheostat arm 14 mounted on the end thereof and adapted to contact the motor switch 15 and to regulate the resistance through the rheostat 16.

Within the casing 1 are the guide sprockets 17 mounted on the shaft 18 and adapted to freely rotate within the casing. One end of the shaft 18 has the bevel gear 19 mounted thereon in mesh with the bevel gear 20 which is mounted on a shaft 21. The bevel gear 22 is mounted

on the opposite end of the shaft 21 and is in mesh with the bevel gear 23 which is mounted on the shaft 24 having the gear 25 on the opposite end thereof. The gear 25 is in mesh with the toothed periphery of the gear 8. A cylindrical bar 26 is mounted in the casing 1 by means of axial extensions thereon extending through the vertical slots 27, 27 in the casing side walls, and supported in a pair of identical mechanisms mounted adjacent to slots 27 on opposite sides of casing 1. Since said mechanisms are identical, only one is shown in detail in Fig. 1 and only one will be described in detail. The axial extension at each end of roller 26 is rotatably mounted in a roller guide 28 which is in turn slidably mounted upon a vertical post 31 so that tongue 29 extending from guide 28 is engaged in the spiral slot 30 of the vertical worm 32. Suitable brackets 33, 33 maintain the worm 32 and the post 31 in position adjacent to the casing 1. A bevel gear 35 mounted at one end of the worm 32 upon an axial extension 34 thereof engages a bevel gear 36 mounted on a shaft 37 disposed transversely below the casing 1 and extended at one end to form shaft 37' preferably flexible, terminating in a bevel gear 38 in contact with another bevel gear 39. The gear 39 is mounted on the shaft 40 which has the spur gear 41 on the opposite end so disposed that the toothed periphery of gear 41 is meshed with the toothed periphery of the gear 12.

The cartridges in the ammunition belt are fed into the booster as shown in dotted lines in Fig. 1, over the drive sprockets 2 into the reservoir of the casing 1, beneath the roller 26 and over the guide sprockets 17, thence into the gun. When the gun is fired, the ammunition will be drawn by the gun over the guide sprockets 17 turning the shaft 18 and imparting rotation through the gears 19, 20, the shaft 21, the gears 22, 23, the shaft 24 and gear 25 to the gear 8. As the gear 8 rotates, the gear 9 being held against rotation by the idle motor 7, the gear 12 will rotate in a clockwise direction, moving the rheostat arm 14 away from the motor switch 15 completing the circuit to the motor 7 and the gear chain 41, 39, 38, 36, 35, imparting rotation from the gear 12 to the shaft 34, moving the roller 26 vertically upwardly in the reservoir, permitting the ammunition to pass freely thereunder. Upon the motor being energized, rotation will be imparted through the gears 6, 5, and 3 to the shaft 4 and drive sprocket 2 which feeds the ammunition into the reservoir of the casing 1.

As the ammunition is drawn from the reservoir of the casing 1 by the gun, the roller 26 will be lifted by the worm gear 32 from rotation imparted by the gear 12 through the gear train 35, 36, 37, 37' 38, 39, 40, 41. As the gun continues to fire and continues to draw ammunition from the reservoir of the casing 1 over the guide sprockets 17, the gear 8 will continue to rotate and the gear 12 will move relative to the gear 8 until the gears 10 are rotating at such a speed that their effect on the gear 12 will be canceled by the rotation of the gear 8 whereupon the gear 12 will stop and motor speed control rheostat 16 will become stationary. As long as gun continues to fire at a steady rate the motor 7 will maintain the same speed, by virtue of the rheostat setting obtained through the combined action of the two gear trains extending from the drive sprockets 2 and the guide sprockets 17 respectively to the ring gear 11. When the gun stops firing, the gear 8 will be stopped by the gear train to the guide sprocket 17 and the differential will transfer the rotation of the drive shaft 4 to the gear 12 thus moving the motor speed control rheostat arm 14 in a counterclockwise direction into contact with the switch 15, breaking the circuit to the motor. The drive sprockets 2, continuing to operate after the gun has ceased firing and until the circuit to the motor is broken, will fill the reservoir of the casing 1, the

roller 26 moving downwardly with the rotation of the gear 12 counterclockwise as the reservoir fills so that the breaking of the circuit to the motor coincides with the filling of the reservoir. A suitable motor brake (not shown) is provided in the motor 7 to assure its deactivation immediately upon the circuit being broken. The roller 26 being geared to the gear 12 will move vertically only in accordance with the movement of the gear 12, and will provide a positive guide for the ammunition within the reservoir, preventing said ammunition from being bunched or jammed within the reservoir during aerial maneuvers.

To provide a motor suitable for the function desired in this device, a constantly excited shunt motor is preferably employed. This results in more rapid initial acceleration than would be possible in a series wound motor without sacrificing ease of speed control. The rheostat 16 is wired in series with the switch 15 and the motor circuit and is so connected that there will be a maximum resistance in the circuit upon starting the motor. Also the arrangement is such that clockwise rotation of the arm 14 will decrease the resistance in the motor circuit. Thus it will be observed that increase in the speed of guide sprockets 17 will always tend to speed up the gear 8 in a clockwise direction and cause the arm 14 to be moved clockwise and and thereby speed up the motor 7. Therefore the rheostat will reach a new position corresponding to a faster motor speed and a faster guide sprocket speed. When this new setting is reached the gear 12 and the arm 14 will once again become stabilized at the new setting. Conversely if there is a slowing down of the guide sprockets 17, the gear 8 will be retarded and the rheostat arm 14 will be rotated counterclockwise to cut the motor speed and synchronize the action of the drive sprockets 2 with the guide sprockets 17.

Where an exceptionally long distance of travel is encountered between the source of ammunition supply and the gun, the device may be divided into two parts, placing the reservoir of the casing 1 and guide sprockets 17 close to the gun and the drive sprockets and motor at a distance away from the reservoir. The drive sprockets may be placed in a position where a 75-pound load may be carried by the drive sprockets, pulling half of the load and pushing the remaining half. The type of links in the machine gun belt contain enough elasticity to permit an approximate 35-pound pull so that a pull and push totaling approximately 75 pounds may be utilized without danger of distorting the ammunition belt links and causing malfunction of the gun. As many units may be desired may be employed in the feed line.

It is believed apparent that the construction disclosed in the drawing is more clearly shown in its present form, however, the device would have greater utility by mounting the differential and motor speed control rheostat within the reservoir walls by making the drive sprocket in the form of a hollow drum having sprocket teeth thereon and the differential and speed control mechanism mounted within the drum.

The embodiments of the invention herein shown and described are to be regarded as illustrative only, and it is to be understood that the invention is susceptible to variation, modification, and change within the scope of the appended claims.

I claim:

1. In an ammunition belt feeder for a machine gun or the like, a power driven feed sprocket for feeding the ammunition to said gun, power means for driving said feed sprocket, a second sprocket between said feed sprocket and said gun and driven by the ammunition belt at a speed dependent on the instant rate of feed of said gun, a differential speed governing device for said power means including a first element driven in accordance with the speed of said feed sprocket, a second element driven in accordance with the speed of said second sprocket and a third element displaceable in accordance with the difference in speed of said first and second elements, and speed control means for said power means actuated by said third element to effect speed synchronization of said sprockets.

2. In an ammunition belt feeder for a machine gun or the like, an ammunition reservoir, a feed sprocket for feeding ammunition into the reservoir, an electric motor for driving said feed sprocket, a second sprocket adapted to be driven by said ammunition as it passes from the reservoir to the feed mechanism of the gun, a differential gear assembly having driving connections both with said feed sprocket and said second sprocket, a speed control means for said motor including a rheostat arm operated by said differential gear assembly, switch means actuated by said arm upon displacement thereof from an initial position to complete a circuit to said motor, movement of said arm from said initial position being effected by rotation of said second sprocket without a corresponding rotation of said feed sprocket, and said speed control means upon displacement of said arm from said initial position being operative to effect speed synchronization of said sprockets through said differential gear assembly.

3. In an ammunition belt feeder for a machine gun or the like, a motor driven feed sprocket for feeding the ammunition to said gun, an electric motor for driving said feed sprocket, a second sprocket between said feed sprocket and said gun and driven by the ammunition belt at a speed dependent on the instant rate of feed of said gun, a differential speed governing device for said motor including a first element driven in accordance with the speed of said feed sprocket, a second element driven in accordance with the speed of said second and a third element displaceable in accordance with the difference in speed of said first and second elements, a speed control rheostat for said motor actuated by said third element to effect speed synchronization of said sprockets, and switch means adapted to be actuated by a movable element of said rheostat for completing a circuit through said rheostat to said motor when said second sprocket is rotated without a corresponding rotation of said feed sprocket.

4. In an ammunition belt feeder for a machine gun or the like, an ammunition reservoir, a power driven feed sprocket for feeding ammunition into the reservoir, power means for driving said feed sprocket, a second sprocket driven by the ammunition belt as it passes from the reservoir to the feed mechanism of the gun and driven at a speed dependent on the instant rate of feed of said gun, the ammunition belt being normally positioned in said reservoir to form a loop between said sprockets, a differential speed governing device for said power means including a first element driven in accordance with the speed of said feed sprocket, a second element driven in accordance with the speed of said second sprocket and a third element displaceable in accordance with the difference in speed of said first and second elements, speed control means for said power means actuated by said third element to effect speed synchronization of said sprockets, a vertically shiftable roller in the reservoir and within said ammunition belt loop, and means geared to said third element for positively shifting said roller.

No references cited