

Jan. 29, 1957

G. L. SMITH

2,779,245

PROJECTILE PARBUCKLING MECHANISM

Filed Aug. 4, 1950

7 Sheets-Sheet 1

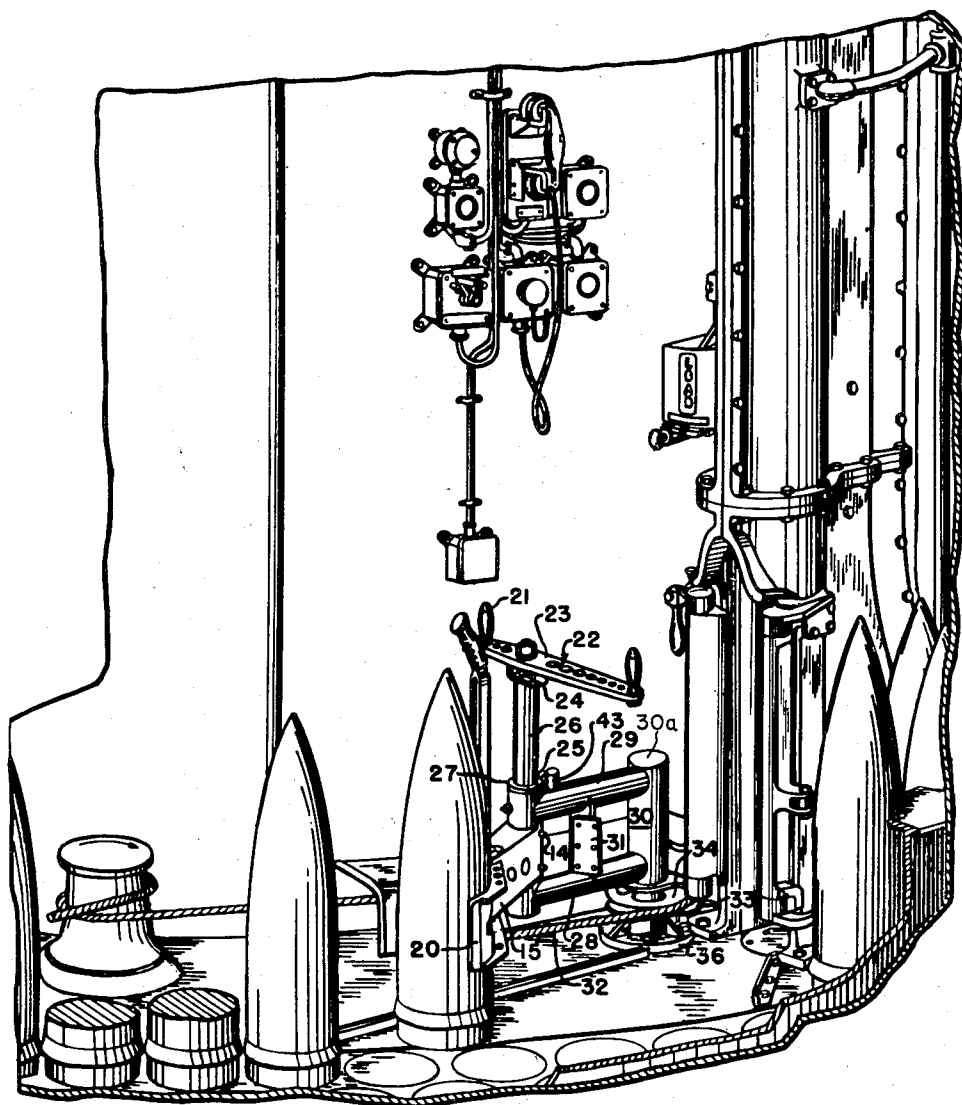


FIG. 1.

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PROJECTILE PARBUCKLING MECHANISM

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7 Sheets-Sheet 2

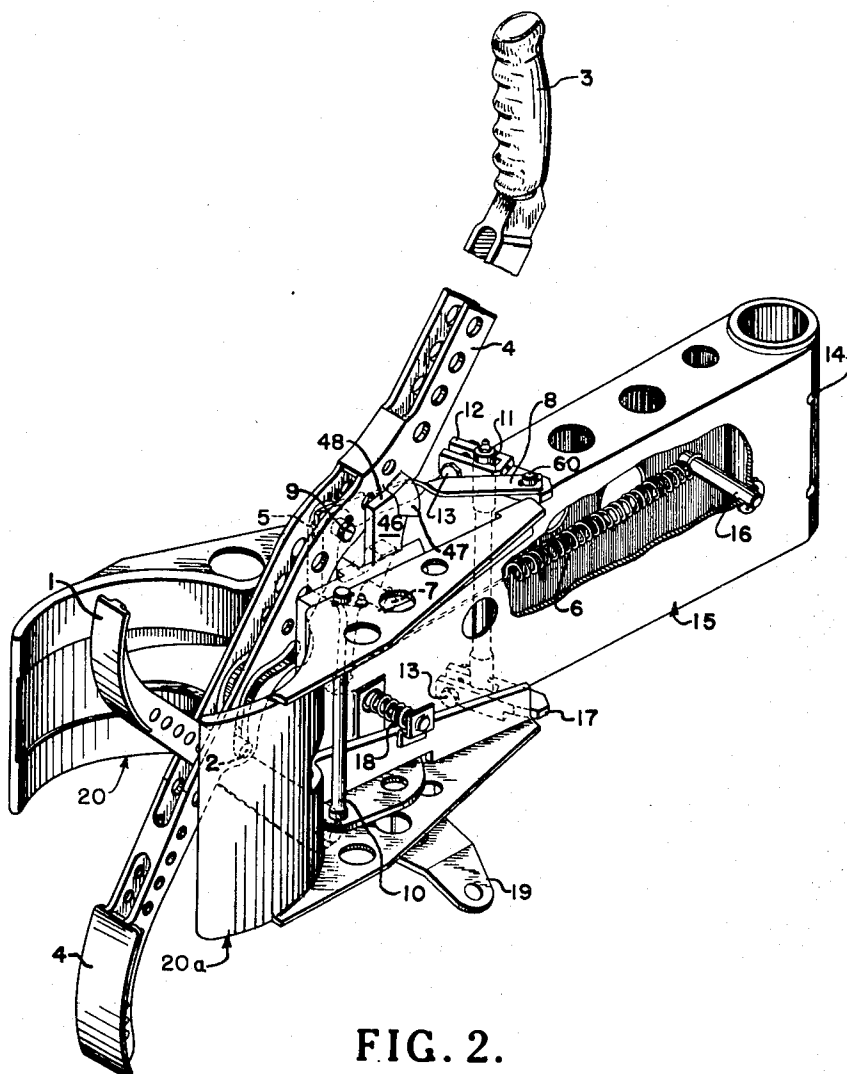


FIG. 2.

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PROJECTILE PARBUCKLING MECHANISM

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7 Sheets-Sheet 3

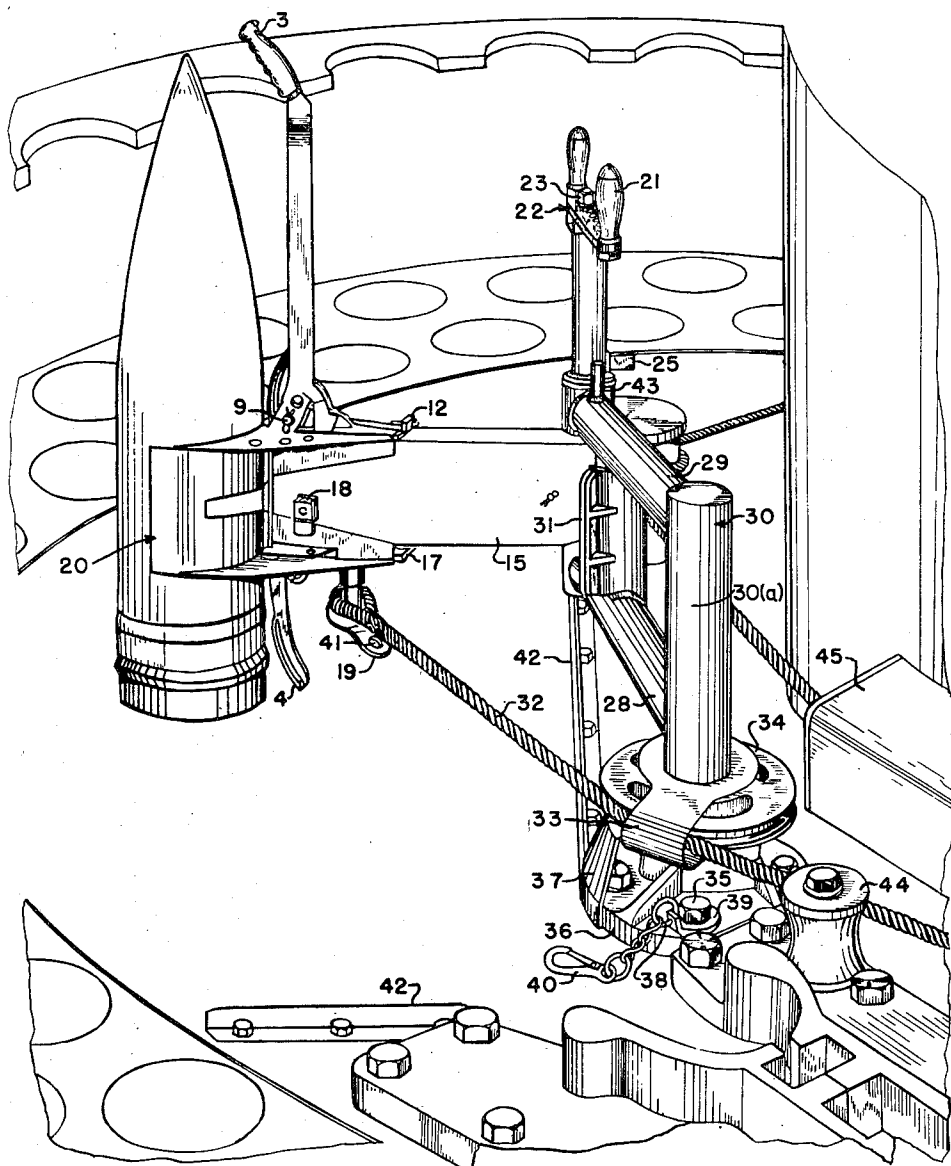


FIG. 3.

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PROJECTILE PARBUCKLING MECHANISM

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7 Sheets-Sheet 4

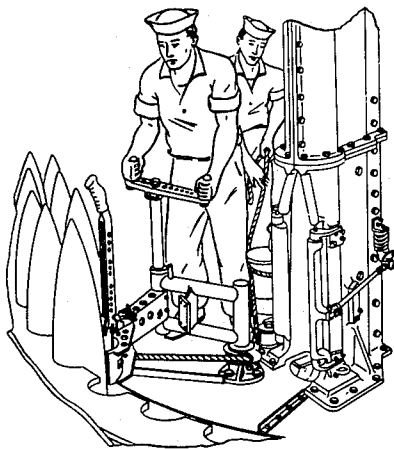


FIG. 4.

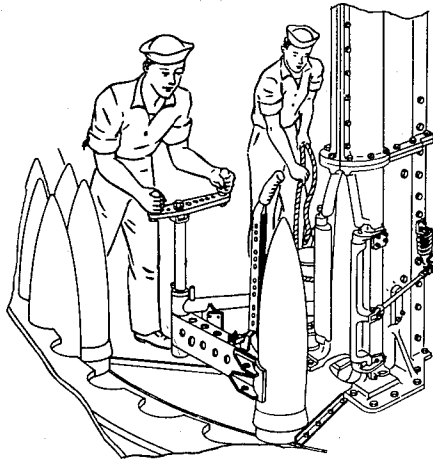


FIG. 5.

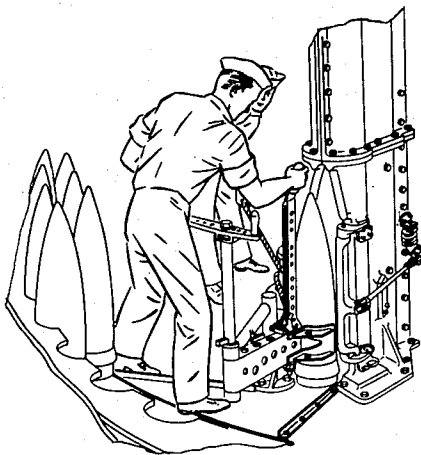


FIG. 6.

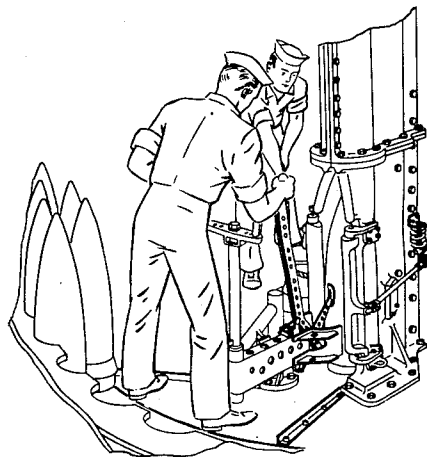


FIG. 7.

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PROJECTILE PARBUCKLING MECHANISM

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7 Sheets-Sheet 5

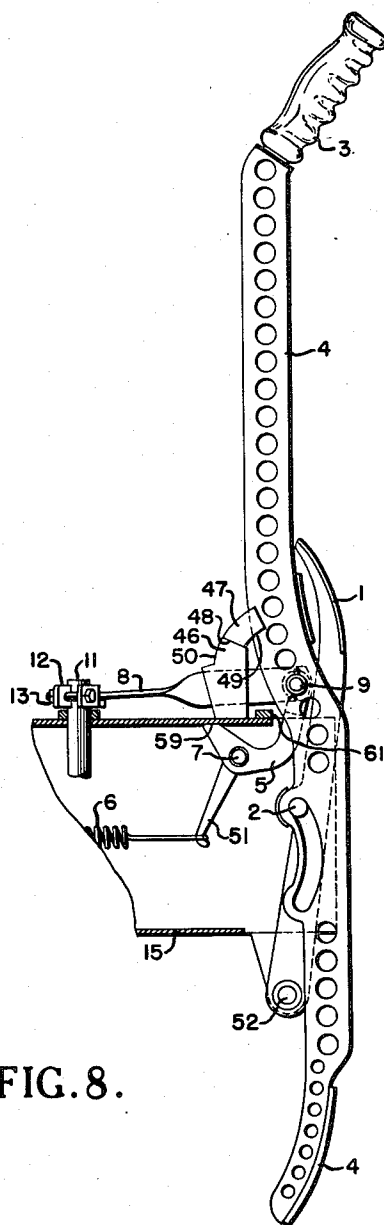


FIG. 8.

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PROJECTILE PARBUCKLING MECHANISM

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7 Sheets-Sheet 6

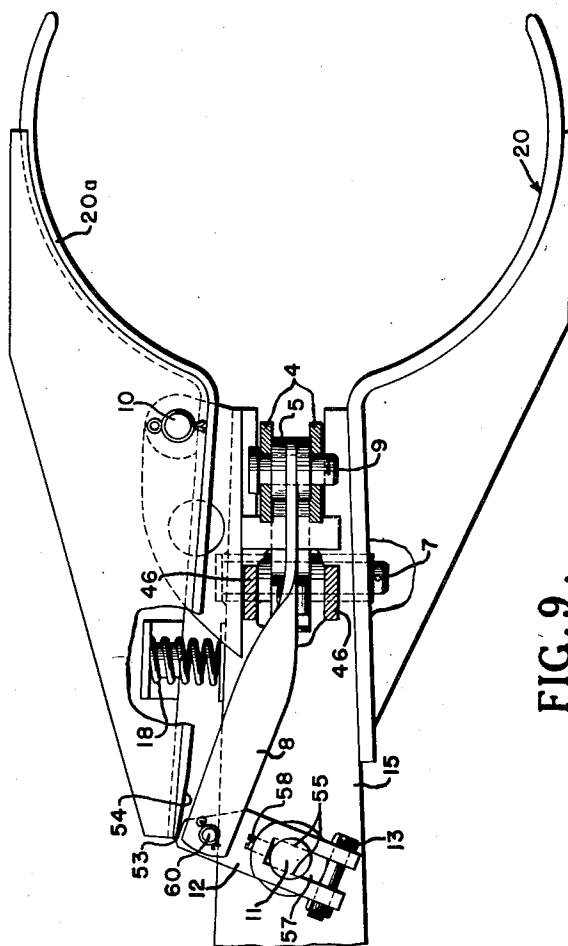


FIG. 9.

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PROJECTILE PARBUCKLING MECHANISM

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7 Sheets-Sheet 7

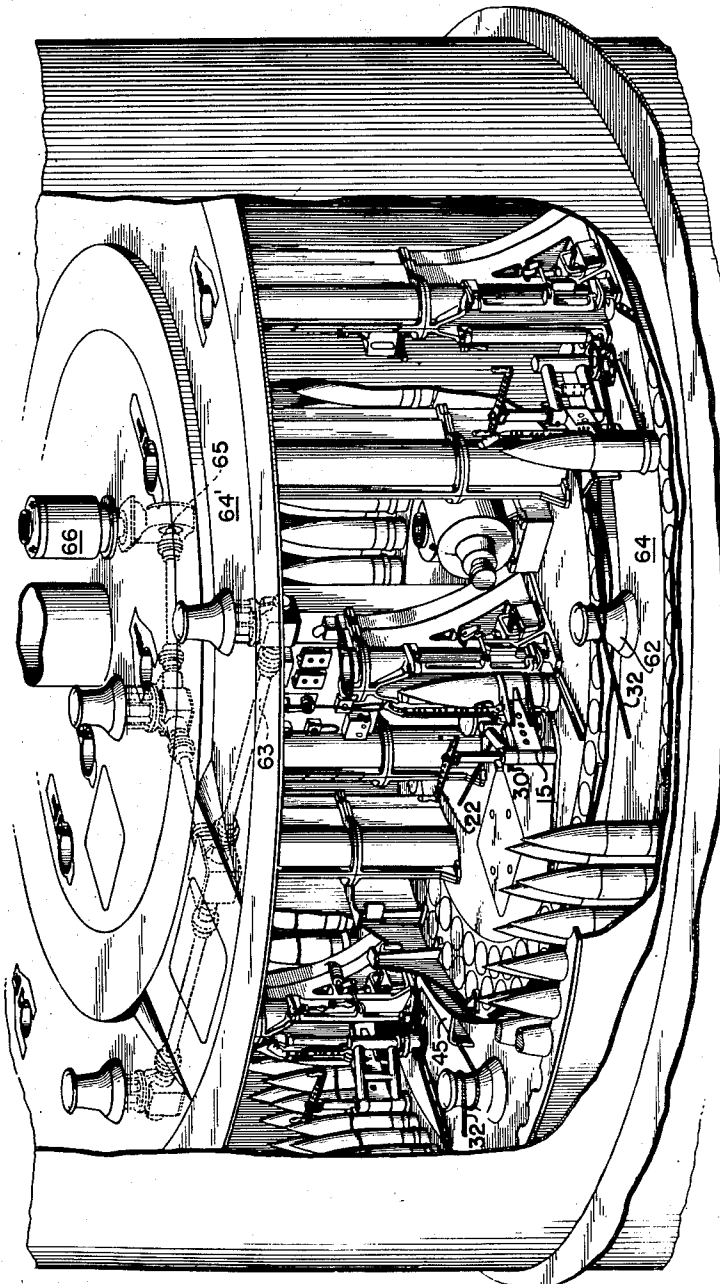


FIG. 10.

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1

2,779,245

PROJECTILE PARBUCKLING MECHANISM

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Application August 4, 1950, Serial No. 177,748

13 Claims. (Cl. 89—45)

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

This invention pertains to projectile handling apparatus for a naval gun turret and more specifically to new and novel structure thereof for moving projectiles from projectile stowing space to the turret hoist whereby the projectiles are thereafter lifted into position adjacent the guns.

The projectile handling or parbuckling equipment of this invention is well adapted for use with ammunition stowage and handling arrangements as shown in Patent 2,456,620 to G. A. Chadwick et al. or the copending application for a Rapid Fire Gun Turret and Method of Loading and Firing Same, Serial No. 153,262, filed March 31, 1950, to Philias H. Girouard et al. The subject matter of this invention is shown and described but not claimed in the above mentioned copending application to Girouard et al. This parbuckling or projectile handling equipment is of a type adapted for use in gun turrets wherein the gun mount and loading and firing mechanisms are effectively isolated from the areas occupied by the projectile stowage facilities. The projectiles are moved from the stowage level to the gun handling and firing equipment by means of projectile hoists of generally conventional arrangement. This invention facilitates movement of projectiles from stowage space adjacent or surrounding the hoist and greatly reduces the manual effort required in moving the projectiles from these projectile retaining space assemblies to a position in the hoist chamber proper.

A preferred embodiment of the parbuckling equipment is described with relationship to a projectile handling flat structure and hoist assembly structure of the hereinbefore cited copending application but is not to be construed as being limited to such usage. This invention is, according to a preferred embodiment thereof, well adapted for use with rapid fire major caliber gun turret assemblies whereby a constant supply of projectile ammunition increments is required to be delivered to the gun loading and firing equipment. The instant invention accomplishes this result without the necessity for large personnel crews to manually handle and load the hoist of these rapid fire gun systems. Parbuckling equipment of the nature of the present invention has been used to permit satisfactory firing of rapid fire guns of the size, for example, of 8" bore at a firing rate of 8 to 11 projectiles or rounds per minute. This rate of firing is an approximate increase in speed of handling and firing of approximately 3 to 1 over the firing rate of three rounds per minute for manually or semi-manually loaded and fired guns of 8" bore. With such rapid handling it is obvious that the supply of projectiles thereto must be continuous. It is the provision of adequate facilities for high rate handling of projectiles that the apparatus embodiment of the present invention is intended.

Prior art methods of projectile handling have included in addition to the manual hand handling, the use of two wheel truck units for the purpose of picking up the projectile at the projectile stowage facilities and moving

2

the same therefrom to the receiving chamber of the projectile hoist. At its best these methods require a certain amount of heavy manual handling during projectile transfer.

- 5 The projectile handling and parbuckling equipment of the instant invention is also adapted for use in receiving projectiles from the hoist in a projectile stowage flat loading cycle, and in moving the projectiles to a securing position in the retaining structure of the projectile flat.
- 10 The steady arm mechanism of the instant invention is an auxiliary handling assembly for use with rapid fire gun equipment and is located adjacent to the projectile hoist loading station. It is movable to and from a hoist loading position at the hoist to and from a pickup position at the stowage ring assembly. It is a manually controlled semi-automatic mechanical arrangement which is power actuated from a gypsy head assembly by a snubbing rope used therewith. It is used in projectile transfer to grab projectiles at the stowage securing space or at the projectile hoist as the case may be and to hold the same securely while in transit. It is also used to eject the projectile either into the projectile hoist or the projectile securing structure.

- 15 One object of the present invention is the provision of a new and improved semi-automatic projectile firing mechanism for use with major caliber gun turret ammunition increments in which manual effort in moving projectiles from a stowage space in the gun turret to a hoisting position is materially reduced over the handling methods heretofore or now in general use and in which the possibility of mal-handling or misalignment at the engagement with the projectile hoist is reduced to a minimum.

- 20 An additional object of this invention lies in the provision of a rapid rate handling mechanism for use with major caliber gun turrets stowage ring assemblies.

- 25 Another object of this invention lies in the provision of an improved means of projectile transfer from a position adjacent the projectile hoist to a position at the hoist wherein the projectile is moved along a predetermined path of travel and is held in a steady position during such transfer and in which tipping, falling, or misalignment of the projectile during such movement is reduced to zero.

- 30 An additional object of this invention is the attainment of new and improved gun loading by applying only a minimum of manual effort in guiding the projectile in its path of movement in loading.

- 35 Another object of the invention is the provision of new and improved control means for handling and guiding the projectile in its movement from a storage location remote from the projectile hoist to a transfer position at the hoist.

- 40 Another object of the invention is the provision of an improved parbuckling device for use in transferring projectiles from a loaded projectile hoist to a storage chamber in the projectile flat remote from the projectile hoist.

- 45 Another object of this invention resides in a new and improved parbuckling mechanism drive arrangement whereby the parbuckler receives a projectile from an indexed projectile ring and imparts movement thereto through a transfer cycle to permit discharge of the projectiles at a position for hoisting into the projectile hoist conveyor.

- 50 Additionally an object of this invention is to provide a parbuckling arrangement wherein positive control of the heavy projectiles is maintained during the full cycle of movement thereof from a stowage space to the hoist or vice versa.

- 55 Another object of this invention is to provide structure

3

for moving projectiles to the gun loading hoist regardless of rolling or list of the ship, whereby the rate of fire may be maintained under adverse conditions and where the alignment of the projectile at its hoist position is maintained under all of the above conditions.

A further object of the invention is to provide projectile handling means for use with ship's stowage structure such that projectiles may be moved freely from the stowage space to the hoist without interference from other ship structure.

Additional objects and advantages of this invention will be apparent from the following description of a preferred embodiment of the invention taken in consideration with the accompanying drawings wherein:

Fig. 1 is a pictorial cutaway view of the general arrangement of the projectile hoist area of a turret and shows the installed arrangement of the parbuckling assembly for use therewith;

Fig. 2 is a pictorial view of the forearm tong, ejecting lever and latch devices of the steady arm of Fig. 1 and is partially cut-away to show details of operational elements therein;

Fig. 3 is a pictorial view showing details of the steady arm assembly of the parbuckling mechanism;

Fig. 4 is a view of the parbuckling assembly in use with the steady arm mechanism and shows the parbuckling mechanism aligned with the projectile in a position ready to grab the projectile;

Fig. 5 is an illustration showing the transferring of the projectile from a projectile ring to a position on the platform adjacent the hoist;

Fig. 6 is an operational view showing the passing of the projectile held by the parbuckling assembly to a position in alignment with the shutters of the hoist;

Fig. 7 is a pictorial view showing the position of the projectile within the powder hoist conveyor on which is illustrated the manner of ejecting the projectile through the shutters of the projectile hoist;

Fig. 8 is a view in elevation of details of the structure of Fig. 2, and showing the steady arm and ejecting lever in a position for tangential engagement with a projectile; and

Fig. 9 is a view in plan of the jaw and latch elements of the forearm tong assembly; and

Fig. 10 is a cutaway pictorial view of the general arrangement of the parbuckling equipment for a three gun turret.

Referring now to Figs. 1, 2 and 3 of the drawings for a more complete understanding of the invention, a showing is made thereon of a preferred embodiment of the steady arm parbuckling mechanism. This mechanism is associated with a gypsy head 62 and gypsy head drive assembly 63, arranged as shown in Fig. 10 and which is mounted on a projectile hoist loading platform 64 and driven in a manner as shown in the hereinbefore recited copending application to Girouard et al. This semi-automatic mechanical arrangement is manually controlled and power actuated from this gypsy head by a differentially arranged parbuckling rope 32. This rope serves to provide the power for transitory movement of a projectile in hoist loading. The projectile steady arm assembly functions to grab the projectile prior to movement, guide it during transit, and eject the same after transfer to the projectile hoist. The device as illustrated in detail in Fig. 3 comprising a deck mounted base assembly 36 in which is pivotally mounted an upper arm assembly 30 and a forearm assembly 15. The forearm assembly 15 associated therewith comprises a handle bar type control 22, hingedly mounted in bushings 27 at the connection between the upper arm members 28 and 29 and the forearm. A tong action mechanism 20 is located at the outer end of the forearm assembly. The above mentioned parbuckling rope 32 is attached to the forearm assembly 15 at a mid-point on the bottom thereof and is passed therefrom over a differential pulley arrangement 34 near the base for connection with the gypsy head 62. The ar-

4

rangement of this rope connection is best shown in Fig. 4. The rope connections of Fig. 3 are modified slightly from the showing of Fig. 4 in that an additional differential pulley, not shown, is included to provide a more convenient arrangement in the turret.

The tong assembly 20 details shown in Fig. 2 include a steadying lever 1 pivotally mounted at 52 in a bearing which is secured to the lower forward part of the forearm and associated by means of a pin and slot connection 2 with an ejecting lever 4 having a handle 3 thereon. The forearm 15 to which the tong member 20 is attached, additionally includes an offset or angular link 5 of Fig. 8, pivotally mounted inside the forearm on a pivot 7. In a preferred embodiment wherein it is desired to provide automatic return of the link 5 the link is provided with a projection 51 for engagement with a spring 6. It also includes the pivot bearing 52 for the lower end of the steadying lever 1. The connecting link 8 is pivotally attached to the offset link 5 at 9 on one end and to an upper latch 12 at the opposite end. The link 3 is connected in a pivotal arrangement with the latch by means of a pin 60. The link 5 is provided with a stop portion 59, arranged to limit the forward travel of this link and to fix the forward position of the pivot 9.

The arrangement of the forearm 15, Fig. 8, with respect to the ejecting lever 4 additionally includes pairs of projections 46 and 47 respectively on the forearm and on the ejecting lever. These projections are provided with mating flat surfaces at 48 and mating arcuate surfaces at 49 and 50. The forearm is also provided with a stop block projection 61, which limits rearward movement of the pivot 9 about the pivot 7. The function of these projections is hereinafter set forth in greater detail.

The tong jaw latch assembly includes the pair of latches 12 and 17 of similar construction. These latches are arranged to engage the pivoted jaw element 20a of the tong mechanism assembly 20 at their outer end and are provided with a flat locking surface at 53 for engagement with a mating portion 54 of the movable tong jaw 20a. The latch elements 12 and 17 are provided with an adjustment at 58 to facilitate the initial positioning of the jaws in order to provide the proper tensioning of the jaw about the projectile. The latch shaft 11 is provided with a pair of milled flats at 55 where it engages the latch element. The latches have a slot at 57 in the end opposite the tong engaging end, and are arranged to slideably receive the diametrically opposed flats of the latch shaft in sliding engagement in the slot thereof. The adjustment is provided by means of a set screw at 53. This screw is moved against the shaft to maintain the spacing of the latch member with respect to the shaft. After the adjustment has been made to properly position the latches with respect to the jaws in a manner to maintain the desired jaw tension on a projectile, the clamp bolts at 13 are locked to maintain the position of the latch shaft against the set screw and to prevent the shaft from sliding rearwardly in the latch. The arrangement provided for the lower latch is identical with that of the upper latch; the two being spaced at opposite ends of the latch shaft.

The arrangement of these assembled parts is such that movement of the lever handle 3 produces movement of the cam pin at 2 in the camming slot of the ejecting lever 4 as well as providing latch movement of the latch 12 about its latch shaft 11 to a position in engagement with a latch surface 54 on the inner end of the tong member 20. One of the tong members of the tong assembly 20 is fixed to the forearm 15 while the other jaw 20a thereof is arranged for pivotal movement with respect to the forearm. This movable jaw 20a pivots about the pivot pin 10 to provide engagement with a projectile and it is maintained in position by means of a compression spring shown at 18 and biased between the forearm and a projection thereon. The forearm assembly 15 is connected by means of tapered pins, not shown, but positioned at 14 through the vertical column 26 of the handle bar assembly 22. The spring element 6 of the forearm

5

assembly is retained at the end opposite the link by a cotter key restrained spring support 16. The latch element 17 is a lower latch which functions similarly to the latch 12. The assembly of the forearm 15 and tong additionally includes a lug element 19 having therein a hole 41. It is arranged to receive an eye splice of the parbuckling cable 32 which cable provides for movement of the projectile into the projectile hoist. Projectile movement along its path is restrained by the guide members 42.

The handle bar assembly 22 includes a restrained horizontal bar element 23 having a pair of handles 21 attached at the outer ends thereof. Engagement of the bar member with the shaft 26 is by means of a squared shaft portion shown at 24.

A lug element 25 serves as a stop and is attached by suitable means such as welding to the lower portion of the upright handle bar column immediately above the bearing bushing 27 of the upper arm member 29. This vertical column which passes through the forearm assembly 15 and is retained by a pin at 14 is similarly received in a bearing, not shown, at the lower portion of the upper arm and is associated with the lower arm member 28. A vertical shoulder member 30a connects the upper and lower members 28 and 29 of the upper arm assembly 30 and is provided with a resiliently coated stop pad 31 which is adapted to be engaged by the vertical face of the forearm assembly 15. The rope member 32 is shielded and restrained by a guide 33 as it passes over a sheave or differential pulley assembly 34 which is mounted on the lower end of the vertical column 30a and immediately above the base member 36. A guard plate 37 is provided on one side of the base member to protect the rope from damage by a projectile moved thereover to the guide rail 42. A bolt element 35 restrains the stop lug 39 of the chain assembly 38 which is arranged to have its hook 40 locked with the lug element 19 through the hole 41 provided in the lock member. A stop pin 43 is positioned on the upper portion of the upper arm member 29 to be engaged by the stop lug 25 of the vertical handle bar column. A parbuckling rope 32 is arranged such that it may pass over an idler pulley 44 through a guide element 45 to the hoist of the turret.

In operation of the parbuckling assembly of the instant invention the loading of projectiles from their stowed position on the projectile ring of a turret to the projectile hoist is accomplished mechanically with only such manual operation as is required to control the device as it picks up, guides and discharges the projectile into the hoist. The forearm 15 is adapted to swing the tong assembly 20 into a projectile receiving position at the stowage ring whereon its projectile gripping mechanism comprising the rigid jaw on the forearm and the movable jaw 20a engages and removes the projectile from this stowage ring and transfers it to its discharge position. The construction and arrangement of the elements of the steady arm assembly 15 is such as to permit movement thereof with a projectile in a predetermined orbit which is limited by projectile contact with the guide rail 42 as it is moved from the projectile ring to the hoist receiving chamber. Actuation of the parbuckling assembly by the gypsy head 62 and gear mechanism 65 associated therewith as shown in Fig. 10 for an upper projectile flat 64' is accomplished by means of the cable 32 attached thereto and operated by the motor 66 of the driven gypsy head 62. The operation of the mechanism is shown in various successive stages of movement in Figs. 4, 5, 6 and 7 wherein Fig. 4 is a pickup position and Fig. 7 is a discharge position at the projectile hoist. Intermediate positioning of the projectile in the transfer cycle is shown by Figs. 5 and 6.

The facilities shown in the operation drawings of Figs. 6 and 7 for operation of the ejecting lever 4, and the steadying lever 1 associated therewith, are shown in

6

greater detail in Figs. 2, 3, 8 and 9. The ejecting lever 1 is shown in an upright position in Figs. 3 and 8, which position is maintained during transfer action of the projectile by the tong assembly 20. In this upright position the flat surfaces of the block projection 47 on the ejecting lever 4 and the pedestal block projection 46 on the upper portion of the forearm tong 20 are in matched alignment. When it is desired to eject the projectile from the tong assembly 20 the ejecting lever handle 3 is pulled rearwardly and is permitted to move upwardly along the inclined surface of the projection 48 on the forearm assembly 15. These projections or blocks 46 and 47 prevent rotary movement of the operating lever 4 about the pivot 7 in the offset or angular link 5. This movement is prevented until the upper block 47 slides off the pedestal or lower blocks 46 on the forearm. This upward and backward movement of the pin 9 of the link 5 and lever connection 8 operates the latch links 12 and 17 to unlock the movable or pivoted half 20a of the tong jaw. Thereafter the arcuate movement of the offset link 5 about the pivot 7 in the forearm as the lever handle 3 is pulled backwardly provides pushing action by the ejecting lever 4 to discharge the projectile from the jaws 20. As the handle is moved back and lifted upwardly slightly by the arcuate path movement of the pivot connection of the bell crank link the projection 47 on the ejecting lever is permitted to ride past the end surface 48 of the pedestal block projection 46 on the forearm and to permit the mating of the curved or arcuate surfaces 49 and 50 respectively of these two projections. At this point the flat of the upper projection block 47 seats on the flat at the end of the arcuate portion 50 of the pedestal projection 46 to cause the steadying lever pivot 2 to move in the curved cam slot of the ejecting lever 4 and to pivot about its lower pivot 52.

The movement of the ejecting lever 4 and steadying lever 1 are maintained in a predetermined relationship by the cam slot connection between these two lever elements whereby they function to apply force on the projectile at such a rate that a common tangent to the pads of the two lever pads is substantially vertical at all times. The ejecting lever handle is thus constrained to cause the levers to push the projectile from the grip of the tong element 20a.

The movement of the pivot connection between the ejecting lever 4 and the offset link 5 additionally provides movement of the connection with the latch link 8 for movement of the link to rotate the latches 12 and 17 about the pivot shaft 11 thereof. This disengages these latches from the pivotal jaw 20a as the handle 3 is moved rearwardly in the initial ejecting action movement. This releasing of the grip of the tong jaws on the projectile permits the ejecting lever 4 to move the projectile from the tong.

In the picking up action of the device, the operator pushes the jaws toward a projectile until the pads of the ejecting lever 4 and of the steadying lever 1 have caused the ejecting lever to come to a substantially vertical position. When the lever 4 is vertical the upper block 47 slides up the arcuate surface 50 of the pedestal block 46, over the top surface 48 thereof and assumes a position wherein the block flats are substantially aligned. At this point of movement the latch link 8 moves to cause latching action of the movable jaw 20a.

The offset link 5 is additionally provided with a projecting portion 51 at the bottom thereof for engagement with the return spring 6.

The return spring aids in bringing the lever 4 to a vertical position for initial projectile grabbing action. It is not a necessity as the operator could move the lever handle to lock the jaws to the projectile. It does however serve to relieve him of this work and it simplifies the operation of the device.

With a device of the instant invention only two men

7

are required to provide projectile parbuckling. One man guides the arm by means of the handlebar assembly 22 while the second man operates the rope 32 at the gypsy head 62.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without payment of any royalties thereon or therefor.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. A projectile parbuckling assembly of the type for use with major calibre ammunition increments, for ship-board turret hoist loading, which comprises in combination, a forearm unit having a tong grabbing element at the forward extremity thereof, an upper arm assembly pivotally connected to the forearm unit at the end opposite said tong element, a vertical column at the opposite end of the upper arm assembly, a base adapted to receive the vertical column of the upper arm assembly and having said upper arm assembly pivotally mounted thereon, a handle bar assembly mounted on a vertical extension of the pivotal connection between the forearm unit and upper arm assembly and having this extension secured to the forearm unit and rotatable within the upper arm assembly of the pivot, a steadying lever, and an ejecting lever attached to the tong grabbing element for steadying the projectile during transfer movement and ejection, the ejecting lever serving to eject the projectile into a hoist at discharge.

2. A parbuckling device according to claim 1 including a driving means for applying power movement to the tong element of said forearm unit.

3. The parbuckling assembly of claim 2 wherein the drive means comprises a sheave pulley attached to the vertical column above the base for rotation with said column of the upper arm assembly, and a parbuckling rope attached to the forearm unit and arranged to pass over the sheave pulley to impart motion thereto.

4. In combination with a parbuckling device of the character of claim 3, the inclusion in the drive system therefore of a power driven gypsy head around which one end of the parbuckling rope may be attached in a manner whereby drive imparted to said gypsy head will produce movement of said tong element to move the projectile in its loading path for hoist loading.

5. In a projectile handling assembly, a parbuckling device comprising a pivotally mounted shoulder element, an upper arm assembly extending therefrom, a forearm and tong assembly connected thereto in a manner wherein the forearm is rotatably mounted and pivotally connected to the lower portion of the upper arm assembly, a pair of projectile clamping jaws arranged at the forward end of the said forearm and tong assembly, a projectile steadying means carried by and operatively associated with the forearm and tong assembly and an ejecting lever device disposed to eject a received projectile from the clamping jaws after transfer during a loading cycle, said parbuckling device also comprising control means for guiding the projectile in a predetermined transfer path, a power drive means including an element connected to the shoulder element of the upper arm assembly in a manner to provide rotational movement thereto and cable means connecting the forearm assembly with the drive means in a relationship capable of imparting rotation of the forearm and upper arm about a pivotal axis at the shoulder element whereby movement imparted by the drive means functions to move the forearm and projectile clamping tong assembly from a projectile receiving position to a projectile discharge position.

6. The structure of claim 5 further characterized by

8

the inclusion in the forearm and tong assembly thereof of a latch means pivotally mounted on the forearm and tong assembly and connected through the ejecting lever by linkage adapted to correlate the actuation of the latch means with movement of the ejecting lever, said tong assembly including a pair of clamping jaws comprising a movable jaw member, spring biasing means arranged to control the positional movement of the movable clamping jaw member, and means on said movable clamping tong assembly adapted for engagement with said latch means which is operated by the ejecting lever.

7. A projectile handling steady arm assembly including a base member, a forearm and tong assembly a vertical column element pivotally mounted therein, said vertical column element having an arm assembly extending therefrom and adapted at its opposite end to pivotally receive said forearm and tong assembly, control means mounted at the pivotal connection therebetween and attached to the forearm and tong assembly to control movement thereof said tong of the forearm assembly including gripping jaw means mounted on the outer end portion of the forearm assembly and adapted to seize and move the received projectile, projectile steadying means and projectile ejecting means mounted on the forearm assembly at the gripping jaw means and disposed to engage and steady the projectile at reception thereof and for steadying and ejecting the projectile upon release from the gripping means.

8. A projectile parbuckling device comprising a pivotally mounted shoulder assembly, an upper arm assembly, a forearm assembly and a tong assembly thereon, means rotatably connecting said forearm assembly with the upper arm assembly, a base assembly pivotally receiving and mounting said shoulder assembly, said tong assembly including a pair of projectile clamping jaws arranged at the forward end of the forearm assembly, one of which jaws is pivotally mounted to the outer end of the forearm assembly, projectile steadying means associated with said forearm and tong assembly and adapted for movement between the jaws thereof, an ejecting lever device connected to the forearm and arranged to move with the projectile steadying means to eject a retained projectile from the tong jaws after transfer action during a loading cycle, latch means pivotally mounted on the forearm assembly, linkage connecting means connecting the latch means with the ejecting lever device to correlate the actuation of the latch means with movement of the ejecting lever, spring biasing means yieldably arranged between the movable and fixed jaws of the tong assembly to control the initial movement of the tong jaw, and adjusting means in the latch means for providing adjustment thereof to secure a firm grip of the jaws on the projectile.

9. The structure of claim 8 further characterized by the inclusion with said shoulder assembly and base assembly for shoulder mounting of a control means for guiding the forearm as it moves a projectile in a predetermined transfer path, and a drive means connected to the shoulder assembly of the upper arm assembly in a manner to provide rotational movement thereto, said drive means also being in connecting relationship with the forearm assembly whereby driving action at the upper arm shoulder is imparted through the drive means to the forearm to move the projectile clamping tong thereof in a selectively reduced angular relationship with the upper arm and from a projectile receiving position to a projectile discharge position.

10. A projectile parbuckling device comprising a pivotally mounted shoulder assembly, an upper arm assembly and a forearm and tong assembly, wherein the forearm is rotatably mounted and pivotally connected to the lower portion of the upper arm assembly, said forearm tong assembly including a projectile clamping tong having a pair of jaw elements, one of said pair of jaw elements being pivotally mounted on the forearm, spring means for yieldably biasing the movable jaw with respect to the tong jaw

on the forearm in a manner to control the positional movement of the movable jaw, a projectile steadying lever means associated with the forearm tong and arranged for movement between the jaws thereof, said steadying means being pivotally mounted at one end thereof on the forearm, an ejecting lever device arranged to eject a received projectile from the clamping tong after transfer and during a loading cycle, said ejecting lever device including a handle element and a slidable connection with the steadying lever, latch means pivotally mounted on the forearm assembly for engagement with the said movable jaw, linkage connecting the latch means with the ejecting lever, an offset link pivotally connected to the forearm assembly at one end thereof and at the opposite end with the ejecting lever and said linkage of the latch means in a manner to correlate the actuation of the latch means to lock the tong jaws about a projectile with a first movement of the ejecting lever handle, said ejecting lever handle being additionally arranged to provide release of the latch means in a manner whereby it is adapted to initiate movement after movable jaw unlocking to push the projectile from the tong jaws, the position of the slidable connection between the steadying lever and the ejecting lever being such as to maintain the outer ends of the two lever elements in a tangential relationship with respect to the projectile throughout movement thereof.

11. A projectile handling steady arm assembly including a base member, a vertical column element pivotally mounted on said base member, a second assembly comprising a forearm and a tong jaw assembly, an upper arm assembly pivotally mounted on said vertical column element and extending therefrom said upper arm assembly being provided with means at the end opposite said vertical column for pivotally receiving said second assembly, control means mounted on the forearm to initiate clamping action of the tong jaw assembly about a projectile and to latch the tong jaw assembly in holding relationship with a projectile during movement, said control means comprising a jaw latch and means for releasing the tong jaw assembly for ejection of the projectile after transfer, a lever assembly attached to the forearm means pivotally mounting and connecting the forearm and said lever assembly, said lever assembly including an ejecting lever having a handle thereon and a steadying lever slideably connected therewith and pivotally mounted at an opposite end with the forearm assembly in a manner whereby an initial movement of the handle releases the jaws for engagement with the projectile, a second movement thereof initiating a locking of the tong jaws and a subsequent movement of the handle after latching releases the jaw latch and provides movement of the steadying lever and

the ejecting lever to force the projectile from the tong jaw assembly.

12. A projectile parbuckling forearm and tong assembly for use in projectile parbuckling which comprises a pair of jaw elements on the forearm, one of said jaw elements being pivotally mounted thereon, latch means for the movable jaw, parbuckling control means including a projectile steadying lever and a projecting projectile ejecting lever, a handle on said ejecting lever, linkage means connecting the latch means with the handle, and a second linkage means connecting the latch means and handle with said forearm.

13. In a projectile handling assembly, a parbuckling device comprising a pivotally mounted shoulder element, an upper arm assembly having arm portions extending therefrom, a forearm and tong assembly connected thereto in a manner wherein the forearm thereof is rotatably mounted and pivotally connected to the extending portions of the upper arm assembly, a pair of projectile clamping jaws arranged at the forward end of the said forearm and tong assembly, a projectile steadying means mounted for movement with the forearm and tong assembly and an ejecting lever device disposed thereon in adjacency to the clamping jaws to eject a received projectile from said forearm and tong assembly after transfer during a loading cycle, said parbuckling device also comprising control means for guiding the projectile in a predetermined transfer path, a power drive means including an element connected to the upper arm assembly at the shoulder element in a manner to provide rotational movement therefor, cable connecting means connecting the forearm and tong assembly with the drive means in a relationship capable of imparting rotation of the forearm and tong assembly and upper arm about a pivotal axis at the shoulder element whereby movement imparted by the drive means functions to reduce the angular relationship between the forearm and tong assembly and the upper arm assembly and simultaneously therewith or selectively with respect thereto to provide rotational drive about the pivotal axis at the shoulder element, and means operable with movement of said ejecting lever device for release disengagement of said projectile from said jaws.

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