A. W. BEAN & J. A. KILLINGER.
AMMUNITION HOIST.
APPLICATION FILED AUG. 16, 1913.

1,158,161.

Patented Oct. 26, 1915.

2 SHEETS—SHEET 1.

FIG. 1

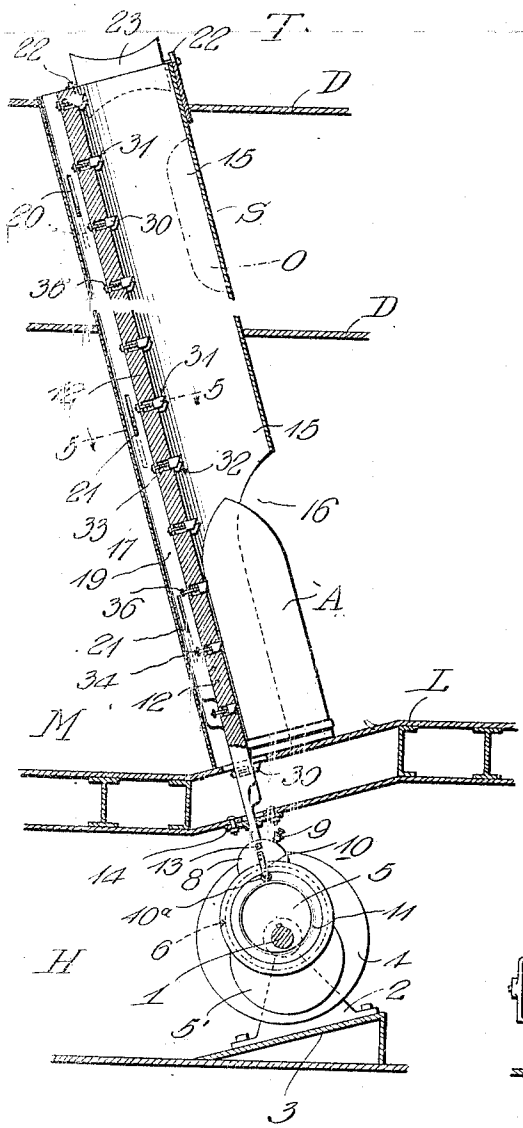
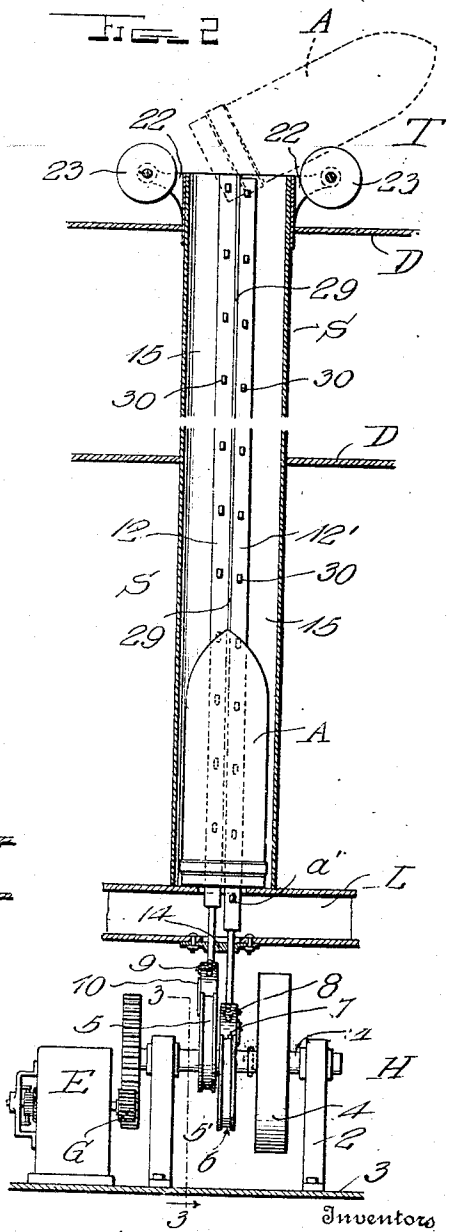


FIG. 2



Witnesses

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2 SHEETS—SHEET 2.

FIG. 5

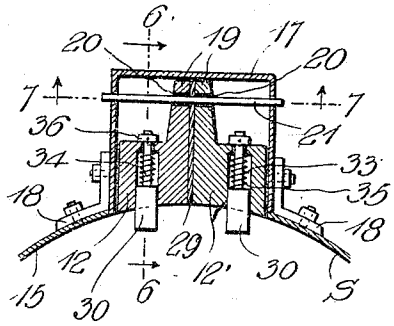


FIG. 8

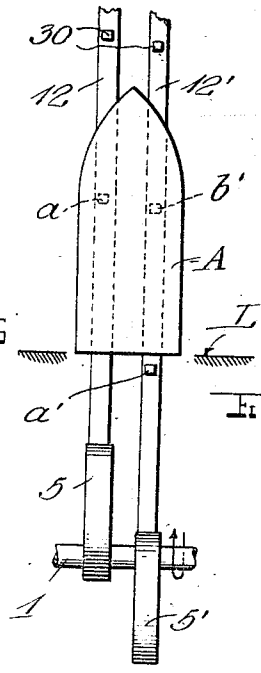


FIG. 9

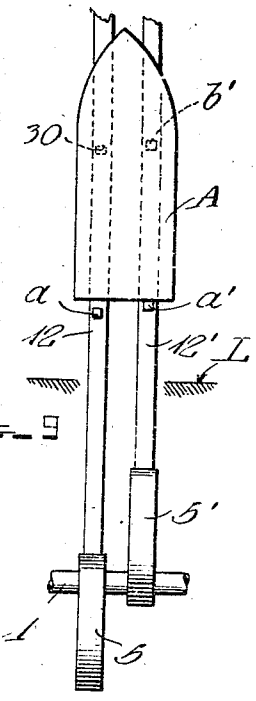


FIG. 6

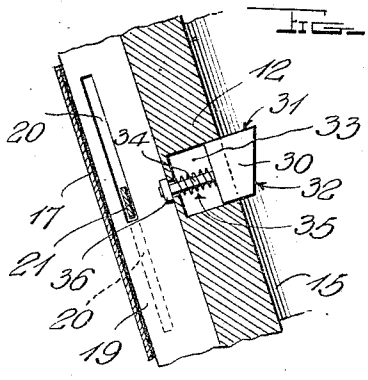
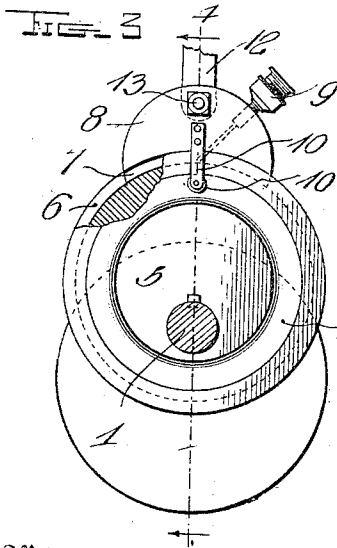


FIG. 3



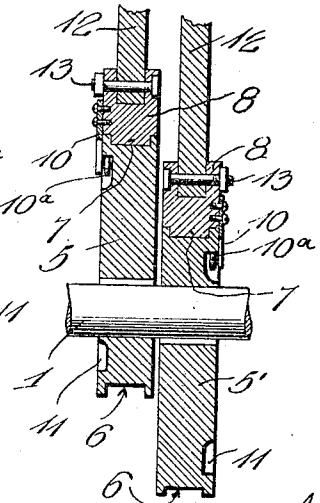
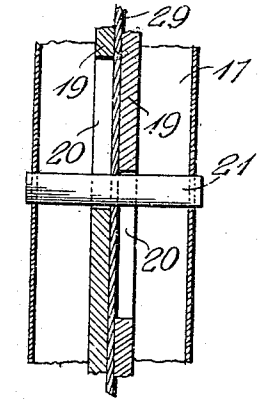


FIG. 4

FIG. 7



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UNITED STATES PATENT OFFICE.

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AMMUNITION-HOIST.

1,158,161. Specification of Letters Patent. Patented Oct. 26, 1915.

Application filed August 16, 1913. Serial No. 785,180.

To all whom it may concern:

Be it known that we, ANDREW W. BEAN, of Mount Rainier, in the county of Prince George and State of Maryland, and JOSEPH A. KILLINGER, of Washington, in the District of Columbia, citizens of the United States, have invented certain new and useful Improvements in Ammunition-Hoists; and we do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to loading ordnance, and more especially to the hoisting devices for raising heavy ammunition, as from the hold or magazine near the bottom of a gunboat, through the various decks to the interior of the turret.

The object of the invention is to produce an extremely simple mechanism for hoisting heavy shells, and one in which the shell is taken up automatically when it is fed to the hoist and is delivered automatically when it reaches the upper end of the shaft, whereby human services are dispensed with further than the act of feeding the shells to the lower end of the hoist and taking them from its upper end and placing them in the cannon. This object is carried out by constructing the hoist in the manner hereinafter more fully described and claimed and as shown in the drawings wherein—

Figure 1 is a vertical section and Fig. 2 a front elevation of this hoisting mechanism complete; Fig. 3 is an enlarged section on about the line 3—3 of Fig. 2, partly broken away, and Fig. 4 is a section on the line 4—4 of Fig. 3; Fig. 5 is an enlarged section taken about on the line 5—5 of Fig. 1; and Figs. 6 and 7 are sections on the lines 6—6 and 7—7 respectively of Fig. 5. Figs. 8 and 9 are diagrams in elevation showing the different positions of an ascending shell under the impulses of the two cams.

We have diagrammatically illustrated in Fig. 1 the internal construction of a battleship, or so much thereof as is necessary to a clear understanding of this invention. In the lower portion of said ship, as perhaps within the hold H, is disposed the driving mechanism for this ammunition hoist, so that, if the motor be an electric motor E as shown in Fig. 2, the electricity will be below the loading floor L which forms the bottom of the magazine M as shown and there will be no danger that a spark will reach any combustible or explosive. From said loading floor L the shaft S of this hoist extends upward, preferably at an angle of about 15°, through the deck or several decks D and into the turret T, where the delivery end of the shaft S will be near the cannon or gun which is to receive the ammunition. It is to be understood that the general practice is to retain the ammunition in the magazine as long as possible, but during gun practice or while the boat is in action the shells are fed up the hoist as rapidly as they are used by the gunners within the turret or elsewhere. At other times, however, the ammunition is stored below, the hoist is out of action, the guns are empty, and everything is as safe and ship-shape as possible.

In the drawings, the motor E is shown as geared at G to a main shaft 1 mounted in suitable bearings 2 carried on a support 3 and perhaps having a heavy fly wheel 4, and on this shaft are secured two cams which are exact duplicates of each other although disposed in direct opposition, and a description of one will suffice for both. As best seen in Fig. 3 the cam 5 is exactly round but mounted off-center on the shaft 1, its face is channeled or grooved as at 6 for the reception of a tongue 7 at the lower end of a shoe 8 whose lower face is curved and rests on the upper side of the cam as shown, and in order to reduce friction this lower face may be oiled through the oil cup 9. To prevent the possibility that the shoe will be thrown off the face, we preferably provide the shoe with a hook 10 which passes down over the outer side of the cam 5 and has its bill loosely disposed within an annular groove 11 formed in the cam as shown. Ordinarily the weight of the shoe and the rack bar carried thereby (as will be explained below) will hold the lower face of the shoe tightly in contact with the upper or active face of the cam, but if for any reason there should be a tendency to dislodge the shoe therefrom the hook 10 engaging the groove 11 will prevent. If desired, an anti-friction roller 10^a may be carried by the hook 10. As seen in Fig. 4 the companion cam and shoe are constructed in precisely the same manner, with the difference of course that the hook is on

the opposite face so that the bodies of the two cams may run side by side and as close to each other as possible.

From each shoe rises a rack bar 12, its lower end being by preference pivotally and perhaps removably connected with the shoe as at 13, and its body passing through a suitable guide 14 carried by the floor L, and extending thence upward throughout the length of the shaft S. Said shaft, as best seen in Fig. 5, will by preference be made in the shape of a sheet-iron tube 15, cut away at its lower end at the front side to produce an inlet 16 for the shell or other piece of ammunition A, and provided at its rear side with an offset best indicated in Fig. 5, and which forms the housing for the two rack bars 12 and 12'. That is to say, a sheet metal strip 17 is bent into substantially U-shaped cross section, and the arms of the U connected with the back of the tube 15 by brackets or angle plates 18, the rear side of the tube 15 being provided with slots or cut away entirely to permit the projection into it of the teeth of the rack bars yet to be described. These bars stand against opposite faces of an upright strip 29, and they preferably have longitudinal fins 19 which project back into the U-shaped housing 17 as seen in Fig. 5 and are slotted at intervals as seen at 20 in Fig. 1 so as to loosely receive pins 21. The latter extend across said housing and through the strip 29, and prevent the dislodgment of the bars. At the upper end of the shaft S are brackets 22 carrying rollers 23 on either side of the mouth or outlet end of the same, and over these rollers the shells A may be passed as they are delivered from the hoist, as indicated in dotted lines in Fig. 2. It will be clear that the size and proportion of parts is immaterial, and it is obviously necessary that the elevator shaft S extend through all the intermediate decks D although we have illustrated but one in Fig. 1.

The teeth of the rack bars and their exact disposition are matters of importance in this invention. Each tooth is in the form of a dog 30 whose upper or active face 31 is flat but whose inner end is beveled beneath said face as seen at 32 in Fig. 6, and the entire dog is mounted in a recess 33 in the body of the bar 12, which recess is disposed transverse to the length of said bar and is therefore almost horizontal when the bar is inclined about 15°. From the back of the dog a rod or bolt 34 projects rearward, through an expansive spring 35 which is disposed between the rear end of the dog and the rear end of the recess, and then through the rear wall of the bar 12 where it receives a nut 36. By removing the latter the dog may of course be taken out of the recess 33. By adjusting the nut 36 the extent to which the active face or corner of the dog will project beyond the front face of the bar 12 may be regulated. These dogs constitute the teeth of the rack bars 12 and 12' and while we have described their construction in detail, we reserve the right to alter said construction although we prefer to dispose these teeth throughout the length of the rack bar as will now be explained minutely. While we do not wish to be limited to the measurements given, they may be assumed for the purpose of illustration. Each cam is herein shown as an eccentric with its active face struck on a true circle and its body disposed three inches off center from the axis of the shaft 1, and the result is that the throw of the cam from its lowest position to its highest position will be six inches, and that will be the length of the path through which the rack bar reciprocates. On this understanding and with cams having a throw of six inches, the active faces of the teeth will be disposed slightly less than twelve inches apart, and in such position on the two bars that they will be substantially in register with each other when one bar is up and the other bar is down, as seen in Fig. 2. However, the fact that they are not exactly in register is important as will be seen. We have shown the teeth on the right hand bar 12' as set a little lower than those on the left hand bar 12 and we have also shown the right hand bar as having one additional tooth at its lower end, which tooth is purposely disposed a little below the level of the loading floor L when this bar is down.

Referring now to the diagrammatic views illustrated in Figs. 8 and 9, when the shell A is fed into this improved ammunition hoist, its lower end sliding on the floor L passes over the active face of the lowermost tooth a' which at this time stands a trifle below said floor as just described. A one-half revolution of the shaft 1 then causes the cam 5' to raise the bar 12' six inches and the cam 5 to permit the bar 12 to descend six inches so that all teeth on the right hand bar now stand relatively twelve inches higher with respect to the teeth on the left bar than they did before the shaft made this half-revolution. However, the fact that the teeth on any bar are a trifle less than twelve inches apart causes those on the left hand bar at this time to stand a trifle below those substantially opposite to them on the right hand bar, and as all teeth or dogs which are not pressed to the rear by the weight of the shell will be pressed forward by their springs 35, that dog a immediately beneath the lower end of the shell on the left hand bar 12 will at this time be projected forward into position to support said shell. Continued revolution of the shaft for another half turn restores the parts to the position shown in Figs. 2 and 8, but this time the shell A is carried up by

the left hand rack bar to such a point in the shaft S that the next dog b' on the right hand rack bar may engage beneath the lower end of the shell to raise the latter further on the next succeeding half-revolution of the shaft. Thus it will be seen that the teeth or dogs on the two alternately reciprocating rack bars raise the shell A step by step throughout the length of the shaft S until it reaches the upper end thereof and can be removed over the rollers 23. Meanwhile, as soon as this piece of ammunition has passed upward out of the inlet 16 sufficiently far, the men at work within the magazine may present another shell to the hoist and it follows the first one up the shaft; in fact, it is quite probable that if the shells or pieces of ammunition are being rapidly used on the gun deck or decks, they will be moving up the shaft constantly. So rapid will be the supply that it is quite possible the shaft S may be provided with openings as indicated at O in Fig. 1 so that if there be guns mounted on the deck indicated at D the ammunition therefor could be supplied through the same hoist by taking it manually out of such opening. In fact, while we have described this device as particularly useful as an ammunition hoist, it will be clear that the same could be employed for elevating other articles than pieces of ammunition, and we reserve the right to put our invention to all uses to which it may possibly be adapted.

What is claimed as new is:

1. In an ammunition hoist, the combination with an upright shaft having a housing communicating with its rear side and inlet and outlet openings in its front side and top, an upright partition in the housing, and pins across said housing at intervals and passing through the partition; of upright rack bars movably mounted in the housing on opposite sides of said partition and having fins projecting to the rear and provided with slots loosely embracing said pins, each bar having a plurality of recesses, a spring-pressed dog slidably mounted in each recess, and means for raising and lowering said rack bars alternately.

2. In an ammunition hoist, the combination with an upright shaft having a housing communicating with its rear side and inlet and outlet openings in its front side and top, and pins across said housing at intervals; of upright rack bars movably mounted side by side in the housing and having fins projecting to the rear and provided with slots loosely embracing said pins, each bar having in its front side a plurality of recesses spaced an equal distance apart, and a spring-pressed dog mounted in each recess; and means beneath the shaft for raising and lowering said rack bars alternately.

3. In an ammunition hoist, the combination with an upright shaft having a housing communicating with its rear side and inlet and outlet openings in its front side and top, and pins across said housing at intervals; of upright rack bars movably mounted side by side in the housing and having fins projecting to the rear and provided with slots loosely embracing said pins, each bar having in its front side a plurality of recesses spaced an equal distance apart, a dog slidably mounted in each recess and having its upper active face flat and its lower face beveled, a bolt projecting rearwardly from said dog across the recess and through the bar and having a nut on its rear end, and an expansive spring mounted on said bolt between the rear wall of the recess and the rear end of the dog; and means beneath the shaft for raising and lowering said rack bars alternately.

4. In an ammunition hoist the combination of two bars each carrying a plurality of spring projected dogs, said bars being disposed side by side, and means for simultaneously reciprocating said bars in opposite directions to move a projectile step by step.

5. In a device of the character described a pair of bars each provided with a series of spring projected means for engaging a projectile, and means for reciprocating said bars simultaneously in opposite directions and alternately in the same direction.

6. In a device of the character described means for moving a projectile step by step, comprising a pair of bars arranged in parallel relation and each provided with a plurality of spring projected dogs designed to engage the lower end of the projectile, and cams for moving said bars alternately in opposite directions.

7. In a device of the character described, the combination of a shaft, a housing communicating with said shaft, a pair of bars disposed in parallel relation in said housing, each bar being provided with a series of spring projected dogs mounted in recesses in said bars and adapted when depressed to lie flush with the faces of said bars, said dogs adapted to progressively engage and support a projectile, and means for simultaneously reciprocating said bars in opposite directions for moving a projectile progressively in one direction.

8. In a device of the character described the combination of a shaft having openings therein to receive a projectile, a housing communicating with said shaft, a pair of bars disposed in said housing in parallel relation, means for simultaneously reciprocating said bars in opposite directions and alternately in the same direction, and rollers mounted at one end of said shaft to receive and support a projectile.

9. In a device of the character described the combination of a pair of bars each being provided with a plurality of means for en-

gaging and supporting a projectile, and means for reciprocating said bars simultaneously in opposite directions and alternately in the same direction to convey a projectile step by step from one end to the other of said bars.

10. In an ammunition hoist, the combination of a plurality of parallel disposed bars and means for simultaneously reciprocating the bars in opposite directions, of projectile-lifting members arranged to project above the bars when the latter are moved in one direction and to lie flush with the bars when the latter are moved in the opposite direction.

11. In an ammunition hoist, the combination of a plurality of parallel disposed bars, and means for reciprocating the bars simultaneously in opposite directions and alternately in the same direction, of projectile-lifting members arranged to project above or lie flush with the bars.

12. In an ammunition hoist, means for moving a projectile step by step comprising a plurality of parallel disposed bars each provided with yieldable means for engaging the lower end of a projectile, and cams for moving the bars alternately in opposite directions.

13. In an ammunition hoist, the combination of a shaft having a projectile receiving opening, of a plurality of bars disposed within the shaft, means for simultaneously reciprocating the bars in opposite directions and alternately in the same direction, means carried by the bars to lift a projectile, and means mounted at one end of the shaft to receive and support a projectile.

In testimony whereof we have hereunto set our hands in presence of two subscribing witnesses.

ANDREW W. BEAN.
JOSEPH A. KILLINGER.

Witnesses:
L. O. HILTON,
J. A. GRIOSTANER.