Sept. 12, 1950 A. C. RIDLAND 2,522,060

HARPOON GUN

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Fig. 1.

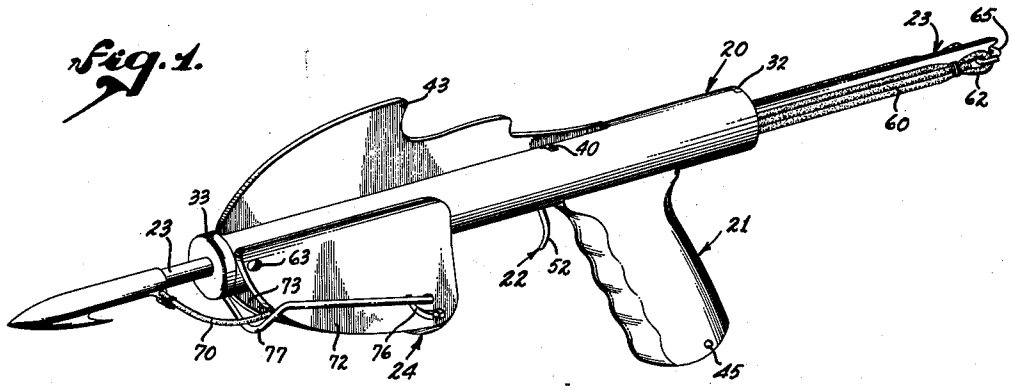


Fig. 2.

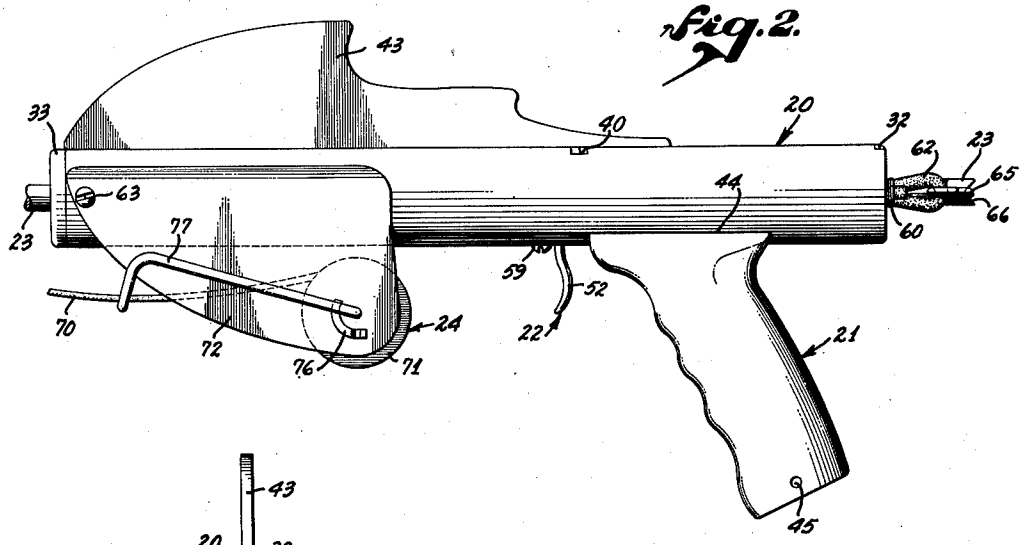
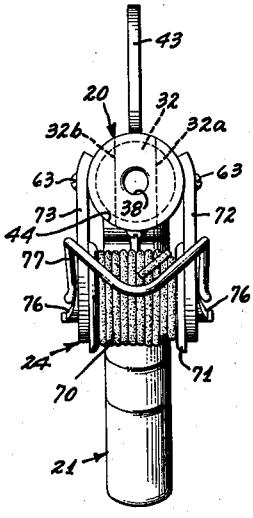


Fig. 3.



ALEXANDER C. RIDLAND,
INVENTOR.

BY
Lusebner, Maltby & Beehler
ATTORNEYS.

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HARPOON GUN

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Fig. 4.

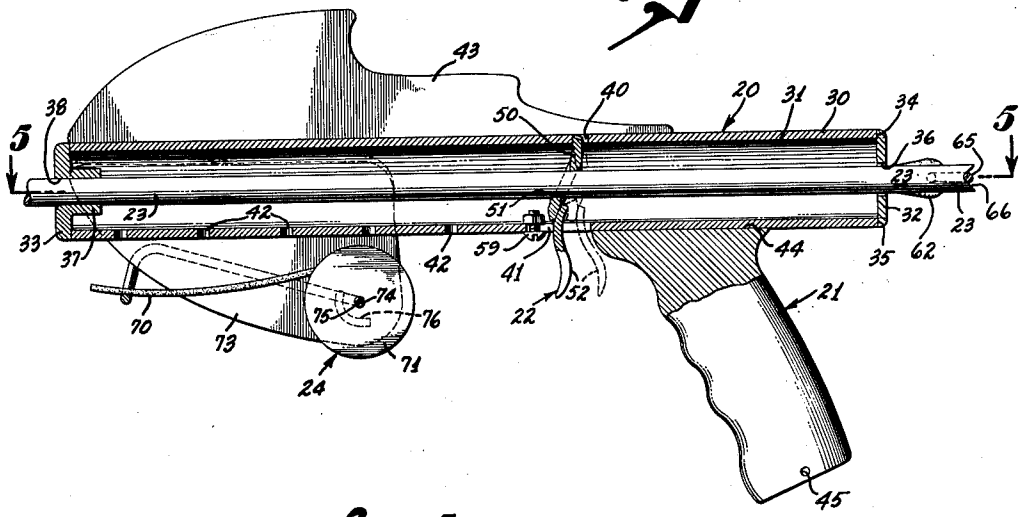
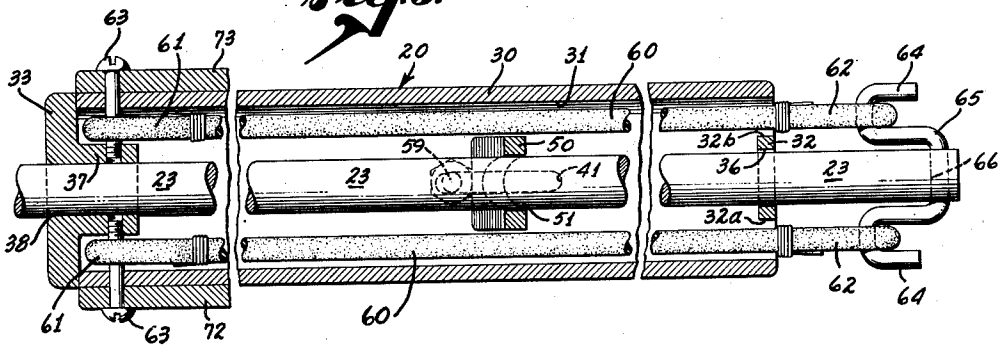


Fig. 5.



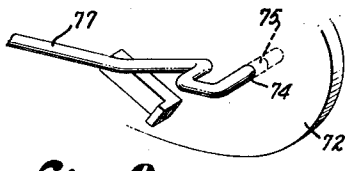


Fig. 9.

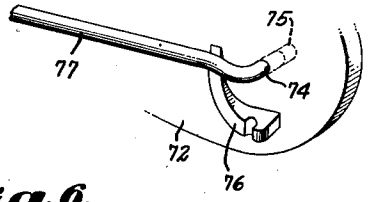


Fig. 6.

ALEXANDER C. RIDLAND,
INVENTOR.

BY
Lahebner, Mattby & Beehler
ATTORNEYS.

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HARPOON GUN

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Fig. 7.

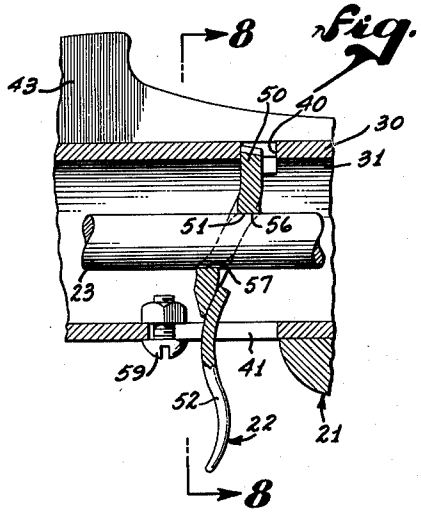


Fig. 8.

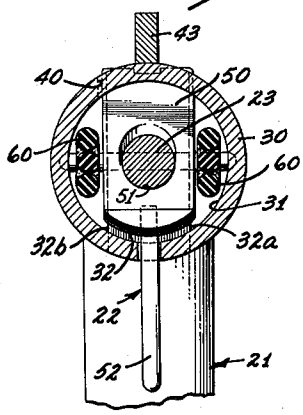


Fig. 10.

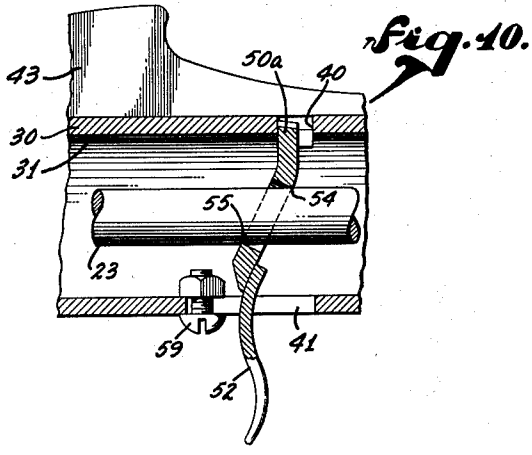
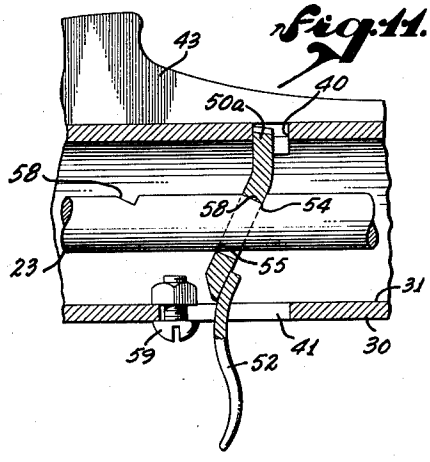


Fig. 11.



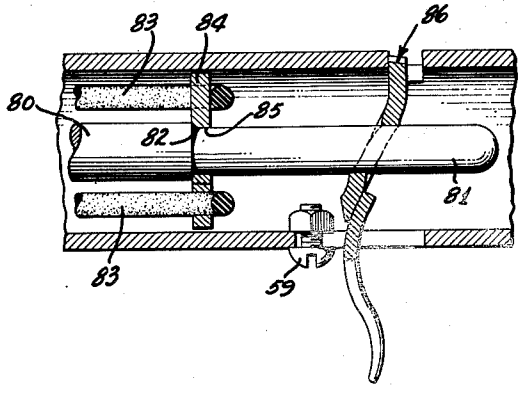


Fig. 12.

ALEXANDER C. RIDLAND,
INVENTOR.

BY
Lefebvre, Maltby & Beehler
ATTORNEYS.

Patented Sept. 12, 1950 2,522,060

UNITED STATES PATENT OFFICE

2,522,060

HARPOON GUN

Alexander C. Ridland, Los Angeles County, Calif.

Application January 20, 1947, Serial No. 723,160

2 Claims. (Cl. 124—22)

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My invention relates in its broadest aspect to a gun and is embodied herein for the purpose of illustration in a gun adapted to propel a projectile under water. My invention also relates to a new and improved binding plate, particularly adapted for use as a trigger and releasing mechanism.

Underwater fishing is becoming an increasingly important and well-liked sport. The object is for the sportsman to swim under water and propel a harpoon or spear at any desirable sea life encountered under the surface. The propelling means is usually by hand. I have provided a new and improved gun for propelling such projectile under water with a greater degree of force and accuracy than can be accomplished by hand.

In connection with my improved underwater gun, I have provided a new and novel means for holding the spear or harpoon in a tensioned position. The means employed in my invention comprises essentially a binding plate which binds or holds the shaft of the spear in position until released by a trigger. Binding plates are well known but are subject to one deficiency; namely the binding edges between the binding plate and the shaft present a line contact and tend either to dull the surface of the contact or bite into the shaft depending upon the relative strength of the materials used.

A further object of my invention is to provide a new and improved binding plate which, when binding, presents a flat surface of considerable area against the shaft upon which it is binding and will not, therefore, tend to bite into, or dull the edges of the binding plate.

It is to be understood that my new and improved binding plate may be used in practically any application of a binding plate principle, and by discussing the use of the binding plate in connection with the holding and trigger mechanism of my gun, I do not thereby intend to limit the application of my invention.

Other and further objects and advantages of my invention will become apparent from the drawings and the specifications attached thereto.

In the drawings:

Figure 1 is a perspective view of a gun embodying the principles of my invention having a harpoon inserted therein in tensioned position.

Figure 2 is a side elevation of the gun illustrated in Figure 1.

Figure 3 is an end elevation of the gun illustrated in Figure 1.

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Figure 4 is a side elevation, partially in section, showing the details of construction.

Figure 5 is an enlarged sectional view taken on line 5—5 of Figure 4.

Figure 6 is an enlarged fragmentary view in perspective of a means for releasing the harpoon line from the gun.

Figure 7 is an enlarged view, in section, showing the details of my improved binding plate.

Figure 8 is a sectional view taken on line 8—8 of Figure 7.

Figure 9 is an enlarged perspective view of a modified form of the releasing mechanism shown in Figure 6.

Figure 10 is an enlarged sectional view showing the modified form of a binding plate to be used as a trigger mechanism.

Figure 11 is a view similar to Figure 10 showing a modified form of shaft.

Figure 12 is an enlarged sectional view showing a modified form of shaft and tensioning means.

My invention in its more important features comprises a barrel **20**, a handle **21** attached to said barrel, a trigger releasing mechanism **22** mounted in said barrel adapted to engage a spear shaft **23** and a spool **24** mounted on said gun and adapted to yieldingly retain a cord attached to the shaft **23**.

The barrel **20** in the preferred form which I have illustrated herein comprises a tubular member **30** having a longitudinally disposed bore **31** adapted to receive the shaft **23** of the spear and end pieces **32** and **33**. The end piece **32** is formed with two parallel sides **32***a* and **32***b*, as shown in Figure 3, and has a width less than the inside diameter of the bore **31** and two oppositely disposed arcuate sides having substantially parallel chords and whose radius of curvature is equal to the outside diameter of the barrel **20** and is adapted to fit into notches **34** and **35** in the barrel **20**. The end piece **32** is also formed with a centrally disposed aperture **36** adapted to receive the shaft **23** of the spear or harpoon. The end piece **32** is secured in the barrel **20** by any suitable means, such as welding or cementing.

The end piece **33** is formed with a centrally disposed boss **37** and a centrally disposed bore **38** longitudinally aligned with the axis of the barrel **20** and the bore **36** of end piece **32**, and is adapted to receive the shaft **23** of the projectile.

Whereas, I have herein described the barrel **20** as the gun in the form preferred by me; that is, as a tubular member having the end pieces **32**

and 33 secured thereto, I would consider any other shape which has a longitudinally disposed bore for receiving the shaft 23 or which has a front and rear member which act as guides for the shaft 23, as the equivalent of the preferred embodiment herein described.

The cylindrical member 30 is also formed with a transverse notch 40, a longitudinal notch 41, and a plurality of apertures 42, the purpose of which will be discussed later.

If it is desired for the purpose of attaining accuracy in using the gun, a fin, such as 43, may be welded or cemented longitudinally on top of the barrel 20. The fin 43 acts as a sighting member and can assume any decorative shape without departing from my invention.

The handle 21 may assume any desired shape which is comfortable as a pistol grip and is formed with a hole 45 passing through the lower end of the handle 21 adapted to receive a cord (not shown) to secure the gun to the wrists of the sportsman using it, so that it will not become lost in the event that it is dropped. The handle 21 is also formed with a concave top 44 adapted to be secured to the underside of the barrel 20 by any suitable means, such as bolting, welding, cementing, etc.

The trigger mechanism 22 comprises a binding plate 50 formed with a centrally disposed bore 51 and a trigger or releasing lever 52 attached thereto by any suitable means, such as welding. As will be seen more clearly in Figure 7, the top edge of the binding plate 50 is adapted to be disposed in the transverse slot 40. The forward edge of the transverse slot 40 acts as a shoulder or stop or pivot point for the plate 50. Any movement to the left of the shaft 23 in Figure 7 tends to rotate the plate 50 in a clockwise direction, thereby changing the vertical projection of the bore 51 to an ellipse whose minor diameter is less than the diameter of the shaft 23, thereby securely binding the shaft 23 against any further movement to the left.

It will be noted in Figure 10, wherein I have illustrated a standard binding plate, that due to the thickness of the material used to make the binding plate, the tilting or rotating action heretofore described results in a binding between the shaft 23 and sharp edges 54 and 55. These sharp edges tend to gouge into the shaft 23 or become flattened depending on the relative strength of materials used.

In order to overcome this objection, it will be noted in Figure 7 that I have provided an improved type of binding plate wherein the edges 56 and 57, which are adjacent the minor diameter of the bore 51 upon rotation have been offset in opposite directions so that upon rotation and binding they present substantially flat surfaces in binding engagement with the shaft 23.

A further modification may be made in shaft 23 in order to overcome the difficulty of a standard type binding plate. The means herein illustrated comprise a plurality of notches 58 cut in the shaft 23 so that the binding action, at least of the top portion of the binding plate 50*a*, presents a substantially flat surface to the shaft 23. There is, however, a tendency to flatten the edge 55 even in this modification. However, the flattening of the edge 55 is not nearly so serious as that shown in Figure 10 because the tolerances required for binding action are not nearly so critical as shown in Figure 10.

The longitudinal notch 41 is formed longer than is necessary for a complete travel of the trigger assembly in binding and releasing the shaft 23. The purpose for such extra length is so that the binding plate 50 may be inserted into the cylindrical member 30 through the notch 41 by rotating 90°. After the trigger assembly and binding plate have been inserted through the notch 41, some suitable means, such as a bolt 59, is provided to prevent the trigger assembly 22 from moving to a forward position sufficiently far to allow the plate 50 to drop out of the transverse notch 40.

The means provided herein for propelling the projectile comprise a plurality of tension members 60 and are illustrated herein as rubber shock cords formed with a loop 61 and 62 on each end. The forward end of the shock cord 60 is held in position in the barrel of the gun by means of a bolt 63 disposed through the loop 61. The loops 62 are adapted to receive hook 64 of a yoke 65. A notch 66 of any suitable shape is cut in the end of the shaft 23 and is adapted to receive the yoke 65. It will thus readily be seen that when the shaft 23 is inserted into the gun and forced to the right in engagement with the yoke 65, the tension cord 60 will be stretched, thereby being put in tension. Any attempt to move the shaft 23 to the left results in a binding with the binding plate 50. The shaft can, therefore, not be released from the gun until the binding plate 50 has been released by moving the trigger assembly 22 in a counter-clockwise direction, such as would be accomplished by pulling the trigger 52. Upon releasing the binding plate 50, the tension cords 60 contract with considerable force and propel the shaft 23 out of the gun. It is apparent that upon contracting in length, the tension cord 60 will expand in diameter. Some means must, therefore, be provided to permit the rapid expulsion of water out of the chamber or bore 31. This is accomplished by means of the holes 42.

In any type of spear fishing, and particularly in underwater spear fishing, some means must be provided for retrieving the spear, particularly when that spear has become lodged in some underwater sea life. I have accomplished this objective by means of a cord 70 attached on one end of the head of the shaft 23 and coiled on its other end about a rotatable spool 71.

The rotatable spool 71 is rotatably secured between two braces 72 and 73, which are secured to and depend from the barrel 20 in parallel relation.

The depending parallel braces 72 and 73 are formed with complementary holes 74 adapted to receive pinions 75 and arcuate cam surfaces 76 concentric with the hole 74. The pinions 75 are adapted to fit into a central bore through the center of the spool 71 in rotatable relation. The pinions 75 are part of an integral piece which comprises a substantially U-shaped wire frame having substantial spring qualities. The end of the U is formed in a V-shape perpendicular to the surface of the U, and is adapted to receive as a guide, the string 70. The purpose of the wire frame 77 is as follows: If during the hunting operation, the harpoon becomes lodged in some immovable underwater obstruction and it becomes necessary for the sportsman to be able to rise to the surface without taking the necessary time to release the gun from his wrist, this may be accomplished by holding the gun so that the string 70 is in tension and by rotating the gun clockwise with respect to the string 70. The string 70 moves the frame 77 in a counter-clockwise direction with respect to the gun and causes

the upper end of the U to ride on the cam surfaces 76, thereby spreading the pinion 75 and releasing the spool 71. The spool 71, being preferably made of a buoyant material, will float to the surface where it can be retrieved along with the spear at the convenience of the sportsman.

Whereas, I prefer placing the inclined surface on the cam, such as shown in Figure 6, I would consider the modification shown in Figure 9, wherein the frame 77 is bent obliquely inward adjacent the point where it becomes the pinion 75. It will readily be seen that a counter-clockwise movement of the frame will cause the pinion 75 to move outwardly and drop the spool 71.

Whereas, the form preferred by me, as heretofore described, may be said to be in the form of a pistol, the principle of my invention may be adapted to what might be known as a rifle, shown in Figure 12. Figure 12 shows only the modification necessary to adapt my invention to a rifle form of gun. It is apparent that if the tensioning means are attached to the end of the shaft, as is shown in Figure 4, the trigger assembly would be too far forward for a rifle type of construction. I have provided, therefore, the modification shown in Figure 12. It comprises a modified shaft 80 having a reduced end portion 81 defining an annular shoulder 82. The tension cords 83 are attached to a plate 84 having a central bore 85 adapted to receive the reduced end portion 81 and engage the annular shoulder 82. The trigger mechanism, referred hereto generally as 86, is adapted to securely engage the reduced end portion 81. The trigger mechanism in this modification is the same as has been heretofore described. It will thus be seen that I have provided a modification wherein the trigger assembly may be placed relatively near the back end of the barrel for a modified rifle type construction.

It will also be readily apparent that my invention is not limited to a single barrel such as is illustrated herein. A double or multiple barrel gun can readily be produced by placing two of the single barrels side by side on one handle.

Whereas, I have herein shown and described my invention in its preferred form and in some modified forms, it is recognized that departures may be made therefrom within the scope of my invention, which is not to be limited to the details disclosed herein, but is to be accorded the full scope of the claims so as to embrace any and all equivalent devices.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A harpoon gun comprising a cylindrical barrel having a stationary guide member disposed at each end of said cylindrical barrel, each of said guide members being formed with an aperture therethrough in axial alignment with each other, said apertures being adapted to receive and guide a harpoon shaft, resilient means disposed in said barrel and extending rearwardly thereof adapted

to engage the end of said harpoon shaft to impart energy thereto, a pivotally mounted binding plate disposed intermediate the end of said barrel having an aperture therethrough in axial alignment with said guide apertures, said binding plate being movable between forward and back pivotal positions, said plate being adapted to frictionally engage said harpoon shaft to restrain said shaft from forward longitudinal movement when said plate is in said forward position and to release and guide said harpoon shaft when in said back position and trigger means associated with said plate extending outwardly from said barrel adapted to cause pivotal movement of said binding plate from said forward to said back position.

2. A harpoon gun comprising a cylindrical barrel having a front and a rear guide one of which is disposed at each end thereof, each of said guides being formed with an aperture in axial alignment adapted to receive the shaft of a harpoon to be propelled from said harpoon gun, a pair of parallel spaced elastic bands secured adjacent said front guide inside said cylindrical barrel and extending outwardly past the rear guide adapted to abut against the end of said harpoon shaft upon insertion through said guide, and a trigger and guide assembly adapted to releasably hold said harpoon shaft against said elastic bands and to guide said shaft upon releasing said trigger mechanism, said mechanism comprising a pivotally mounted plate disposed intermediate the end of said barrel having an aperture therethrough in axial alignment with said end guide apertures and having forward and rear pivotal positions, said plate being adapted to frictionally engage said harpoon shaft in its forward position to restrain said shaft against said elastic bands and being adapted to guide said shaft when moved to its rear position.

ALEXANDER C. RIDLAND.

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