E. S. HALSEY.

AUTOMATIC BALLOON DISTRIBUTING SYSTEM.

APPLICATION FILED AUG. 12, 1918.

1,286,178. Patented Nov. 26, 1918.

Fig. 1.

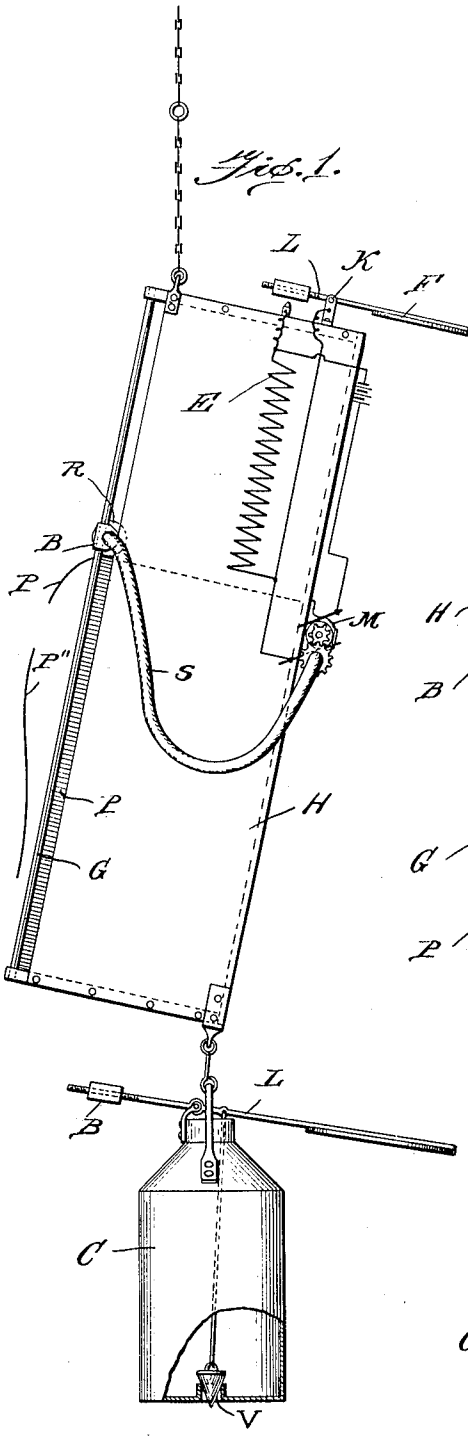


Fig. 2.

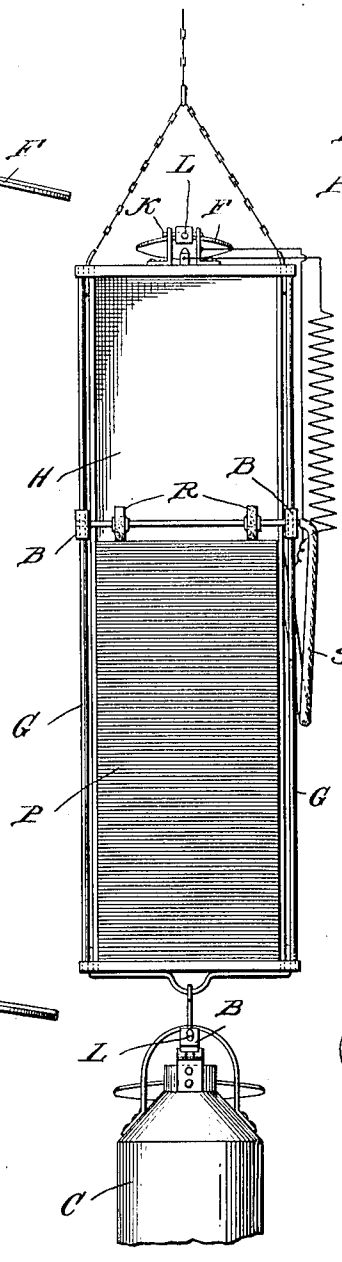
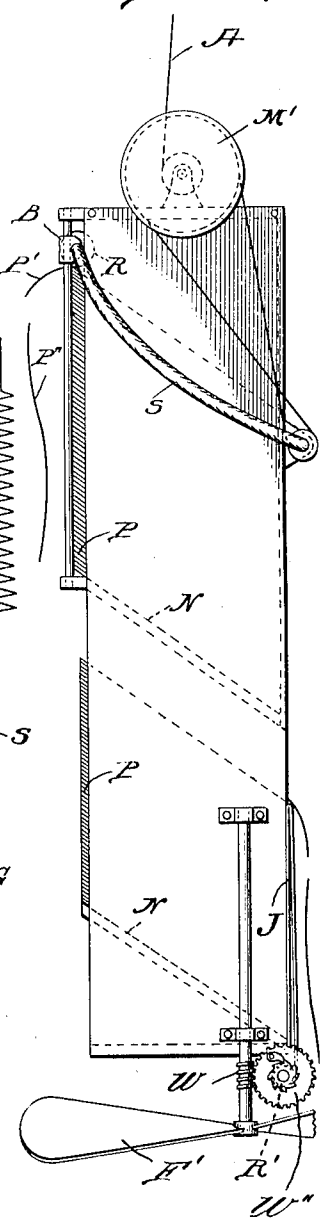


Fig. 3.



Inventor

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AUTOMATIC BALLOON DISTRIBUTING SYSTEM.

1,286,178. Specification of Letters Patent. Patented Nov. 26, 1918.

Application filed August 12, 1918. Serial No. 249,489.

To all whom it may concern:

Be it known that I, EDWARD S. HALSEY, a citizen of United States, and resident of Takoma Park, in the District of Columbia, have invented certain new and useful Improvements in Automatic Balloon Distributing Systems, set forth by the following specifications and claims.

My invention relates to an automatic scattering of literature, or other matter, by free unmanned balloons over enemy territory in times of war, or may be used for advertising purposes.

It is a well-known fact that a free, open, balloon, if liberated and left to its natural course, will, upon arising, describe an arc, or semi-circle, descending again to the earth within the course of an hour or so. The only known means of effectually overcoming this, other than manual discharge of ballast at critical moments by a pilot, are, a trailing ground rope, or equivalent.

Some effort has been made to neutralize this natural tendency to descend by discharging bundles of literature at several periods by time fuses, but as there was no definite coördination between the time of weight liberation and the descending period, this has met with very little success. Another expedient, which has met with limited success, is a receptacle of water ballast, with a small outlet having a constant trickling stream of water therefrom.

The nature of my invention is a hopper holding a large quantity of material or literature, suspended from a free floating balloon, and equipped with a motor means for progressively discharging of this material, preferably at a continuous and sufficient rate, to fully compensate for the natural diffusion of gas from the balloon, thus neutralizing its tendency toward descent, and encouraging an upward inclined course, while simultaneously securing the benefits of an even distribution of material.

The objects of my invention are to accomplish this uniform and widespread scattering of material in the most economical manner possible, by a very simple, economical, automatic equipment, which will sustain the balloon in flight over a course of from two to seven hundred miles without a pilot or a risk of life.

Referring to the drawings which illustrate my invention, similar letters refer to similar parts throughout the several views, in which Figure 1 is a side elevation in diagrammatic sketch of my preferred form of literature hopper, with controlling and operating devices attached, as would hang from a balloon; Fig. 2 is a front view thereof, looking at the open side from which the stack of literature projects and from which the sheets are discharged; while Fig. 3 illustrates another modification of my invention.

Referring again to my preferred form, as shown in Figs. 1 and 2, the hopper, H, is a three-sided box made of heavy cardboard or wood veneer, with top and bottom heads nailed in. Into this the paper sheets, P, are stacked. These views show the stack to occupy a little over half of the height of the hopper. In my commercial machine the hopper, when completely full, holds about 10,000 sheets.

The twin roller, R, is carried on a light shaft, mounted in sliding bearings, B, that travel up and down the full height of the hopper on a pair of guide rods, G. This roller rests of its own weight on top of the stack of paper, and in my preferred form is driven through the medium of the flexible shaft, S, by a small motor, M, mounted on the back of the box, but may be driven through any other suitable kind of gear.

When the hopper is stacked full of literature, the feed roller rests on the front top edge thereof, and as it revolves it feeds out the sheets one by one, descending progressively as the stack diminishes, until the bottom circulars are discharged. P′ indicates a sheet of paper in the process of being discharged by the roller, while P″ indicates a circular after it is dropped from the box.

I prefer to time my motor so as to discharge about seven a minute, which I find ordinarily neutralizes the natural diffusion of gas, but as a balloon flight is subject to many sudden contractions, such as cold currents, entrance to clouds, disappearance of the sun, or descending air current, I find it necessary, in order to sustain a sufficient minimum altitude and constant equilibrium to provide automatic means to promptly check any of these descending effects before any material momentum is gained, and I accomplish this in two ways: first, by accelerating the rate of discharge of the circulars upon the slightest tendency to descend, and secondly, by automatic ballast release, of such inert matter as water or sand.

Figs. 1 and 2 illustrate one means of

accelerating the rate of paper discharge, consisting of a nicely poised fan, F, rocking on the pivot, K, which has an electric circuit shunting the resistance, E, so connected that when the fan is raised by the slightest descent the lever, L, contacts with the resistance terminal, thereby cutting out the resistance and speeding up the motor for a few moments, until balloon's tendency to descend is arrested.

I use the water ballast, suspended from the bottom of the hopper, in the can, C, partly to coöperate with the former means, where the tendency to descend is excessive, but more especially to regulate the flight of the balloon for the first few hours of the flight, when it is desired to cross neutral territory or a body of water before starting the literature feed. In such cases the starting of the motor is accomplished by closing the electric circuit by alarm clock mechanism, not shown.

This automatic water ballast, which I have devised, consists of a can, C, with a V valve in the bottom, connecting, up through the center of the can, with a pivoted lever, L, having an air fan at its outer end, and nicely counterbalanced by the weight, B, so that a descent of a few feet through the air would raise the valve promptly to drop ballast, and the valve will close again immediately as soon as the tendency to descent is arrested.

Referring to the modification shown in Fig. 3, the hopper is divided into two sections, each provided with a separate stack of paper. The bottom of each section is constituted by a slanting bottom board, N, which gives the paper a tendency to slide down against the back of the box, giving an equivalent effect to the slanting suspension effect, shown in Fig. 1. I often use both expedients in my preferred form, to prevent the paper from being thrown forward and pitched out in launching.

In Fig. 3 the upper portion of the apparatus is operated in an equivalent manner to that of Fig. 1, by a discharge roller driven by a flexible shaft, but in this modification the flexible shaft is driven by a gravity motor M′ consisting of a spool of wire pivotally mounted on the top of the box. The free end of this wire, A, acts as the suspension for the whole apparatus by being attached to the balloon, and as the weight of the machine tends to unwind this wire, by running away from the balloon, it drives the flexible shaft through a belt and multiplying pulleys, or other gearing. In a modification of this gravity motor which I have built, the rate of operation is limited by a two-speed, friction ball governor escapement, regulated by a balanced fan, similar to the fan arrangement in Fig. 1.

The bottom stack of literature, in Fig. 3, is discharged by the rotary fan, F′, only when the balloon descends, the rate of discharge increasing with the rate of descent. In this bottom half the literature is retained by a temporary back wall, J, of heavy paper or fabric, glued as a panel or curtain across the back of the hopper, with a folded extension flap curtain, doubled over and down and attached to a roller, R′, at the bottom of the box. This roller is driven by the worm wheel, W″, by the worm, W, which is rotated by the fan, the resultant action being a very slow and progressive ripping off of this folded curtain, away from the side boards of the hopper, downward, as it is wound up by said roller, thus allowing the uppermost sheets of paper to slide out, as indicated, to neutralize the tendency to descend, the operation and function being equivalent to that of the water ballast carried by Fig. 1.

While many other means of carrying out my invention have come to mind, I believe the several means here illustrated are sufficient to give a comprehensive appreciation of the scope of the invention.

While I have found a delicately poised fan attached to the outer end of a long lever arm decidedly the most effective means for controlling or actuating the discharge of literature or other ballast to check the descent of the balloon, it should be understood that I do not limit myself to such devices, as I have demonstrated that a large, sensitive, barometric diaphragm, or a statoscopic device may be used for this purpose.

I claim:—

1. In a device of the class described for suspension from a free floating balloon, means for checking the downward course of said balloon, consisting of a progressively-dischargeable cargo; automatic means for the discharge of said cargo; and automatic controlling means for the time and rate of said discharge, consisting of a suitable sensitive, air actuated element, exposed to and actuated by the surrounding atmosphere, so adapted as to cause said discharge to occur at a sufficient rate and time to check said descent promptly.

2. In a device of the class described for suspension from a free floating balloon, a vertical hopper for a stack of horizontally-inclined sheets of literature; an opening in said hopper for the discharge of said sheets; and an automatic motor means attached to said hopper adapted for progressively feeding said sheets from said stack at an accelerating rate of discharge, whenever said balloon starts to descend, in order to check said descent.

3. In a device of the class described for suspension from a free floating balloon, a vertical hopper for a stack of horizontally-inclined sheets of literature; an opening in said hopper for the discharge of said sheets;

and an automatic motor means attached to said hopper for progressively feeding said sheets from said stack at an accelerating rate of discharge, actuated by a sensitively poised wing surface so extended from said hopper as to be effected by the air upon any appreciable descent.

4. In a device of the class described for suspension from a free floating balloon, a vertical hopper for a stack of horizontally inclined sheets of literature; an open side to said hopper for the transverse discharge of said sheets; a motor drive discharge gear for said sheets consisting of a gravity feed roller resting upon the outer top edge of said stack; a pair of vertically inclined rods stationed one at each side of said discharge opening, extending from top to bottom of said stack; a pair of vertically sliding bearings for the outer ends of said roller, working respectively up and down on said rods; and said hopper being so suspended from the balloon as to be inclined backward substantially as shown to prevent the stack of literature from being lurched out from the hopper.

5. In a device of the class described for suspension from a free floating balloon, a vertical hopper for a stack of horizontally-inclined sheets of literature, an open side to said hopper for the transverse discharge of said sheets; a motor driven discharge gear for said sheets consisting of a gravity feed roller resting upon the outer top edge of said stack; a pair of vertical guiding rods stationed one at each side of said discharge opening, extending from top to bottom of said stack; a pair of vertically sliding bearings for the outer ends of said rollers, working respectively up and down on said rods; and a suitable means of automatically accelerating the discharge of said literature immediately whenever the balloon starts to descend, for the purpose specified.

6. In a device of the class described, for suspension from a free floating balloon, a vertical hopper for a stack of horizontally-inclined sheets of literature, an open side to said hopper for the transverse discharge of said sheets; a motor driven discharge gear for said sheets consisting of a gravity feed roller resting upon the outer edge of said stacks; a pair of vertical guide rods; a pair of vertically sliding bearings for the outer ends of said roller, working respectively up and down on said rods; and a suitable means of automatically accelerating the discharge of said literature promptly whenever the balloon starts to descend, actuated by a sensitively poised wing surface so extended from the hopper as to be deflected by any appreciable descent through the air.

7. In an automatic balloon regulating device suspended from a free balloon a reservoir for flowable ballast; an automatic discharge outlet from said reservoir; and a sensitive controlling device for said discharge outlet actuated by the surrounding atmosphere so adapted that said outlet will effectively release said ballast when descending, and retain said ballast when rising.

8. In an automatic balloon regulating device suspended from a free balloon a liquid ballast tank; a lift outlet valve in the bottom portion thereof; a short-fulcrumed actuating lever for said valve; a connecting rod between said rod and lever; and a horizontally-inclined air fan surface fixed to the outer end of said lever adapted to raise said lever and valve promptly during any appreciable descent and close said valve upon the slightest ascent, for the purpose specified.

Having described my invention, I hereunto set my hand in the presence of two witnesses this 6th day of August, 1918.

EDWARD S. HALSEY.

Witnesses:
E. H. HAMERSTEIN,
W. T. SAWYER.