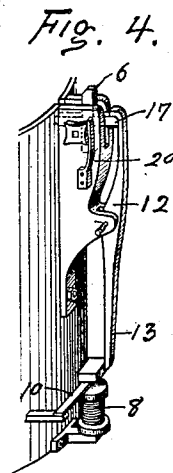
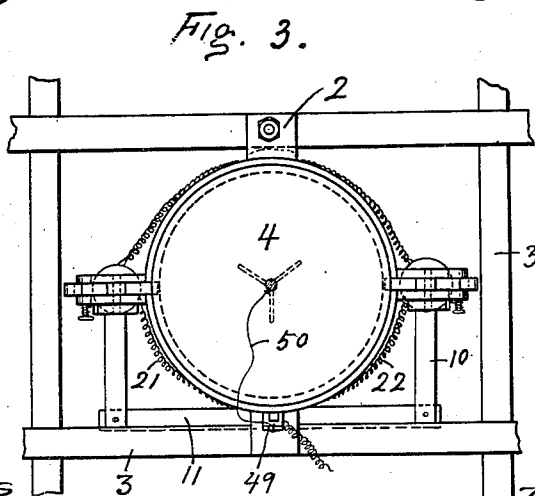
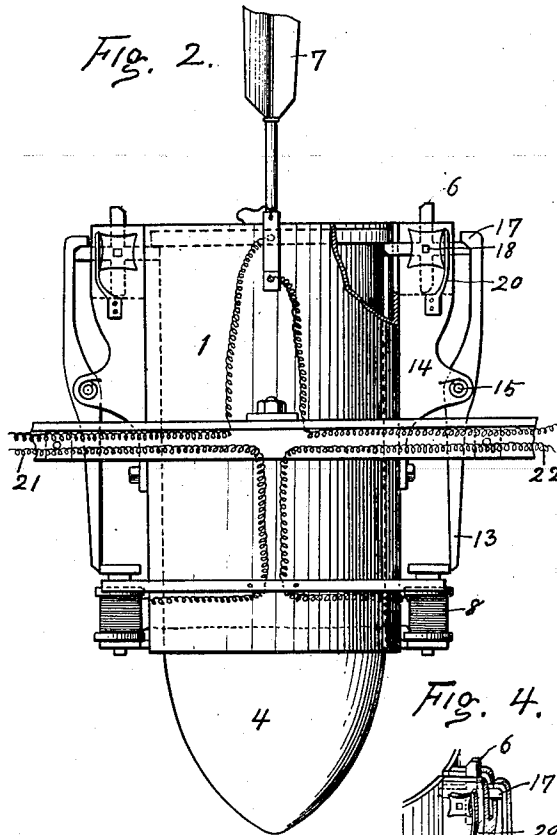
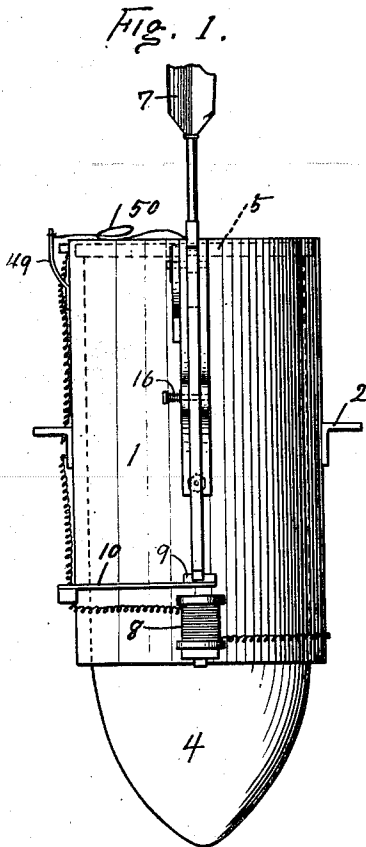


T. YOSHIDA.
BOMB DROPPING APPARATUS FOR AEROPLANES OR AIRSHIPS.
APPLICATION FILED OCT. 14, 1916.

1,290,858.

Patented Jan. 7, 1919.

2 SHEETS—SHEET 1.



Witnesses

C. H. Heller
C. Reginald Culligan.

Inventor
Toshio Yoshida

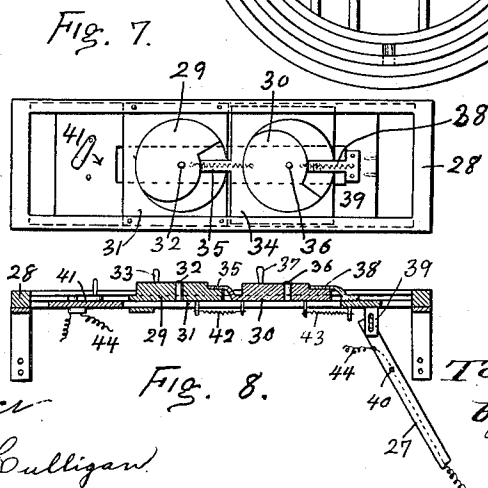
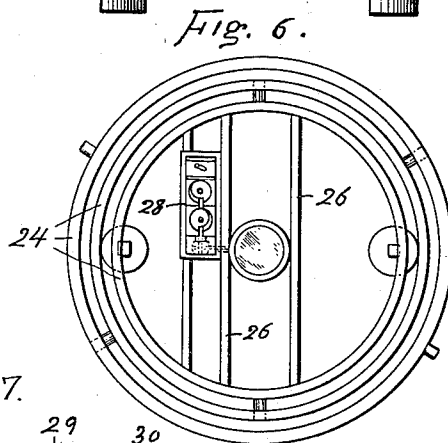
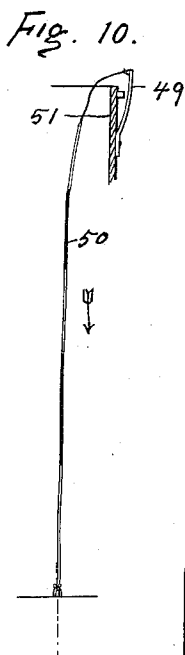
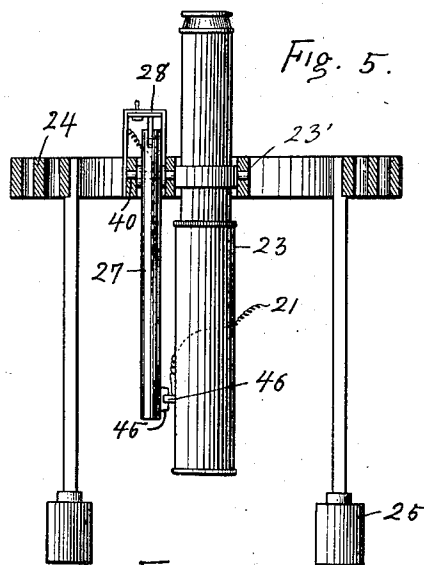
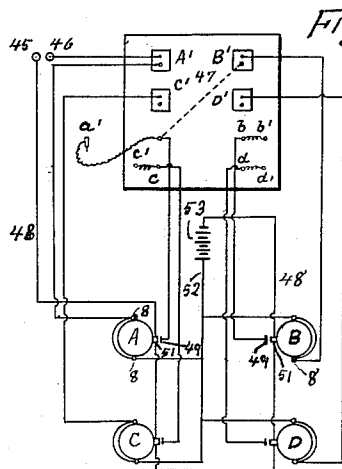
by *Amos L. Norris*
Attorney

T. YOSHIDA.
BOMB DROPPING APPARATUS FOR AEROPLANES OR AIRSHIPS.
APPLICATION FILED OCT. 14, 1916.

1,290,858.

Patented Jan. 7, 1919.

2 SHEETS—SHEET 2.



Witnesses

C. D. Mesler

C. Reginald Culligan

Inventor
Toshio Yoshida

by *James L. Norris*
Attorney

UNITED STATES PATENT OFFICE.

TOSHIO YOSHIDA, OF KOISHIKAWA-KU, TOKYO, JAPAN.

BOMB-DROPPING APPARATUS FOR AEROPLANES OR AIRSHIPS.

1,290,858.

Specification of Letters Patent.

Patented Jan. 7, 1919.

Application filed October 14, 1916. Serial No. 125,706.

To all whom it may concern:

Be it known that I, TOSHIO YOSHIDA, subject of the Emperor of Japan, residing at No. 75 Zoshigayacho, Koishikawa-ku, Tokyo, Japan, have invented new and useful Improvements in Bomb-Dropping Apparatus for Aeroplanes or Airships, of which the following is a specification.

This invention relates to a novel apparatus for dropping a bomb or bombs or the like from an aeroplane or airship and its object is to insure the hit of a bomb on an object or to drop bombs successively in a limited locality by a certain novel arrangement of a sight to be laid in accordance with the speed and height of the airship and of the special dropping mechanism to be actuated electrically when the airship reached a proper point.

In the accompanying drawings;—

Figure 1 is an elevation of a case carrying a bomb; Fig. 2 is a side view and Fig. 3 is a plan view thereof respectively; and Fig. 4 is a detail of the actuating lever and the mechanism connected thereto.

Fig. 5 is a vertical sectional view of the sight; Fig. 6 is a plan thereof; Fig. 7 is a plan of the laying gear; and Fig. 8 is a vertical sectional view thereof.

Fig. 9 shows diagrammatically the arrangement for dropping a series of many bombs in succession and the actuating means therefor.

Fig. 10 is a detail of the cord connecting the case and the bomb.

Corresponding and like parts are indicated in all the views of the drawings by the same references.

In Figs. 1 to 4, 1 designates a carrying case of a bomb 4 and is attached to a suitable portion of an aeroplane or airship by a frame 3, to which latter the case is fastened by means of its ears 2.

The bomb 4, having a flange 5, is removably held by a support 6 pivoted to the case 1, by the engagement of the said support with the flange 5. 7 is a guide vane attached to the bomb.

8 is an electromagnet and 9 its armature. The armature 9 is supported by a spring 10, one end of which is fixed to a rod 11 and this armature is situated properly between the lower end 13 of lever 12 and the case 1.

The lever 12 is pivoted by a pin 15 to a

bracket 14 fixed to the case 1, the lower end 13 being forced normally outwardly by a spring 16. At the upper end of the lever 12, a hook 17 is formed to engage with the beveled top of the support 6, so as to permit the said hook to be readily disengaged from the support 6 when the lower end 13 of lever 12 is released from the engagement with the armature 9.

The supports 6 are in the form of arms radiating from a block fixed on a shaft 18, to the ends of which square blocks 19 are attached. These square blocks are held against accidental movement by resistance springs 20 fixed to the bracket 14. 21 and 22 are wires connecting the coils of the electromagnets to a source of electric current. The foregoing construction is duplicated at opposite portions of the case 1, as clearly shown.

By the above mentioned construction, it will be obvious that, if the operator connects the wires 21 and 22 to a source of energy, the magnets 8 will be energized and the armatures 9 having been pulled by the said magnets 8 will release the lower ends 13 of the levers 12 thereby withdrawing the upper hooks 17 of the said levers from the beveled upper surfaces of the arms of the supports 6. The bomb 4 will drop and rotate the supports 6.

When the supports 6 rotate a quarter revolution, the springs 20 will check the rotation of the supports 6 by engaging the next faces of the square blocks 19. If the operator stops the supply of the current, the springs 16 will cause the levers 12 return to their normal positions and the armatures 9 will engage to the lower ends of the levers 12 and at the same time the hooks 17 engage with the next arms of the supports 6.

In Figs. 5 to 8, 23 is a telescope supported by the beam 26 on a suitable stabilizer which is a well known form consisting of rings 24 and weights 25 for such apparatus, and the telescope may swing on the trunnion 23' in a plane parallel to the sight 27.

The sight 27 is to be laid in accordance with the speed and the height of the airship and for this purpose, a laying board 28, a "speed cam" 29 and a "height cam" 30 are provided on the stabilizer.

The speed cam is pivoted by a pin 32 to a plate 31 fixed on the board 28 and may be

rotated by a handle 33. An arm 35 of the plate 34 of the height cam engages with the face of the speed cam 29 by the spring 42, to cause the plate 34 to slide on the board 28 when the speed cam is rotated.

The height cam 30 is pivoted by a pin 36 to a plate 34 and it may be rotated by a handle 37. An arm 38 of a sliding plate 39 engages with the face of the height cam 30, to cause the plate 39 to move on the board 28 when the height cam is rotated. By these constructions, the sliding plate 39 may be placed at a necessary point on the laying board by adjusting the positions of the cams 29 and 30.

The sight 27 is connected to the sliding plate 39 by a slot and pin and is held on the stabilizer by the trunnion 40. Hence the sight 27 may be fixed at a proper position when the sliding plate has been adjusted by the cams 29 and 30.

41 is a switch, one member of which is connected to a contact 45 on the sight 27 by the wire 44. On the telescope a contact 46 is provided to close a circuit for the wires 21 and 22 when it comes into engagement with the contact 45 on the sight 27.

The aeroplane or airship equipped with the improved apparatus must move through a vertical plane passing through the object below desired to be attacked and the operator must adjust the sight beforehand in accordance with the speed and the height of the airship.

If the operator looks always at the object through the telescope the latter will swing on its trunnion 23' according to the progress of the airship, and when it reaches a proper point the contact on the telescope will come into engagement with the contact on the sight. By this engagement of the contacts, the bomb will be dropped by the action of the mechanism described above referring to Figs. 1 to 4. The switch 41 is provided to avoid dropping of the bomb when not required.

Figs. 9 and 10 show an apparatus adapted to drop a number of bombs successively at predetermined intervals. The number of bombs may be multiplied as may be desired, and in Fig. 9 four bombs are shown arranged for successive release.

In Fig. 9, A, B, C and D show the positions of the cases carrying bombs and each of them is constructed as described in Figs. 1 to 4. 47 is a switch board located near to the operator. A', B', C' and D' are switches for the coils of the electromagnets of the cases and *a*, *b*, *c* and *d* are the connecting posts and *a'*, *b'*, *c'* and *d'* are the keys to connect the posts *a*, *b*, *c* and *d* with the switches A', B', C' and D'.

45 and 46 are the contacts on the sight and the telescope and the contact 46 is connected to the switch A'. One terminal of

the coils of the electromagnets of all the cases is connected to a terminal of the source of current 53 by a common wire 52 and the remaining terminals of the coils are connected to the switches A', B', C' and D' respectively.

Each case has a spring contact 49 near the top and a cord 50, having a proper length for the predetermined interval of drop, is connected between the contact 49 and the bomb, and all these spring contacts 49 are connected to the posts *a*, *b*, *c* and *d* respectively.

A lug contact 51 is provided on each case adapted to engage with the spring 49 when the cord 50 is stretched and all these lug contacts 51 are connected to another terminal of the source of current 53 by a common wire 48.

By the above mentioned construction, if the contact 45 comes into engagement with the contact 46, a circuit from the contact 45, passing through the wire 48, the source of current 53, the wire 52, the coil of the case A, and the switch A' to the contact 46 will be closed and the bomb carried by the case A will be dropped.

To automatically drop the bomb B in succession relatively to the bomb A, it is only necessary to connect the post *a* to the switch B' by the key *a'*. When the bomb A drops a distance equal to the length of the cord 50, the pulling stress on the cord will cause the spring contact 49 to engage the contact 51. Then the circuit from the switch B', by way of the post *a*, contacts 49, 51, the common wire 48, the source of current 53, the common wire 52, and the coil on the case 1, to the switch B' will be closed and consequently the bomb B will be dropped.

The length of the cord 50 is to be adjusted according to the required intervals of the drops in succession and it must be cut off by its own weight or other suitable means after it has been stretched.

To drop another bomb, for example the bomb B, it is only required to first connect the contact 46 with the switch B'.

If all the keys *a'*, *b'*, *c'* and *d'* are connected in any desired order to the switches A', B', C' and D' beforehand, then all the bombs A, B, C and D will drop in succession in the identical order with intervals predetermined by the length of the cords.

The foregoing apparatus embodying the features of the invention has the following advantages: (1) no skill is required because the operator has to close only the circuit when he reached a proper point; (2) as the sight is laid beforehand, it will lessen the chance of misses; (3) a bomb or bombs may be placed in any desired position apart from the operator; (4) any number of bombs may be dropped in succession in a limited locality at predetermined intervals;

(5) the stability of the airship will never be disturbed if the order of bombs to be dropped is chosen properly.

If desired, a box containing stone or the like may be carried by the case instead of the bomb and the box may be opened by the electromagnet as above mentioned.

It must be understood that the mechanism may be modified in various ways without any change of the spirit of this invention.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is;

1. In a bomb dropping apparatus for aeroplanes or airships, the combination with speed and height cams, of a sight to be laid in accordance with the speed and height of the airship and provided with an electrical contact, a telescope swinging in a plane parallel to the sight and also provided with an electrical contact to engage the contact of the sight, a case disposed to permit a bomb to drop therefrom and having oppositely arranged bottom engaging electrically controlled means, and an electrical circuit including electro-magnets for operating the said electrically controlled means to release the bomb from the case, the said circuit being closed by engagement of the contact of the sight with the contact of the telescope when the aeroplane or airship reaches a proper point above an object to be attacked.

2. In a bomb dropping apparatus for aeroplanes or airships, a laying board having a plate fixed thereto and provided with a pivoted speed cam, a movable plate on the laying board having a height cam pivoted thereto; a sliding plate on the laying board actuated by the cams to move on the latter, a sight connected to the sliding plate and provided with an electrical contact, a telescope swinging in a plane parallel to the sight and also provided with a contact to engage that of the sight, a case for holding a bomb and from which the said bomb is dropped when released, and electrical connections and electrically controlled devices between the sight and telescope and the case and operating to hold and release the bomb in the case, the bomb being released when the contact of the telescope engages the contact of the sight to close the circuit.

3. In a bomb dropping apparatus for aeroplanes or airships, means for holding a number of bombs, a sight laid in accordance

with the speed and height of the airship, a telescope swinging in a plane parallel to the sight, the sight and telescope having electrical contact devices for engagement with each other, and electrical connections and electrically controlled devices between the sight and telescope and the means for holding a number of bombs and operable to automatically release the bombs in succession after any one of the bombs has been dropped from the said means.

4. In a bomb dropping apparatus for aeroplanes or airships, the combination of bomb holding means embodying cases for carrying a number of bombs for successive release, electrically controlled devices for temporarily holding the bombs in the cases, an electrical circuit including a source of electrical energy connected to said electrical devices and adapted to release each bomb from its case, a contact device on each case in electrical connection with said source of electrical energy, a spring device also on each case to engage said contact, and a cord connected to each spring device and also attached to the bomb in the corresponding case, the engagement of the spring with the contact on each case closing the circuit to release bombs in succession from the cases.

5. In an apparatus of the class described for an aeroplane or airship, the combination of a containing means for bombs, electrically controlled devices for temporarily holding a bomb in the containing means, a sight to be laid in accordance with the speed and height of the airship, a telescope mounted to swing in a plane parallel to the sight, the said sight and telescope having electric circuit-closing means in the circuit of said electrically controlled devices, the containing means being provided with a contact device, a circuit closing means on the containing means and to which the bomb is connected and operable by the latter when dropped a certain distance below the said containing means, and caused to engage said contact device, and electrical connections for the circuit closing means on the containing means.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

TOSHIO YOSHIDA.

Witnesses:

T. KUSAHA,
H. F. HAWLEY.