Nov. 13, 1956 E. A. FRANSON 2,770,170

HOIST FOR PROJECTILES

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Fig. 1

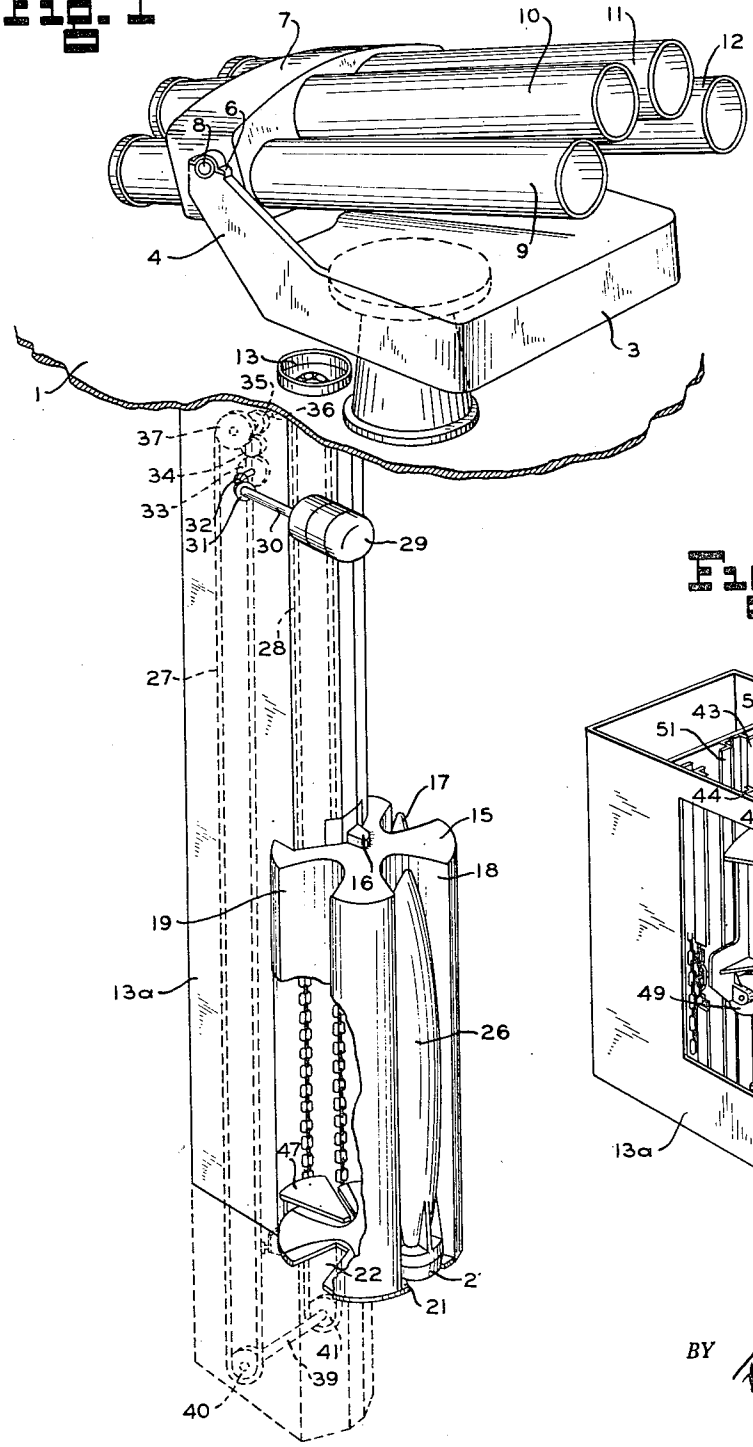

Fig. 2

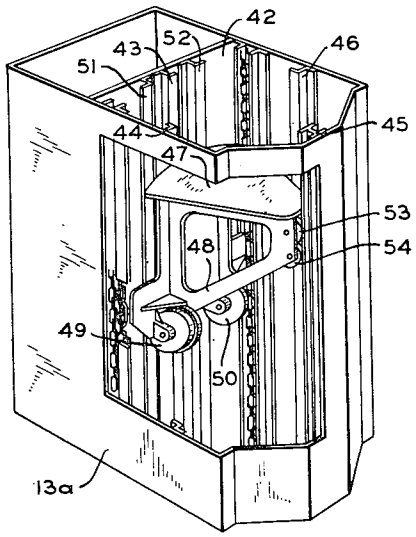

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Fig. 2

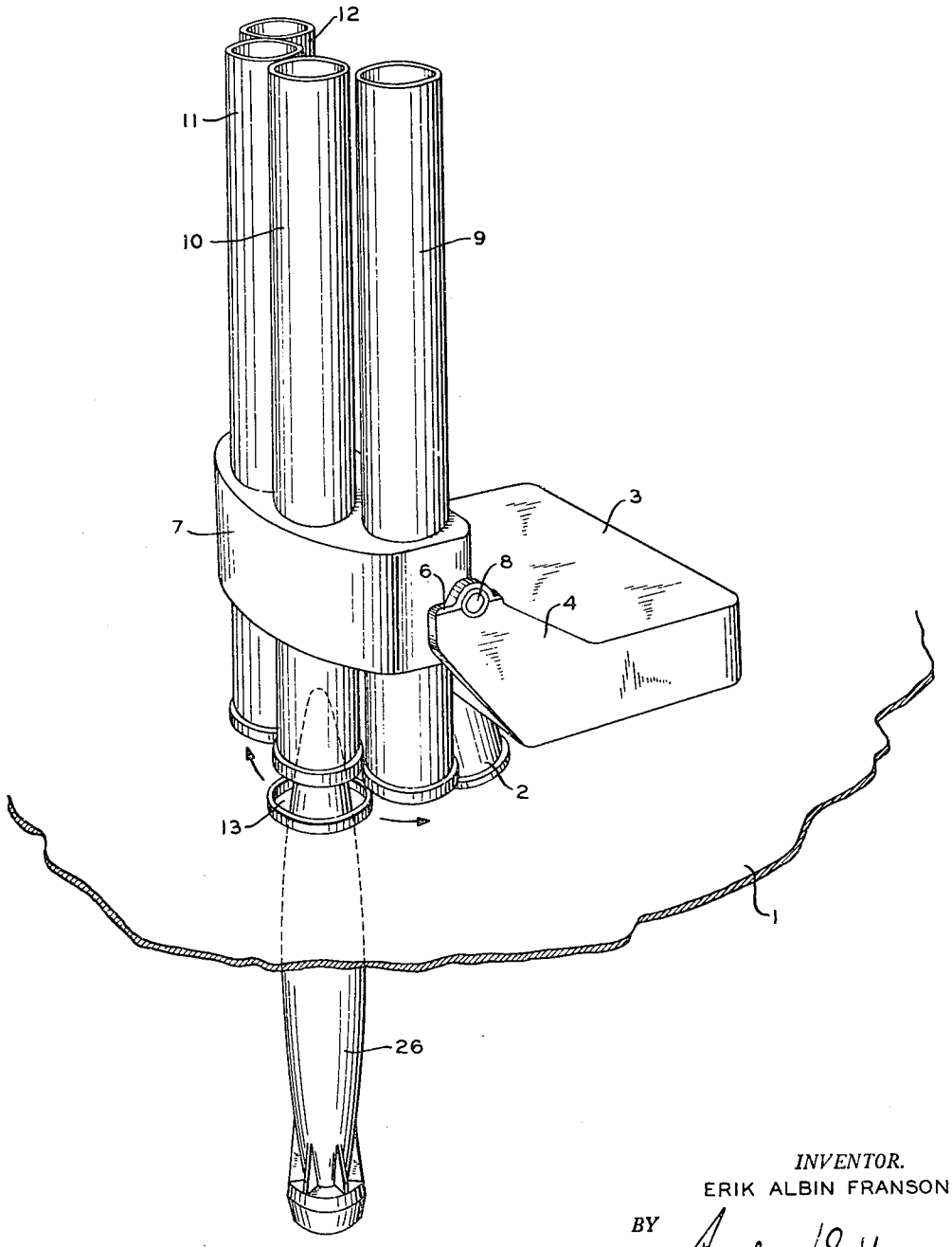

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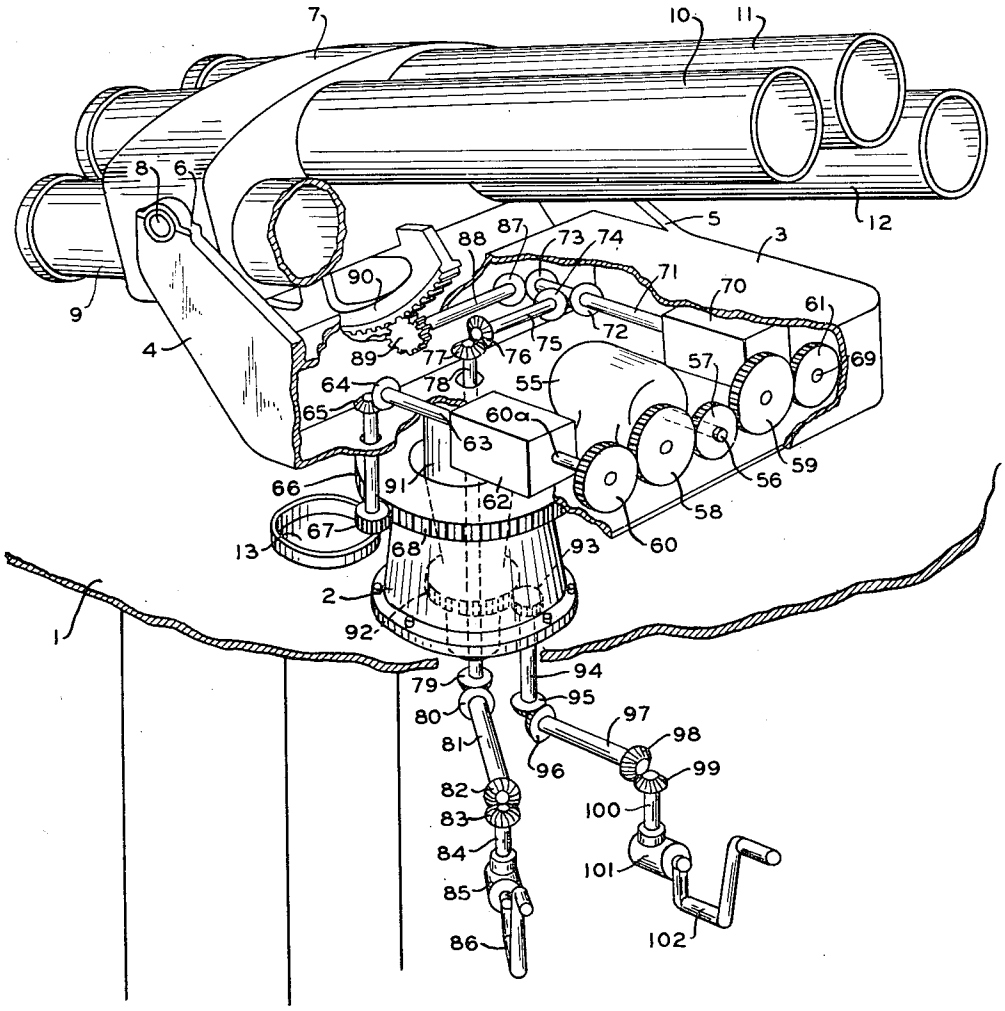
Fig. 4



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HOIST FOR PROJECTILES

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5 Claims. (Cl. 89—46)

The present invention refers to a hoist for projectiles, preferably for depth charges, consisting of a hoist shaft and a hoisting device.

The invention is characterized by a rotatably supported preferably cylindrical body, which body enters partly into a hoist shaft and is provided with recesses for projectiles, which recesses each act together with a hoisting device in such a way that the hoisting device is partly or entirely movable in the recess. As the present invention is especially well suited for a depth-charge launcher, the invention will therefore be described in connection with a launcher.

The said depth-charge launcher is shown in detail in the enclosed three drawings, where Fig. 1 shows a depth-charge launcher with a hoist machinery for the hoisting of depth charges, Fig. 2, a part of the hoist shaft, Fig. 3, the depth-charge launcher under loading, and Fig. 4 the depth-charge launcher partly sectionalized to illustrate the operating machinery.

In the Fig. 1, 1 is a floor, which for example can consist of the deck of a ship. On the floor there is a base 2 arranged, around which a parallelepipedical body 3 is rotatably arranged. From the body 3, two arms 4 and 5 extend, which arms at their ends are provided with supporting means 6 for trunnions arranged in a supporting frame 7. Of the said trunnions only one is visible. This one has been given the reference number 8. In the supporting frame 7, four launching tubes 9–12 are arranged. These tubes are at their back ends provided with means not shown for the supporting of the depth charges. Furthermore, these tubes are parallel and their axes are situated on an arc, the center of which is situated in the turning centre of a body 3 when the axes of the tubes are parallel to the vertical axis through the turning centre of the body 3. In the figure there are shown four launching tubes, but it should be self evident that one can also use more or fewer tubes. In the floor there is a hole 13, which can be covered by a door. From the said hole and from the underside of the floor a substantial rectangular hoist shaft, 13*a*, extends for hoisting depth charges. In one wall of the hoist shaft there is a hole. In that hole a body protrudes, preferably a cylinder 15, the end of which is supported by supporting means of which the upper one, which is given the reference number 16, is visible. The said cylinder 15 is rotatable in the said supporting means. The side wall of the cylinder is provided with a number of axial recesses 17–20. At the lower end of the cylinder 15 a disk 21 is arranged, which has the same diameter as the cylinder. In the said disk, the recesses 22–25 are arranged, which are symmetrical in relation to the recesses previously mentioned, i. e. the recesses of the cylinder. The recesses 22–25 are a little smaller than the recesses previously mentioned. Because of that there is created at the lower end of each recess of the cylinder 15 two supporting edges. On these supporting edges the end of the depth charge 26 can rest. In the hoist shaft, two endless chains 27 and 28 run. The two chains are parallel to each other and are driven by a motor 29 having a motor shaft 30 which drives over two conical gear wheels 31 and 32 drive a gear wheel 33, which in turn over a middle wheel 34 a gear wheel 35 which is arranged on a shaft 36. In the ends of the shaft two sprocket wheels 37 are arranged. Over each of these sprocket wheels 37 the two chains 27 and 28 run. At the very bottom of the hoist shaft, parallel to the shaft 36, a shaft 39 is arranged, which at its ends is provided with sprocket wheels 40 and 41. The two chains 27 and 28 also run over these wheels. The motor 29 with its shaft, as well as the shafts 36 and 39 and the shafts of the gear wheels 33 and 34, are supported in a suitable manner in supporting means not shown. Within the hoist shaft a vertical wall 42 is arranged, which is situated in the same plane as the shafts 36 and 39. Through this wall there are obtained in effect two hoist shafts, the larger one of which is intended for hoisting charges. In this part hoist shaft a number of guide rails 43–46 are arranged. At the two chains 27 and 28 there is fastened a hoisting device in the form of a disk 47, fixed at a bracket device 48, which at its lower part is provided with two wheels 49 and 50, which run along the rails 51 and 52 which are fastened at the wall 42. When thus running, the wheels 49 and 50 lie close to the rails 51 and 52. The bracket device is also at its right part provided with two trundles 53 and 54 which run along the rail 45. When running, the trundles lie close to the rail 45. The disk 47 has a surface form which is very nearly like the surface form of the recesses 22–25. When the cylinder is turned into a position in which one of its recesses is aligned with disk 47 this disk will, when it is situated in the same plane as the disk 21, very nearly fill out the respective recess in the disk 21.

In Fig. 3, there is shown the same depth-charge launcher as in Fig. 1, which depth-charge launcher is elevated in such a way that the axes of the launching tubes are parallel to the rotating axis of the body 3. The tubes are traversed in such a way that the tube 10 is situated opposite the hole 13. In the figure there is also shown a depth-charge 26 being inserted. As the hoist machinery is shown so clearly in the foregoing figure it has been left out in the present figure, in order to make the present figure more simple and more clear.

In Fig. 4, the depth-charge launcher of Fig. 1 is shown partly in section. Also here the hoist machinery is left out, as it is not considered necessary for making clear the present figure, and as it has been shown in connection with Fig. 1. The parallelepipedical body 3 contains an electrical motor 55, which is provided with a shaft 56, at the end of which a gear wheel 57 is arranged. This gear wheel drives, over two middle wheels 58 and 59, two gear wheels 60 and 61. The middle wheels 58 and 59 are supported in a suitable way in supporting means not shown. The gear wheel 60 is fixed in the one end of a shaft 60*a*, which consists of an input shaft to a regulatable gear-shift device 62. The output shaft 63 from the said gear-shift device is provided, on its free end, with a conical gear wheel 64, which is in mesh with a conical gear wheel 65, which is arranged on one end of a vertical shaft 66 which on its other end seats a gear wheel 67, which is in mesh with a gear arc 68, fixed at the base 2. The gear wheel 61 is arranged at the one end of a shaft 69, which forms the input shaft of a regulatable gear-shift device 70. The output shaft 71 of the said gear-shift device is provided with two conical gear wheels 72 and 73, the conical wheel 72 of which is in mesh with the conical wheel 74 of a shaft 75, which on its other end supports a conical gear wheel 76, which is in mesh with a conical wheel 77, arranged on the one end of a vertical shaft 78, which on its lower

end supports a conical gear wheel **79**, which is in mesh with a conical gear wheel **80**, arranged at one end of a shaft **81**. The shaft **81** is connected over the elements **82–85** with a control handle **86**, for turning the shaft **81** by hand. The gear wheel **73** engages a conical gear wheel **87** on the one end of a shaft **88**, which on its other end supports a gear wheel **89**, which is in mesh with a toothed sector **90**, fixed to the supporting frame **7**. The parallelepipedical body **3** is fixed to a cylinder-shaped member **91**, which is rotatably supported in the base **2**. In the lower part the member **91** is provided with a gear arc **92**, which is in mesh with a gear wheel **93**, arranged at one end of the shaft **94**, which on its other end is provided with a conical gear wheel **95**, which is in mesh with a conical gear wheel **96**, which is arranged on one end of a gear shaft **97**. The last-mentioned shaft is over the elements **98–101** connected with a control handle **102** for turning the shaft **97** by hand.

The depth-charge launcher described above functions as follows. We presume that the hoisting device containing the disk **47** is situated a little below the disk **21**, and that the recesses **17–20** are empty. In this initial position, three depth charges are placed in the recesses **17**, **18** and **19** in such a way that the lower ends of these charges rest against the supports which the disk **21** forms in each recess. Thereafter the cylinder **15** is rotated in such a manner that for example the recess **19** with the charge therein protrudes into the hoist shaft **13***a*. In the empty recess **20**, there is now placed another charge. The magazine which is formed by the cylinder **15** is now fully loaded. The charges in the magazine can now one after one be hoisted through the hoist shaft. Before this, however, the launching tubes must be turned in such a way that they can receive the charges. For turnnig the launching tubes the motor **55** is used, which rotates the gear-shift devices **62** and **70**, whereby first the gear-shift device **70** is adjusted in such a way that the axes of the launching tubes become vertical. By means of the gear-shift device **62** the depth-charge launcher is then traversed in such a way that the launching tubes one by one will be situated exactly opposite the hole **13**, in such a way that each launching tube forms an extension of the hoist shaft **13***a*. It is then appropriate to first let the tube **9** be situated over the hole **13** and thereafter in turn the tubes **10**, **11** and **12**. It is also possible to start with the tube **10** as shown in Fig. 3. We start from that the tube **10** forms a continuation of the hoist shaft. In this position we start the motor **29**, whereby the hoist device with the disk **47** will move upwards, whereby the disk **47** will come into close contact with the end of the charge and lifts the charge upwards. When the charge has left its recess in the cylinder **15**, it will be guided by the rails **43–46** in the right part hoist shaft. In order to make it possible to insert the projectile in the tube **10**, the hoist device has to pass through the hole **13** and to extend slightly into the tube **10** until the mentioned but not shown fastening devices snap in behind the end of the charge. From the Fig. 2 it is clear and distinct that the hoisting device is of such a design that it can protrude through the hole **13** and into one of the launching tubes. When all the launching tubes of the depth-charge launcher are provided with depth charges, the depth-charge launcher by means of the motor **55** and the gear-shift devices **62** and **70** can be elevated or traversed as desired, whereafter the depth charges by means of conventional discharge devices not shown can be launched either at one time, or one by one, or in any other desired succession. In case the aiming machinery for one reason or another should not function, there are possibilities to elevate as well as to traverse the depth-charge launcher by the control handles **86** and **102**.

I claim:

1. In a launching assembly for launching depth charges of the class comprising at least one launching tube and a pivot mount mounted upon a platform and mounting the tube thereon pivotal between a perpendicular loading position and a slanted discharge position, the combination with a hoist disposed below the platform and comprising a fixedly mounted perpendicular hoist shaft upwardly protruding through said platform for directly ramming a depth charge into the launching tube when in perpendicular position and aligned with the shaft, said hoist shaft having a lateral loading opening below said platform, a loading drum below the platform rotatably mounted axially parallel to said shaft and in a spatial relation relative thereto such that in each rotational position of the drum, part of the side wall thereof protrudes into the shaft through said opening, the protruding side wall part of said drum being formed with at least one axial recess extending throughout the length of the drum for inserting therein a depth charge to be loaded, retaining means on the drum extending into said recess for retaining in position a charge inserted in said recess, a lifting tray movable up and down in said hoist shaft, and drive means coupled with the lifting tray for moving the same between a lower and an upper limit position, the said lifting tray having a configuration providing for a downward passage of the same through an empty recess past said retaining means and for lifting the tray into its upper limit position above the level of the upper end of the hoist thereby hoisting the charge completely out of said hoist shaft and into the launching tube.

2. In a launching assembly for launching depth charges of the class comprising at least one launching tube and a pivot mount mounted upon a platform and mounting the tube thereon pivotal between a perpendicular loading position and a slanted discharge position, the combination with a hoist disposed below the platform and comprising a fixedly mounted perpendicular hoist shaft upwardly protruding through said platform for directly ramming a depth charge into the launching tube when in perpendicular position and aligned with the shaft, said hoist shaft having a lateral loading opening below said platform, a loading drum rotatably mounted axially parallel to said shaft and in a spatial relation relative thereto such that in each rotational position of the drum, part of the side wall thereof protrudes into the shaft through said opening, the protruding side wall part of said drum being formed with at least one axial recess extending throughout the length of the drum for inserting therein a depth charge to be loaded, support means on said drum protruding into said recess for supporting a charge inserted in said recess and resting upon said support means, a lifting tray structure movable up and down in said hoist shaft, and drive means coupled with said lifting tray structure for moving the same between a lower and an upper limit position, the said tray having a cross-sectional outline slightly less than the cross-sectional outline of said support means in said recess to provide for passage of the tray structure through the recess and past the support means in either direction and for gripping the bottom part of an inserted charge left free by said support means and the height of the tray structure being such that the level thereof in the upper limit position of the tray structure is above the level of the upper hoist shaft end thereby hoisting the charge completely out of the hoist shaft and into the launching tube.

3. A hoist according to claim 2, wherein the said support means comprise a disk secured to the bottom end of the drum and having a peripheral recess of a configuration such as to form support flanges protruding into said recess of the drum.

4. A hoist according to claim 1, wherein the cross-section of the portion of the hoist shaft protruding above said platform is circular and corresponds substantially to the cross-section of the cooperating launching tube,

and wherein guide rails in the shaft portion below said platform guide a charge during its travel through said shaft portion.

5. An assembly according to claim 2, wherein the said tray structure comprises uprights forming a frame, the lower end of said frame being secured to said drive means and the upper end supporting a platform for receiving a depth charge, the height of said frame being such that in the upper limit position of the frame structure said platform is situated above the level of the upper hoist shaft end.

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