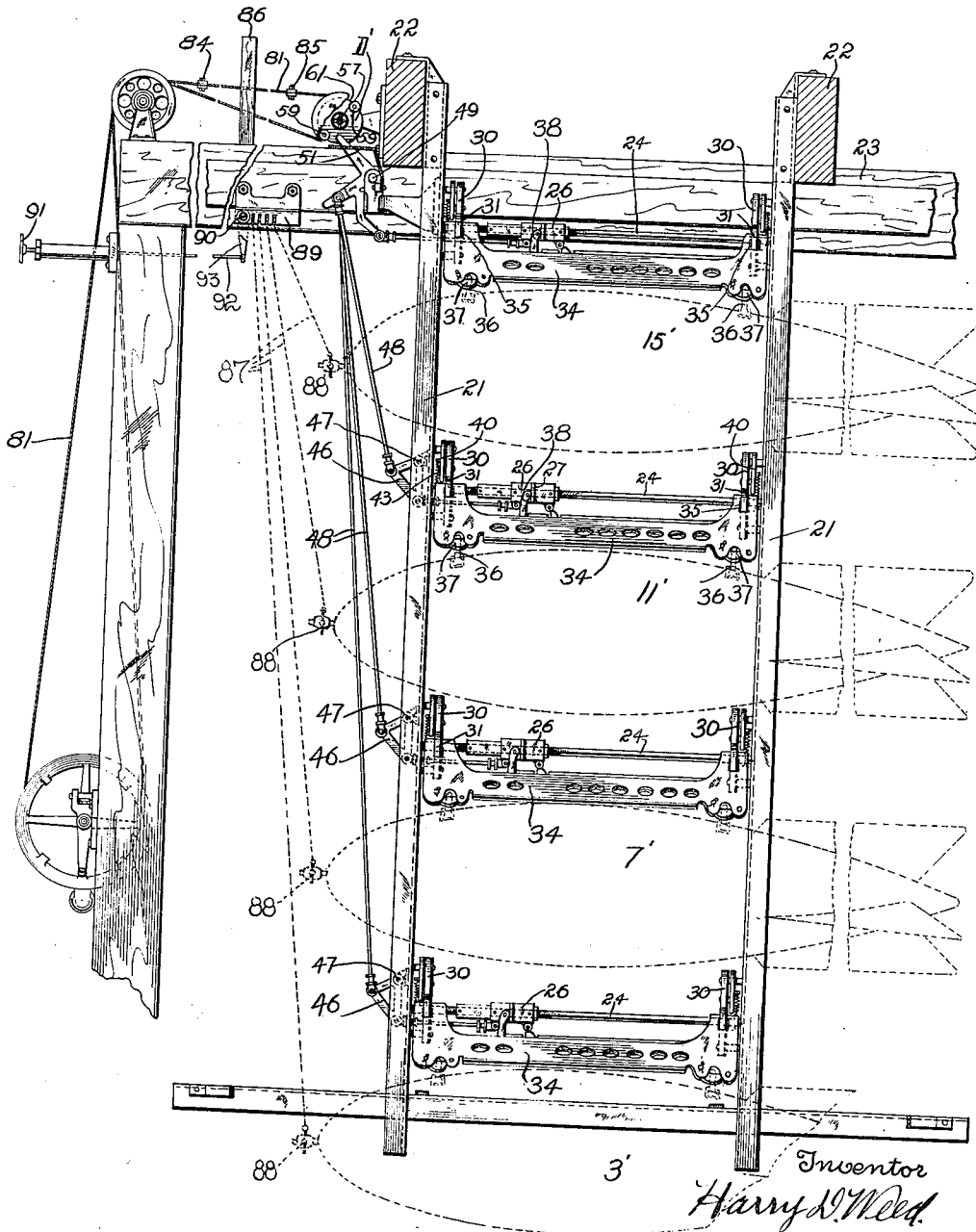


H. D. WEED.
BOMB CARRYING AND RELEASE SYSTEM.
APPLICATION FILED JUNE 7, 1919.

1,396,150.

Patented Nov. 8, 1921.
6 SHEETS—SHEET 1.

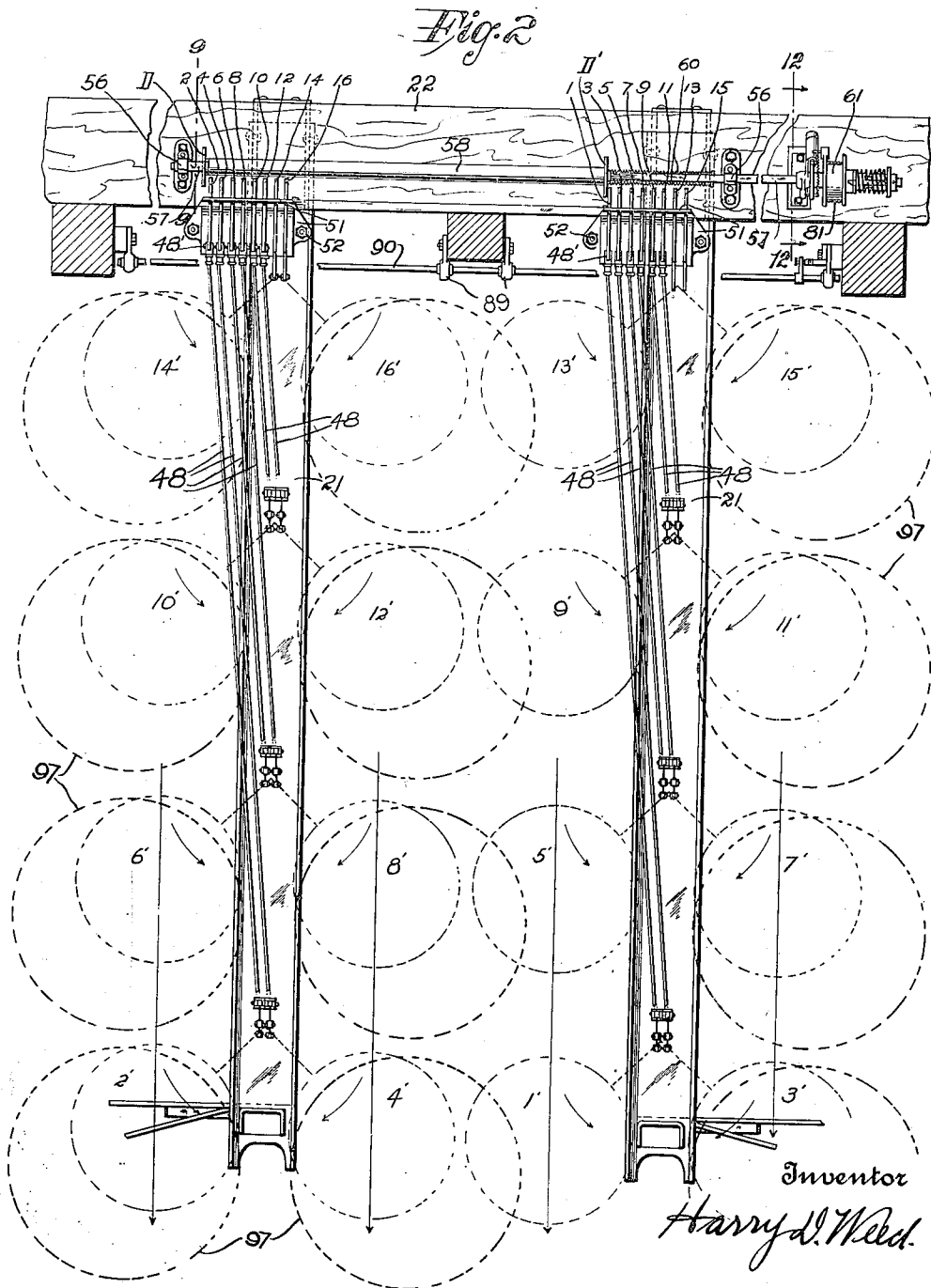
Fig. 1



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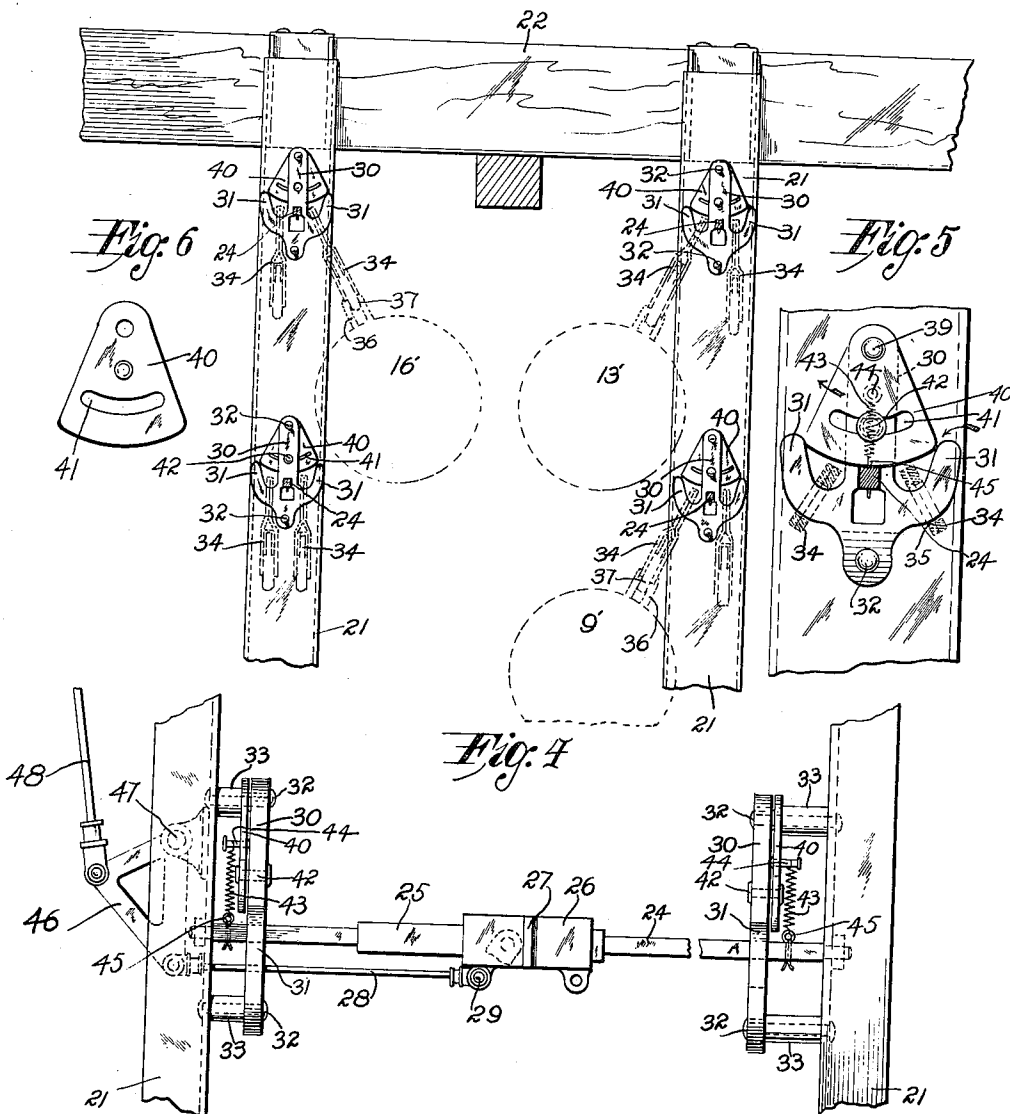


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Fig. 3



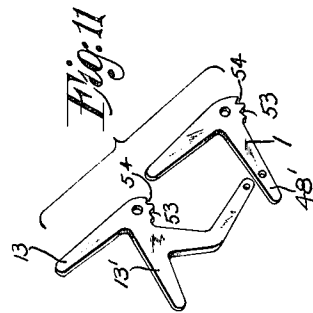
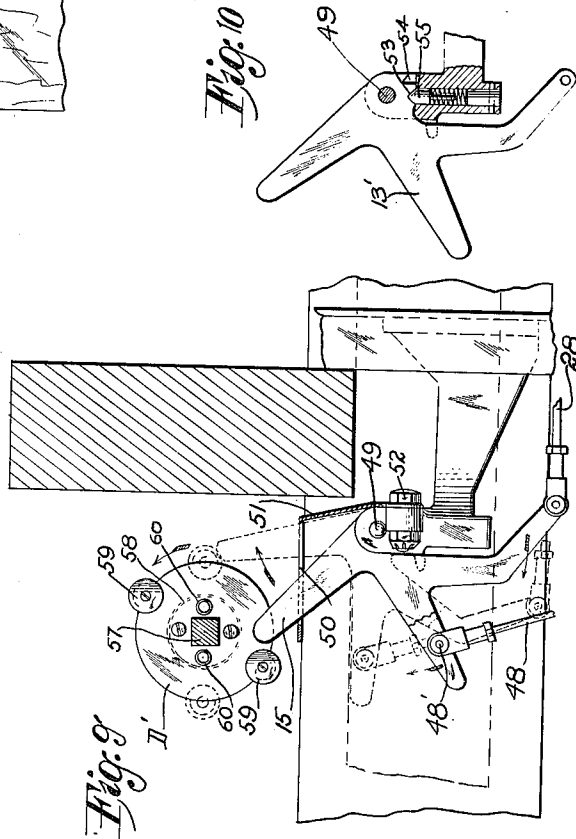
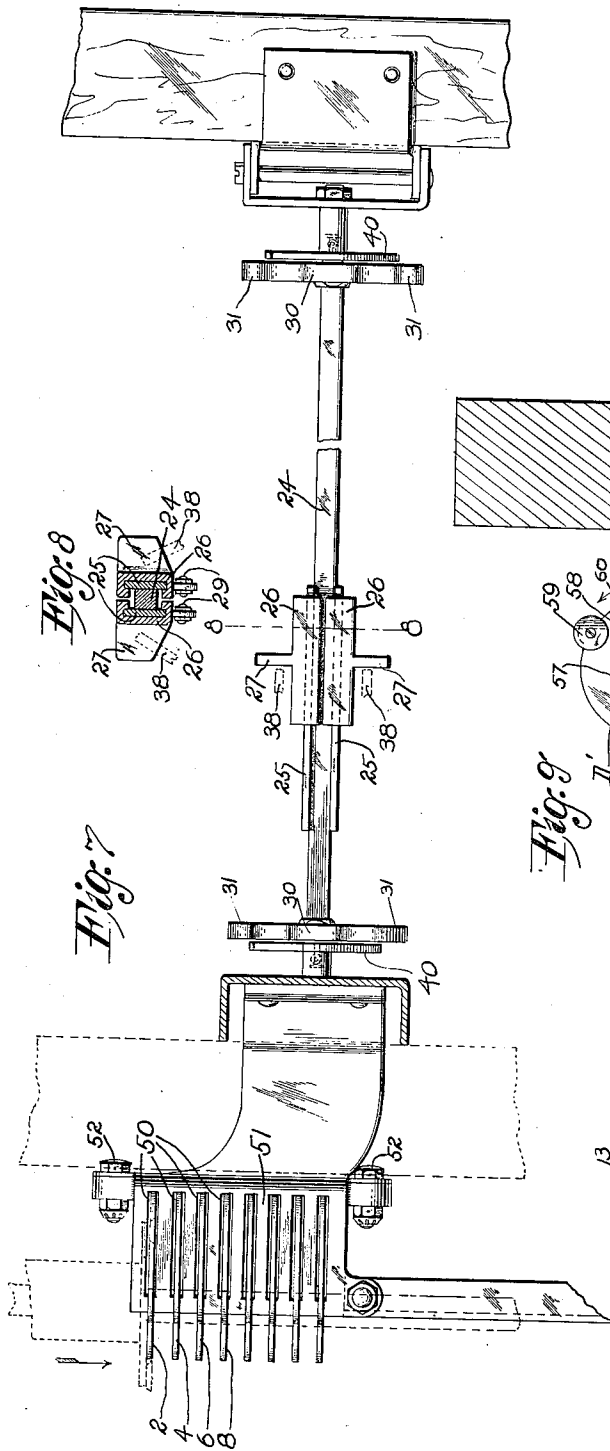
Inventor
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6 SHEETS—SHEET 4.



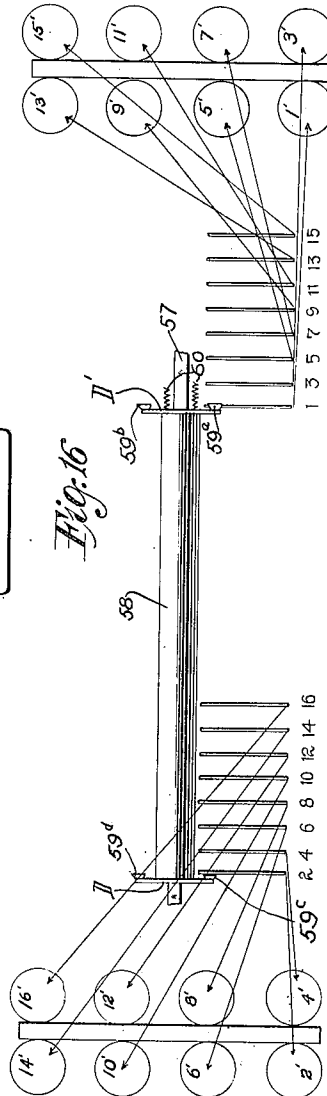
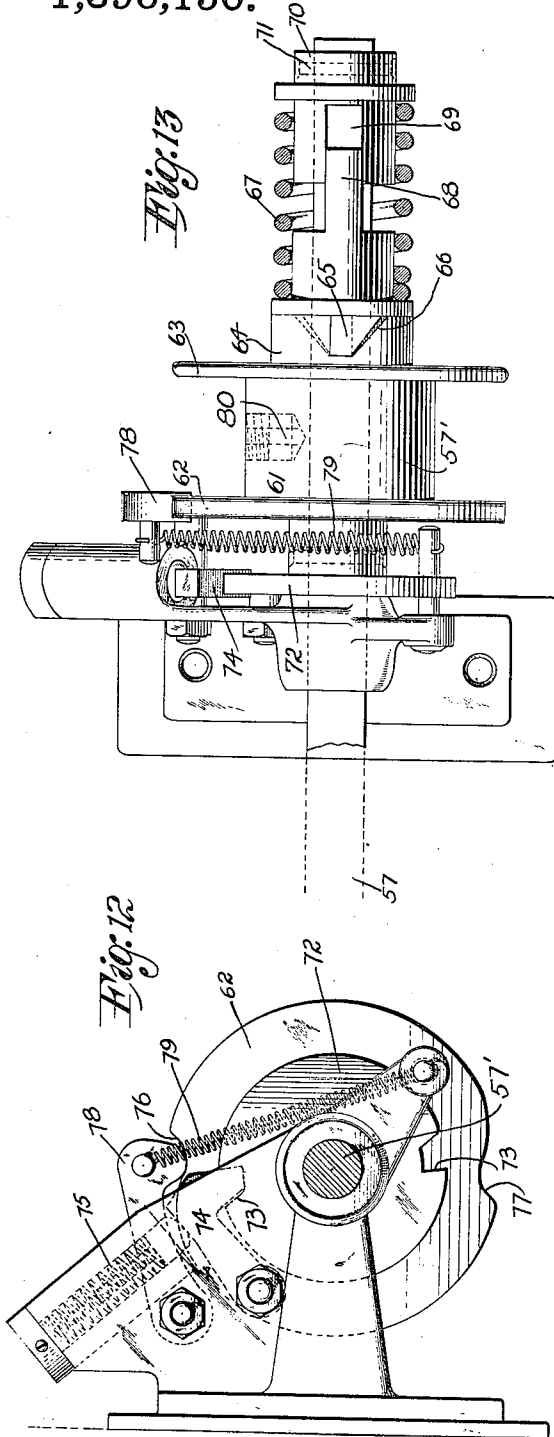
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6 SHEETS—SHEET 5.



Inventor
Harry D. Weed.

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1,396,150.

Patented Nov. 8, 1921.
6 SHEETS—SHEET 6.

Fig. 13

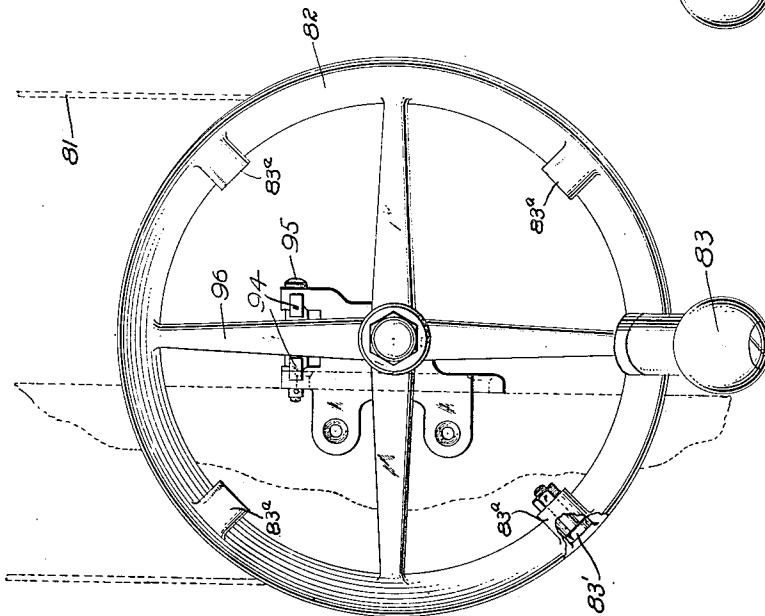
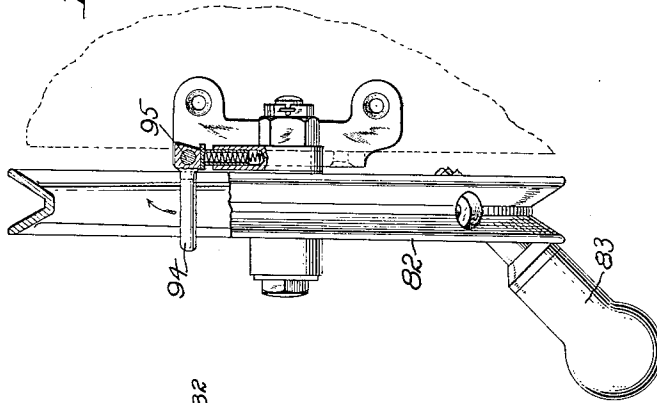


Fig. 14

Inventor
Harry D. Weed.

UNITED STATES PATENT OFFICE.

HARRY D. WEED, OF THE UNITED STATES ARMY.

BOMB CARRYING AND RELEASE SYSTEM.

1,396,150.

Specification of Letters Patent.

Patented Nov. 8, 1921.

Application filed June 7, 1919. Serial No. 302,588.

To all whom it may concern:

Be it known that I, HARRY D. WEED, a citizen of the United States, stationed at McCook Field, Dayton, Ohio, have invented an Improvement in Bomb Carrying and Release Systems, of which the following is a specification.

The invention described herein may be used by the Government, or any of its officers or employees in prosecution of work for the Government, or by any other person in the United States, without payment of any royalty thereon.

This invention relates to a system for carrying and releasing aerial bombs.

The principal object of the invention is to design a bomb carrying rig, which will carry two or more sets of bombs, which are arranged in two or more vertical columns, and which are released in such a manner that bombs are alternately dropped from the two sets of bombs, and in such a manner that all of the bombs in a given horizontal row are dropped before any of the bombs in the horizontal row next above is dropped.

It is a further object of this invention to provide a manually operated release for the bombs that will, without putting any burden of selection on the operator, automatically and alternately release bombs from the two sets of bombs, and which will release the lowermost bombs first.

It is a further object of this invention to design a bomb carrying rig for a plurality of bombs, so designed that if only a few bombs are carried by the rig, these bombs will be dropped in proper sequence, even if they are hung on to the rig in any combination whatever. The release mechanism is also designed so that there is no lost motion therein, even if only a few bombs are carried, and even if these few are hung on the rig in any combination whatever.

It is a further object of this invention to provide a manual release that can be set to release any desired number of bombs, this number being preferably a factor of the total number of bombs carried, which must be reset before any more bombs may be released. That is to say, if sixteen bombs are carried, as is the case in the particular design illustrated on the drawings, the manual release may be set to release say, four bombs, after which it must be reset.

Other objects and advantages will appear as the description proceeds.

In the drawings illustrating a preferred embodiment of my invention, in which similar reference characters indicate similar parts,

Figure 1, is a side view of the bomb carrying rig.

Fig. 2, is a front view of the same.

Fig. 3, is an enlarged detail of the hangers that support the bombs.

Fig. 4, is a side view of the same, showing also certain release mechanism.

Figs. 5 and 6 are enlarged details of parts shown in Fig. 3.

Fig. 7, is a plan view of parts shown in Fig. 4, showing in addition the releasing triggers.

Fig. 8, is a section on the line 8—8 of Fig. 7.

Fig. 9, is an enlarged view taken on the line 9—9 of Fig. 2.

Figs. 10 and 11, are enlarged views of trigger details.

Figs. 12 and 13 are side and front views respectively of an operating drum and associated parts, Fig. 12 being taken on the line 12—12 of Fig. 2.

Figs. 14 and 15 are front and side views respectively, of the operating wheel.

Fig. 16 is a diagrammatic view to illustrate the sequence followed in the dropping of the bombs.

The rig of this invention is designed to carry sixteen bombs. These bombs are numbered from 1' to 16' inclusive. They are here shown as arranged in four columns and four rows; it is obvious however that any number of bombs may be carried. This particular rig is a convenient size for a large bomb carrying airplane, such as the Handley-Page machine.

Triggers numbered from 1 to 16 inclusive respectively control the bombs 1' to 16'. These triggers will be described more in detail later.

Four vertical standards 21 arranged in the form of a rectangle are supported from horizontally extending beams 22, which in turn are supported on the beams 23. Attached to and extending between fore and aft pairs of standards 21, are a series of horizontally extending guides 24. Referring now to Figs. 7 and 8 each guide 24

carries a pair of vertically disposed plates 25, extending above and below the edges thereof. A slide 26 slidably engages over each of the plates 25. Each slide 26 is provided with a lug 27 the purpose of which will presently appear. Rod 28 is pivoted at 29, to each of the several slides 26. A slide 26 is provided for each bomb.

A series of brackets 30, each provided with two hooks 31 are rigidly attached to the standards 21 by rivets 32. The brackets 30 are spaced inwardly from the standards 21 by spacer tubes 33. The brackets 30 are provided with suitable apertures through which the several guides 24 pass. The forward series of brackets 30 support the forward points of suspension of the several bombs, while the rear series of brackets 30 support the rearward points of suspension. Each bomb is hung on to its respective pair of hooks 31, by a hanger 34. This hanger 34 is provided with apertures 35 that engage over the hooks 31. The rings 36 on the bomb engage with releasable hooks 37 carried by the hanger 34. The hooks 37 are arranged to be simultaneously released by movement of the latch 38 to the left of Fig. 1. The detailed mechanism by which the movement of this latch effects the simultaneous release of the two hooks forms the subject of a separate application, filed June 7, 1919, Serial No. 302,585.

Referring to Fig. 3, it will be noted that the bombs hang downwardly and outwardly in such a manner that gravity tends to make them bear against the adjacent standard 21, whereby swinging and vibration of the bombs are prevented.

Each trigger 38 projects into the path of one of the already described lugs 27, so that when lug 27 is moved to the left the latch 38 will release the hooks 37 to drop the appropriate bomb.

Associated with each pair of hooks 31 and pivoted at 39 is a plate 40, which when in the position shown in Fig. 5, serves to lock the respective hangers 34 in place on its respective hook 31. Plate 40 is provided with an arcuate slot 41, through which projects a fixed pin 42. A spring 43 is associated with each plate 40, the upper end of said spring being connected to the plate at 44, while the lower end of the spring is connected to the guide 24 at the point 45. Plate 40 may be readily moved to either side by hand to allow the hangers 34 to be hung on the hooks 31. The spring 43 functions to return the plate 40 to the position shown in Fig. 5.

The means for operating the slides 26 will now be described. To each slide 26 is connected a rod 28 which in turn is pivoted to a bell crank 46, which is pivoted at 47 to the standard 41. To each bell crank 46 is pivoted a rod 48, which at its upper end is con-

nected to a trigger at 48'. There are in the present embodiment of the invention sixteen slides 26 and sixteen triggers, one for each bomb. The triggers are numbered from 1 to 16 inclusive, those in one set bearing even numbers and those in the other set bearing odd numbers.

All of the triggers except 13, 14, 15 and 16 are connected to respective rods 48. Triggers 13 to 16 are connected directly to the several rods 28 because they, being on substantially the same level with the rods 28, need no such connecting element as 48 to put them in operative engagement with rods 28.

All of the triggers are of bell crank formation pivoted to move about the axis 49. Each trigger moves in its respective slot 50, these slots being cut in a plate 51, that is held by bolts 52, to a suitable standard. The triggers have an arc of movement of about 30°, as indicated between the dotted and full line positions shown in Fig. 9.

In order to hold each trigger in positive position at either one end or the other of its arc of movement, each trigger is provided with two notches 53 and 54. A spring pressed dog 55 is adapted to engage in either one of these notches to hold the trigger in either the dotted or full line position shown in Fig. 9. The spring pressed dog causes the trigger to be snapped promptly to either one end of the slot 50 or the other. The triggers may be readily moved from one position to the other by hand.

Triggers 1 to 12 are shaped as indicated by the trigger 1 of Fig. 11, while triggers 13 to 16 are shaped like the trigger 13 of Fig. 11. Each of triggers 1 to 12 has an extension 48' which serves as a handle for manual setting of the triggers. Rods 48 are pivoted to this extension 48'. Triggers 13 to 16 have extensions 13' that serve as handles for manual setting of the triggers and have arms 13* to each of which a rod 28 is connected.

The means for tripping the triggers will now be described. Rotatably mounted in bearings 56, which are supported on the beams 22, is a rod 57, the central part of which is square in cross section as indicated in Fig. 9. Mounted to slide longitudinally on the rod 57 is a tube 58, which is provided with disks D and D' at opposite ends thereof. Each disk is provided with a pair of oppositely disposed trigger engaging buttons 59, near its periphery.

A pair of springs 60 attached to disk D' and to the rod 57, function to pull the two disks and tube 58 to the right of Fig. 2. These springs rotate with the rod 57 and tube 58. Tube 58 rotates with the squared rod 57.

It will now be apparent that tube 58 has a longitudinal movement due to the rotation

of the rod 57. The means for rotating the rod 57 will be described later. When the bombs are hung in position as shown in Fig. 2, all of the slides 26 will be pushed to the right of Fig. 4, and all of the triggers will be moved to the full line position as shown in Fig. 9. They are set in this position by hand by manipulation of handles 13' and 48'. It will be apparent then that movement of the triggers in a clockwise direction, as seen in Fig. 9 will cause the release of the bombs.

As has been stated, it is an important object of this invention to alternately release bombs from two sets of bombs, and furthermore, to release all bombs in a given row before any bombs in the row next above are released. The means for effecting these objects will now be described.

The various triggers are set by manually moving them to the position shown in full lines in Fig. 9. In such position each of the slides 26 will be in its extreme right hand position, to the right of its respective latch 38, as shown in Fig. 1. The disks D and D' respectively control the tripping of the even and odd numbered triggers. The spring 60 is normally pulling the disks D and D' to the right so that either one or the other of these disks is always in contact with one trigger of one set of triggers. This being the case, if the tube 58 and the two disks are rotated, it will be apparent that one of the buttons 59 on either disk D or D' will contact with one of the triggers to move it to the dotted line position as shown in Fig. 9, a movement which will pull a slide 27 to the left to release a latch 38 to drop a bomb.

The triggers are so interposed in the paths of the disks D and D' that when the disks D and D' are rotated, after trigger 1 is tripped by disk D', disk D is moved by springs 60, into contact with trigger 2 to trip said trigger, then disk D' moves in contact with trigger 3 to trip this trigger, then disk D moves into contact with trigger 4 to trip that trigger, and so on, triggers 5 to 16 being tripped in regular numerical order. It is apparent therefore that bombs are alternately released from the two sets of bombs.

It should also be noted that the connections to the bombs are such, that all the bombs on a given level are released before any bombs on the level next above are released. All this is attained, it should be noted, through the mechanism used and requires no care on the part of the operator to calculate which bomb to release next.

It should also be noted that if any number of bombs, say for instance five, are hung on to the bomb rig in any haphazard manner that they will be released in proper sequence so that the bombs on a given level are all released before any of the bombs on the

level next above are released. Suppose bombs are hung in the positions 2', 7', 9', 14' and 16', Fig. 2. It is evident that these bombs will be released in numerical order and so that no bomb on a given level is released until all the bombs on the level next below are released.

It should also be noted that there is no lost motion due to some of the bomb carrying positions not being loaded. If any pair of bomb hooks are not loaded with a bomb, the respective slide 26 is pulled to the left of Fig. 4, manually; this moves the corresponding trigger to the dotted line position shown in Fig. 9, a position in which it is clear of the path of disk D or D', as the case may be. The result of this is that disk D or D' skips all inactive or unloaded triggers and comes into contact with an active or loaded trigger, said disk being drawn into such contact by the action of springs 60. That is to say, there is no lost motion, no lost strokes, of the tripping disks D or D'. A bomb is released every half-revolution of the disks, regardless of how the bombs are loaded.

For instance, suppose such an extreme case of loading with only two bombs, as having only positions 2' and 15' filled, all of the others being empty. Then only triggers 2 and 15 will be in the path of disks D and D' respectively, and all of the others will be in the dotted line position of Fig. 9. Disk D will trip trigger 2, then spring 60 will pull tube 58 and the disks all the way over to the right, Fig. 16, skipping all the inactive triggers and contacting with the active trigger 15. Rotation of rod 58 and disk a half revolution will now trip trigger 15 and drop bomb 15'.

If the bombs are hung in two full symmetrical sets, the mechanism releases them in strict alternation. But, if they are not so hung, but are hung in the irregular 2', 7', 9', 14', 16' arrangement described above, it should be noted that 7' and 9', both on one side, are dropped in succession.

The device functions perfectly for any combination of bombs. Suppose, for instance, positions 2', 4', 6', 8', 12' and 16' are filled, that is, suppose the loading is all on one side. The bombs will be released in their numbered order, by disk D. Disk D' and the odd-numbered triggers, 1 to 15, that would be in the dotted position, Fig. 9, and so out of the path of disk D', remain idle. Disk D' would, of course, rotate, but would not trip any triggers.

If bombs #1 and 2, Fig. 2, have been released and in the next operation it is desired to drop four, it is obvious that #3, 4, 5 and 6 will be the next ones to drop, in which case two bombs will be dropped from the first row, and two from the second row; and it is also obvious that those in the first row

will be released prior to the two mentioned in the row above.

It should also be noted that when a bomb is released the hanger will swing to a vertical position, thereby making no interference with the next bomb above when it is released. This is shown in Fig. 3.

In regard to the buttons 59^a, etc., on D and D' it may be noted that if all the triggers are loaded, Fig. 16, button 59^a on D' and 59^a on D only are active in doing any tripping of the triggers. 59^a trips 1; 59^a trips 2 on the next half-revolution; then 59^a trips 3; 59^a trips 4; and so on. 59^b and 59^c are inactive. But suppose more bombs are loaded on one side than the other; that is, suppose 6' and 8' are in position and 7' is not; 59^a trips trigger 6; then on the next half-revolution, 59^c trips trigger 8, that is, both buttons on a given disk function successively to successively trip two triggers in one set of triggers when the trigger in the other set that normally would be tripped in between the tripping of said two triggers, is inactive. In other words, if the even numbered bombs are in position, and none of the odd-numbered bombs are in position, buttons 59^c and 59^a operate successively, on every half-revolution of tube 58, to release a bomb, 59^a and 59^b being inactive.

The means for actuating the rod 57 will now be described. The part 57' at the right hand end of the rod 57 is round instead of square, and on this part is rotatably mounted the drum 61, provided with flanges 62 and 63. A one way clutch is interposed between the shaft 57' and the part 64 of the drum 61 so that when the drum is rotated clock wise as seen in Fig. 12 it will turn the rod 57, but when the drum is rotated in the opposite direction it will not move rod 57. This clutch comprises a dog 65 that engages in a notch 66 in the part 64, one face of said dog being parallel to the axis of the drum 61 while the other face is at an angle thereto. The dog 65 is pressed into engagement with the part 64 by the spring 67. The dog 65 is carried by the element 68, which slidably engages in the notch 69 of the element 70, which is keyed to the rod 57', by the key 71.

A disk 72 provided with notches 73 is fixed to the rod 57'. A dog 74 is spring pressed by the spring 75 to engage in these notches 73 to allow the disk and rod 67 to rotate clock wise as seen in Fig. 12 and to prevent a counter clock wise movement. Flange 62 is provided with shallow notches 76 and 77, within which engages a dog 78, that is snapped into place by the spring 79.

The drum 61 is adapted to have several turns of cable therearound, said cable being, at one point, fixed to said drum by a convenient means such as a screw 80. The parts just described operate as follows: As the drum 61 is rotated in a clock wise direction

by the cable, this movement is transmitted through the clutch to rotate the rod 57', which is a part of the rod 57, and so causes the tripping of the triggers, as already described. The notches 76 and 77 are so positioned that the dog 78 snaps into one or the other of them just after a bomb has been released. This snapping into place of the dog 58 can be distinctly felt by the operator who is operating the cable that is attached to the drum 61. He can therefore tell when the release of a given bomb is completed.

The drum actuating cable is indicated at 81, Fig. 14, where it is shown as making one or more turns around a hand wheel 82 provided with a handle 83, within convenient reach of the operator. Cable 81 is securely attached to the wheel 82 at one point by a bolt 83'. Bolt 83' may be put in any one of a plurality of convenient sockets 83^a.

In order to prevent the operator from turning the handle 82 too much to release an unnecessary number of bombs, a means is provided whereby only a certain number of bombs, say, for instance four, may be released without resetting the hand wheel. To this end two stops 84 and 85 are positioned on the cable 81 on the opposite sides of an aperture in a suitable standard 86 through which cable 81 passes. It will now be evident that only a limited amount of rotation is permitted wheel 82. The extent of this rotation is dependent upon the distance between the stops 84 and 85. The greater the distance, the greater the number of bombs that will be dropped.

When the requisite number of bombs have been dropped and say stop 85 is against standard 86 the mechanism is reset for dropping four more bombs by reversing the direction of rotation of the hand wheel to bring stop 84 against the standard 86, this reverse movement turning the drum 61 in the opposite direction. This opposite movement of drum 61 does not move the rod 57', the one way clutch allowing the backward rotation of the drum 61. The rod 57' is held against backward rotation by the dog 74.

It is customary in bomb dropping work from airplanes, to have a safety release pin in each bomb, which must be pulled out to arm the bomb. I provide means for automatically pulling out the safety release pins, a means which however, does not pull the pin in case the bomb is dropped by accident. This mechanism is described in detail in my co-pending case, filed June 7, 1919, Serial No. 302,587.

Referring now to Fig. 1, four safety release wires are indicated by 87, each wire leading to a safety release pin 88, in its respective bomb. These safety release wires are engaged in a holder 89, which holds them in such a manner that when the bombs are intentionally dropped, the wires will be

tightly held to pull the release pins to arm the bombs, while they will be released by the holder 89 to allow the safety release pins 88 to stay in position if a bomb is accidentally dropped. Any number of holders 89 may be provided, sufficient to hold all the wires 87 from all the bombs that are carried. These holders 89 are controlled, as set forth in my said co-pending application by the rotation of a shaft 90, the rotation of which is manually controlled in any convenient way, such as by a handle 91, Bowden wire 92 and a lever arm 93. As shown in Fig. 2, the shaft 90 may control four of these safety release wire holders 89.

The wheel 82 is preferably provided with means to latch it against accidental rotation, such as a U-shaped latch 94, pivoted at 95 to engage a spoke 96 of the hand wheel.

While in Fig. 2, I have illustrated the carrying of sixteen smaller bombs, the hangers 30 and standards 21 will readily carry twelve large bombs 97, as indicated in the dot and dash lines, Fig. 2.

While I have illustrated a possible embodiment of my invention it should be understood that it may be carried out in other ways, as defined in the following claims.

I claim:

1. In combination, means for carrying two sets of bombs, the bombs in each set being in two vertical columns, and means for releasing the bombs so that they are alternately dropped from the two sets.

2. In combination, means for carrying two sets of bombs, the bombs in each set being in two vertical columns, and means for releasing the bombs so that they are alternately dropped from the two sets, and so that all the bombs on a given level are dropped before any are dropped from the level next above.

3. In combination, two sets of bombs, releasable means for carrying said bombs, two sets of triggers operatively connected to said releasable means, one trigger to each bomb, and means to alternately trip said triggers to drop bombs alternately from the two sets of bombs.

4. In combination, two sets of bombs; releasable means for carrying said bombs, two sets of triggers operatively connected to said releasable means, one trigger to each bomb, and means to alternately trip said triggers to drop bombs alternately from the two sets of bombs, said parts cooperating so that all the bombs on a given level are released before any bombs are released from the level next above.

5. In combination, two sets of bombs, two sets of triggers, a bomb release mechanism controlled by each trigger, an element extending from one set of triggers to the other, and two trigger tripping devices carried by said element, one of said devices for each

set of triggers, said element and said trigger tripping devices cooperating to trip triggers alternately between the two sets of triggers.

6. In combination, two sets of bombs, two sets of triggers, a bomb release mechanism controlled by each trigger, an element extending from one set of triggers to the other, and two trigger tripping devices carried by said element, one of said devices for each set of triggers, said element and said trigger tripping devices cooperating to trip triggers alternately between the two sets of bombs, said parts further cooperating to release all the bombs on a given level before any bombs on the level next above are released.

7. In combination, two sets of triggers a bomb release mechanism controlled by each trigger, an element that is movable longitudinally and is rotary, extending from one set of triggers to the other, two trigger tripping devices carried by said element, one of said devices for each set of triggers, said element and said trigger tripping devices cooperating to trip triggers alternately between the two sets of triggers, the rotary movement of said element serving to cause tripping of the respective triggers, by said trigger tripping devices, the longitudinal movement of said element serving to bring said trigger tripping devices into successive operative engagement with the respective triggers.

8. In combination, two sets of triggers, a bomb release mechanism controlled by each trigger, an element that is movable longitudinally by a spring and is rotatable manually, extending from one set of triggers to the other, two trigger tripping devices carried by said element one of said devices for each set of triggers, said element and said trigger tripping devices cooperating to trip triggers alternately between the two sets of triggers, the rotary movement of said element serving to cause tripping of the respective triggers, by said trigger tripping devices, the longitudinal movement of said element serving to bring said trigger tripping devices into successive operative engagement with the respective triggers, and manual means to rotate said element.

9. The combination as claimed in claim 10, in combination with means to limit the number of bombs that may be released without resetting said manual means.

10. In a bomb carrying mechanism, a set of triggers that may be set in active or inactive positions according as each trigger is or is not, connected to a bomb release mechanism, a bomb release mechanism connected to each active trigger and a trigger tripping device that successively trips each active trigger, said trigger tripping device, during such tripping operation, moving from active trigger to active trigger and skipping the inactive triggers.

11. In a bomb carrying mechanism, means for carrying bombs horizontally and disposed in vertical and horizontal rows, and means to release said bombs, said means releasing all bombs in the lowermost horizontal row before any bomb in the next horizontal row can be released. 10
- 5 releasing all bombs in the lowermost horizontal row before any bomb in the next horizontal row can be released.

12. In a bomb carrying mechanism, means

for carrying a plurality of bombs horizontally and disposed in vertical and horizontal rows, and means to release any number of said bombs, said means releasing all bombs from the lowest row before releasing the bombs in the next row above.

HARRY D. WEED.