

Jan. 20, 1953

G. F. BROWN

2,625,880

BOMB CLUSTER ADAPTER

Filed Sept. 20, 1949

3 Sheets-Sheet 1

FIG. 1

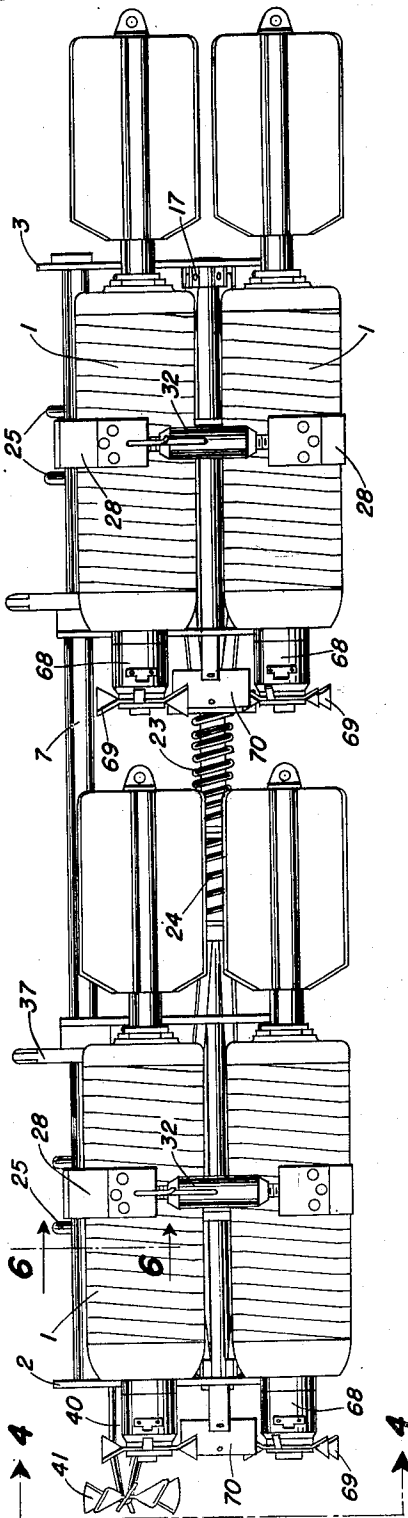


FIG. 5

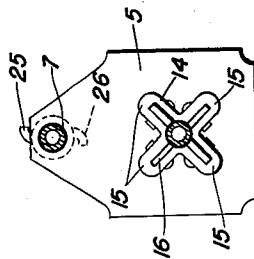


FIG. 4

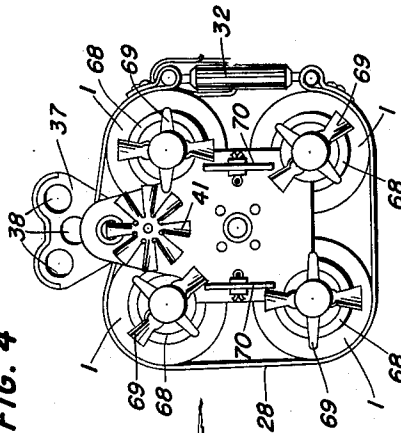
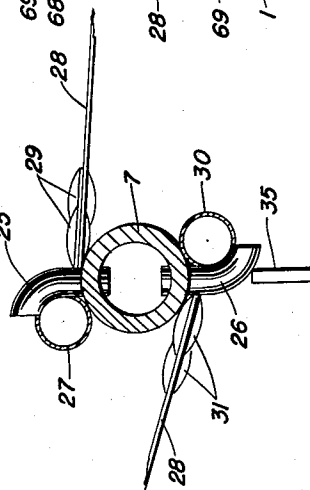


FIG. 6



INVENTOR
GEORGE FORREST BROWN

BY

A. O. O'Brien

ATTORNEY

Jan. 20, 1953

G. F. BROWN
BOMB CLUSTER ADAPTER

2,625,880

Filed Sept. 20, 1949

3 Sheets-Sheet 2

FIG. 3

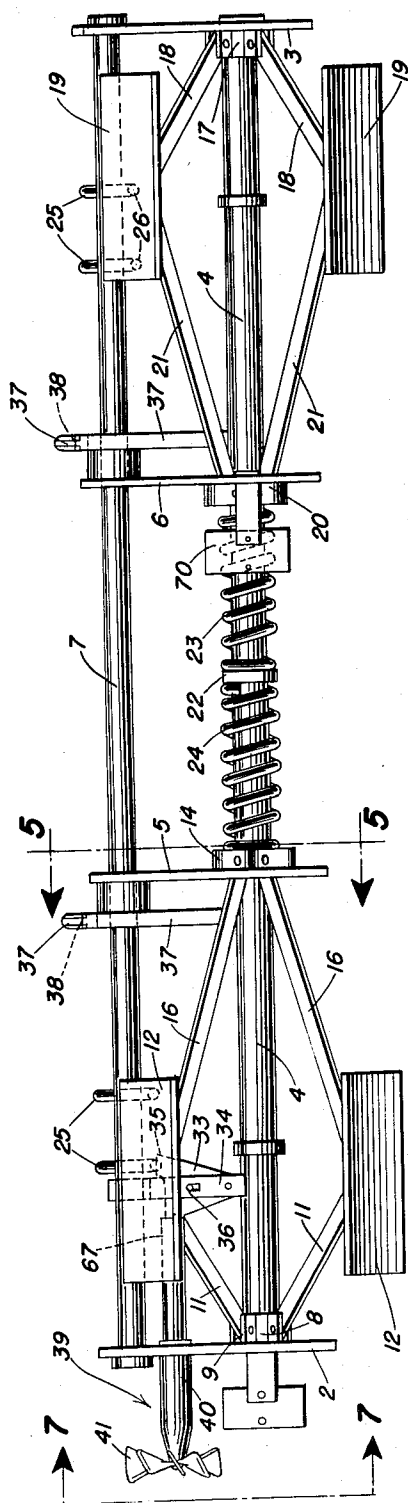
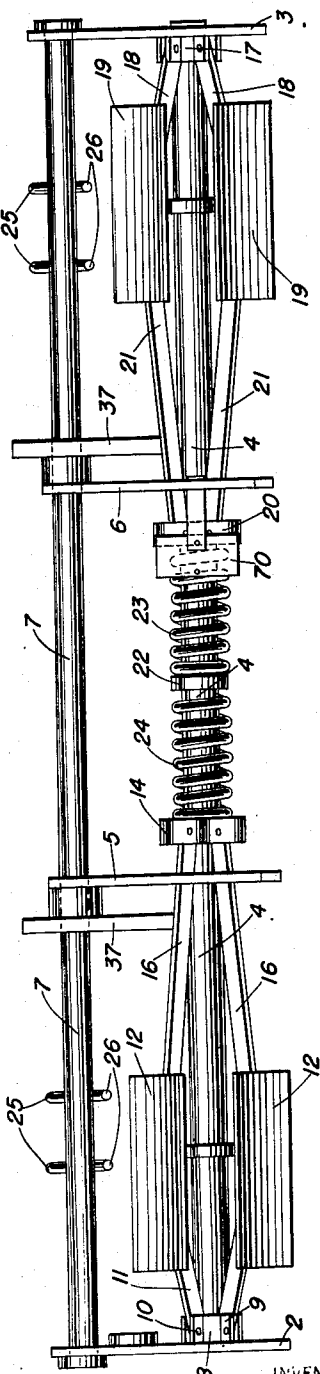


FIG. 2



INVENTOR
GEORGE FORREST BROWN

E. D. O'Brien

BY

ATTORNEY

Jan. 20, 1953

G. F. BROWN
BOMB CLUSTER ADAPTER

2,625,880

Filed Sept. 20, 1949

3 Sheets-Sheet 3

FIG. 7

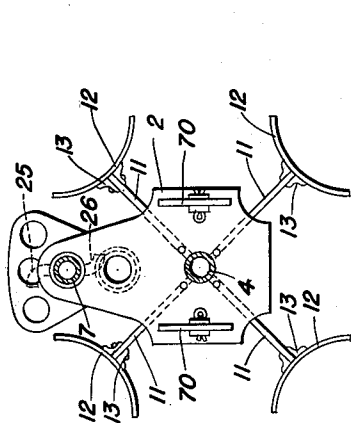
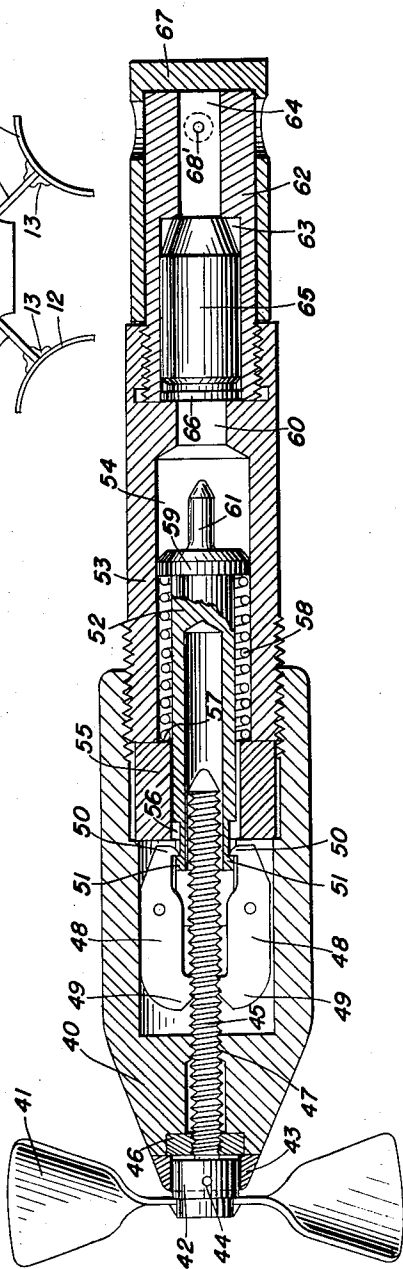


FIG. 8



INVENTOR
GEORGE FORREST BROWN

BY *G. D. O'Brien*
ATTORNEY

UNITED STATES PATENT OFFICE

2,625,880

BOMB CLUSTER ADAPTER

George F. Brown, Shelburne Falls, Mass.

Application September 20, 1949, Serial No. 116,661

5 Claims. (Cl. 102-7.2)

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

1

This invention relates to a bomb cluster adapter and more particularly to a mechanism for mounting a number of bombs in a compact manner so that the bombs can be released from their mounting and separated in space when dropped.

It is desirable in certain bombing operations to cover the target area with a number of small bombs rather than to use only one bomb of larger size. The cluster of smaller bombs should correspond in size and weight with the larger bomb which it replaces so that one bomb support can be used interchangeably for either the cluster or the larger bomb. The release of the individual bombs from the cluster must be timed so that the bombs will not disperse until they have cleared the bomb carrying vehicle.

The individual bombs of the cluster can be a fragmentation type of bomb (such as a 20-pound fragmentation bomb) and can be equipped with arming vanes which will not allow the bomb fuzes to arm until the bombs have been dropped and separated from one another.

Therefore, an object of the invention is to provide a device for carrying a number of small bombs in compact relationship which device will scatter the bombs once they have been dropped.

Another object is to provide a mechanism to prevent the scattering of the individual bombs until the carrying vehicle is a safe distance from the bombs.

A further object of the invention is to provide a bomb cluster that can replace a single bomb of larger size in the carrying vehicle.

A still further object of the invention is to provide a device for scattering bombs while in flight so that a desired target area can be covered with bomb impacts to increase the possibilities of a direct impact on a selected target and to cover the entire area with bomb fragments.

Other objects and advantages will be readily apparent from consideration of the following specification and drawings in which:

Fig. 1 is an elevational view of the bomb cluster of the invention showing the bombs in a position to be loaded into the carrying vehicle;

Fig. 2 is an elevational view of the bomb cluster mechanism in the position ready for projecting the bombs;

Fig. 3 is an elevational view of the bomb cluster mechanism in the position assumed after the bombs have been projected from the mechanism;

Fig. 4 is a front elevational view of Fig. 1 along line 4-4 showing the arming vanes for the pistol release device and for the bomb fuzes;

Fig. 5 is a cross sectional view taken along line 5-5 of Fig. 3;

2

Fig. 6 is a cross sectional view taken along line 6-6 of Fig. 1;

Fig. 7 is a front elevational view of Fig. 3 along lines 7-7 showing the bomb cradles extended; and

Fig. 8 is a central longitudinal sectional view of a pistol release device preferably forming part of the invention.

Referring to Fig. 1, the bombs 1 are shown mounted on the cluster adapter in a position ready for mounting on the carrying vehicle, such as an airplane. In Fig. 2, the cluster adapter mechanism is shown in a position corresponding to Fig. 1 with the bombs removed. The adapter mechanism consists of a front plate 2 and a rear plate 3 separated by and rigidly attached to lower rod 4. Intermediate plates 5 and 6 are likewise rigidly mounted on lower rod 4 for support. The upper rod 7 is free to rotate in openings in plates 2, 3, 5 and 6.

Attached to plate 2 is a bracket 8 provided with four pairs of extensions 9 for receiving within each pair, the end of one of the four arms 11. The pins 10 allow the ends of the arms 11 to pivot within the extensions. One end of each arm 11 is also pivotally attached to one of the four bomb cradles 12 (see Fig. 7) by means of the extensions 13 on each cradle. A bracket 14 is slidably mounted on lower rod 4 and comprises four pairs of extensions 15 (see Fig. 5) for pivotally securing thereto one end of each of the four arms 16. The other end of each of the arms 16 is pivotally attached to a cradle 12. It is therefore apparent that any movement of bracket 14 back and forth along rod 4 will cause cradles 12 to move toward and away from rod 4 because of connecting arms 11 and 16.

At the rear end of rod 4, a bracket 17 is rigidly attached to plate 3 and pivotally mounts one end of each of the four arms 18. The other end of each arm 18 is pivotally attached to a cradle 19. A bracket 20 is freely slidable on rod 4 and pivotally mounts one end of each of the four arms 21, the other end of arms 21 being pivotally attached to cradles 19. The construction at the rear end of rod 4, for moving cradles 19 toward and away from rod 4, is similar in all respects to the construction at the forward end of rod 4 for obtaining movement of cradles 12.

Located at the center of rod 4 and rigidly attached thereto is a separator 22 which separates springs 23 and 24 and provides a bearing surface for each spring. One end of spring 24 bears against bracket 14 and tends to force bracket 14 against plate 5. In a like manner, one end of spring 23 bears against bracket 20 to force bracket

20 against plate 6 (see Fig. 3). In the normal position of the cluster mechanism, before the bombs are attached, the cradles assume a position away from rod 4.

On the upper rod 7 are rigidly attached two pairs of band hooks, each hook comprising an upper rod section 25 (see Fig. 6) and a lower rod section 26. Both rod sections have one end inserted through an opening in rod 7. The two upper rod sections 25 of each pair of band hooks are curved to receive a pin 27, which is attached to one end of a band 28 by use of rivets 29. The two lower rod sections 26 of each pair of band hooks are curved to receive a pin 30 which is attached to the other end of band 28 by means of rivets 31.

When it is desired to load the bombs 1 on the cluster adapter, the cradles 12 and 19 are moved toward rod 4, into the position shown in Fig. 2, by compressing springs 23 and 24. The four cradles at each end of rod 4 are placed 90° apart as shown in Fig. 7. The bombs are then placed in the cradles and bands 28 are placed around the bombs, with pins 27 and 30 held by rod sections 25 and 26 respectively of each pair of band hooks. Each band 28 has a turnbuckle 32 for tightening the bands around each group of four bombs.

During the time the bombs are loaded on the cluster adapter, the rod 7 and the band hooks are prevented from turning by a king pin 33, pivotally mounted between two members 34 (only one of which is shown) attached to the upper and lower rods. The king pin 33 has a projection 35 which contacts the lower rod section 26 of the forward band hook (see Fig. 6) to prevent the tension on bands 28 from rotating rod 7. A shear wire 36 extending through the king pin 33 and mounting members 34 normally holds the projection 35 in contact with lower rod section 26.

The cluster adapter mechanism, carrying the bombs, is supported from the carrying vehicle by two suspension plates 37, attached to both the upper and lower rods. Holes 38 are provided in both plates 37 to receive the mounting structure, such as an airplane bomb rack.

Mounted in the forward plate 2 is a pistol release device 39 which operates to move king pin 33 out of position so that the bombs 1 may be released. The pistol release device is shown in detail in Fig. 8 and comprises a casing 40 mounting an arming vane 41 at its forward end. The arming vane carries a cylindrical member 42 which is normally received within section 43 of casing 40. An arming pin 44 extends through section 43 and cylindrical member 42 to prevent vane 41 from rotating until the bomb cluster is dropped from the carrying vehicle. An extended screw 45 is attached to member 42 and coacts with threaded sections 46 and 47 in the forward end of casing 40. Pivotaly mounted in the opening of casing 40 are two detents 48 having forward ends 49 which normally bear against screw 45. The rear projections 50 on detents 48 coact with projections 51 on firing pin 52.

The threaded opening in the rear end of casing 40 receives a cylindrical member 53 having a bore containing the firing pin 52. The forward section 55 of member 53 has a bore 56 of slightly smaller diameter than bore 54 to provide a bearing surface 57 for one end of spring 58. The firing pin 52 has a collar 59 which rides in the bore 54 and provides a bearing surface for the other end of spring 58. It is therefore apparent that spring 58 tends to force the firing pin in a rearward direction and the firing pin is held against this spring force by the rear projections 75

50 on detents 48. The member 53 has a bore 60 for receiving the projection 61 on the collar 59 of the firing pin.

Threaded into the rear end of member 53 is a cylindrical member 62 having a bore 63 and a small bore 64. Within the bore 63 is located a cartridge 65 having a detonator 66. The detonator faces the bore 60 in the member 53. A piston 67 is slidably mounted on cylindrical member 62 and is retained on the member 62 by use of a shear pin 68' which passes through the member 62 and the piston 67. As shown in Fig. 3, the piston 67 normally abuts against the edge of king pin 33 prior to the scattering of the bombs. The bombs 1 carry fuzes 68 which have arming vanes 69. Safety stops 70 are attached to plates 2 and 6 and are positioned in the path of the arming vanes 69 to prevent the vanes from rotating until the bombs are separated from the cluster mechanism.

The operation of the cluster adapter mechanism will now be explained. The bombs 1 are first placed on the cradles 12 and 19 and the bands 28 are placed around each group of four bombs. The pins 27 and 30 are placed in the band hooks and the turnbuckles 32 tightened to force the forward lower rod section 26 against projection 35 on king pin 33. The springs 23 and 24 are placed under compression and the bombs and cradles are positioned near rod 4. The cluster adapter can then be mounted on the carrying vehicle by use of suspension plates 37.

When the bomb cluster is dropped, the arming pin 44 is pulled, allowing arming vane 41 to rotate and unscrew the extended screw 45 from the casing 40 at the forward end. As soon as the rear end of screw 45 clears the ends 49 of detents 48, the ends 49 will be forced together and the ends 50 of detents 48 will move out of contact with projections 51 on the firing pin 52 due to the pressure of spring 58 on collar 59. The time required for the end of screw 45 to clear the forward ends of the detents is sufficient to allow the bomb cluster to drop a safe distance from the carrying vehicle. When the detents 48 no longer hold the firing pin, the pin will be driven rearwardly and projection 61 will strike the detonator 66 and explode cartridge 65. The resulting pressure developed in bore 64 against piston 67 will cause the piston to shear pin 68' and be driven rearwardly against king pin 33.

The force of piston 67 against king pin 33 is sufficient to sever shear wire 36 and to move projection 35 out of the path of the forward rod section 26. The tension in bands 28 and the force of springs 23 and 24 against the bombs will cause the bands to rotate rod 7 until the band hooks are in a position to free pins 27 and 30. When the bands are freed, springs 23 and 24 on the lower rod 4 expand and, acting through the lever arms 16 and 21, push outboard on all the bomb cradles, forcing the bombs away from the cluster. Since the bombs are projected in four different directions, their points of impact will be scattered in order to cover a large target area. The strength of springs 23 and 24 which scatter the bombs can be varied to vary the resulting impact area of the bombs.

As soon as the bombs leave the cluster adapter mechanism, the arming vanes 69 are free to turn since they are no longer blocked by safety stops 70. The fuzes 68 are therefore armed previous to impact.

A novel device has been described which provides a novel manner of loading a number of bombs in a compact manner and for scattering

5

the bombs before impact. It should be understood, of course, that the foregoing disclosure relates to only a preferred embodiment of the invention and that numerous modifications or alterations may be made therein without departing from the spirit and the scope of the invention as set forth in the appended claims.

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

What is claimed is:

1. In a bomb cluster adapter mechanism of the character described, a central frame member, individual cradles against each of which a different one of a plurality of bombs is adapted to be rested, individual toggle linkages mounted on said central frame member each supporting a different one of said cradles and adapted upon toggle movement thereof to radially displace said cradles toward and away from said central frame member, articulating means connecting said individual toggle linkages for equalizing their toggle movements, spring biasing means acting against said toggle linkages to urge said cradles away from said central frame member, binding means normally maintaining the bombs against the cradles with said cradles displaced toward said central frame member, and means disrupting the binding means thus to remove restraint from the bombs and permit their projection away from said mechanism by said spring urged cradles.

2. In a bomb cluster adapter mechanism, a plurality of cradles each for carrying a bomb, a rod embodied in the mechanism around which rod the cradles are assembled, a fixed and a slidable bracket spaced along the rod, a linkage mounting each bomb cradle consisting of diverging arms pivoted at their near ends to the cradles and at their far ends respectively to the fixed and slidable brackets, spring means exerting pressure on the slidable bracket to tend to lessen the distance between the far ends of the arms, a band surrounding the bombs carried by said cradles to normally maintain the spring bias against each linkage, and means for releasing said band to allow said spring means to move said linkages and cradles in order to project said bombs radially outward from said mechanism.

3. In a bomb cluster adapter mechanism for carrying groups of bombs, a rod having at each end a bracket member fixed relative thereto, two bracket members positioned on said rod intermediate its ends and slidable relative thereto, each end bracket being attached to one of

6

said intermediate brackets by four pairs of lever arms positioned at 90° intervals around the brackets, each pair of said lever arms carrying a bomb cradle for receiving a bomb, a separator located at the center of said rod to provide a bearing surface for two springs surrounding said rod and located on opposite sides of said separator, each of said springs having a second bearing surface on one of said intermediate brackets to bias said intermediate brackets away from said separator, a band surrounding each group of bombs in a position so that each pair of lever arms is extended to compress the two springs, and means for releasing said bands to allow said springs acting against said pairs of lever arms to project the bombs away from said adapter mechanism.

4. In a bomb cluster adapter mechanism, a plurality of cradles for carrying bombs, spring biasing means for biasing said cradles in a direction outwardly from said mechanism, a band surrounding said bombs carried on said cradles to normally maintain the bias on said cradles, a pin secured to each end of said band, a freely rotating rod carrying a pair of band hooks for receiving each of said pins on said band, a king pin normally in contact with one of said band hooks to prevent said rod from rotating due to the tension of said band, and means for moving said king pin away from said one band hook to allow said rod to rotate to a position such that said pins separate from said band hooks and allow said cradles to project said bombs outwardly.

5. In a bomb cluster adapter mechanism, a spring biased firing pin for detonating a cartridge, a piston moved by the detonation of said cartridge to release said bombs, means for sustaining a plurality of bombs in a cluster consisting of an encompassing band having terminal pins, turnable means situated between the pins and having outwardly extending means to obstruct the pins and so hold the band tight, and latch means confronting said piston and temporarily engaging at least one of the outwardly extending means.

GEORGE F. BROWN.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,346,177	Chanard	July 13, 1920
2,071,594	Trimbach	Feb. 23, 1937
2,342,523	Baxter	Feb. 22, 1944
2,346,494	Leland	Apr. 11, 1944