B. C. BATCHELLER.

PNEUMATIC DESPATCH TUBE APPARATUS.

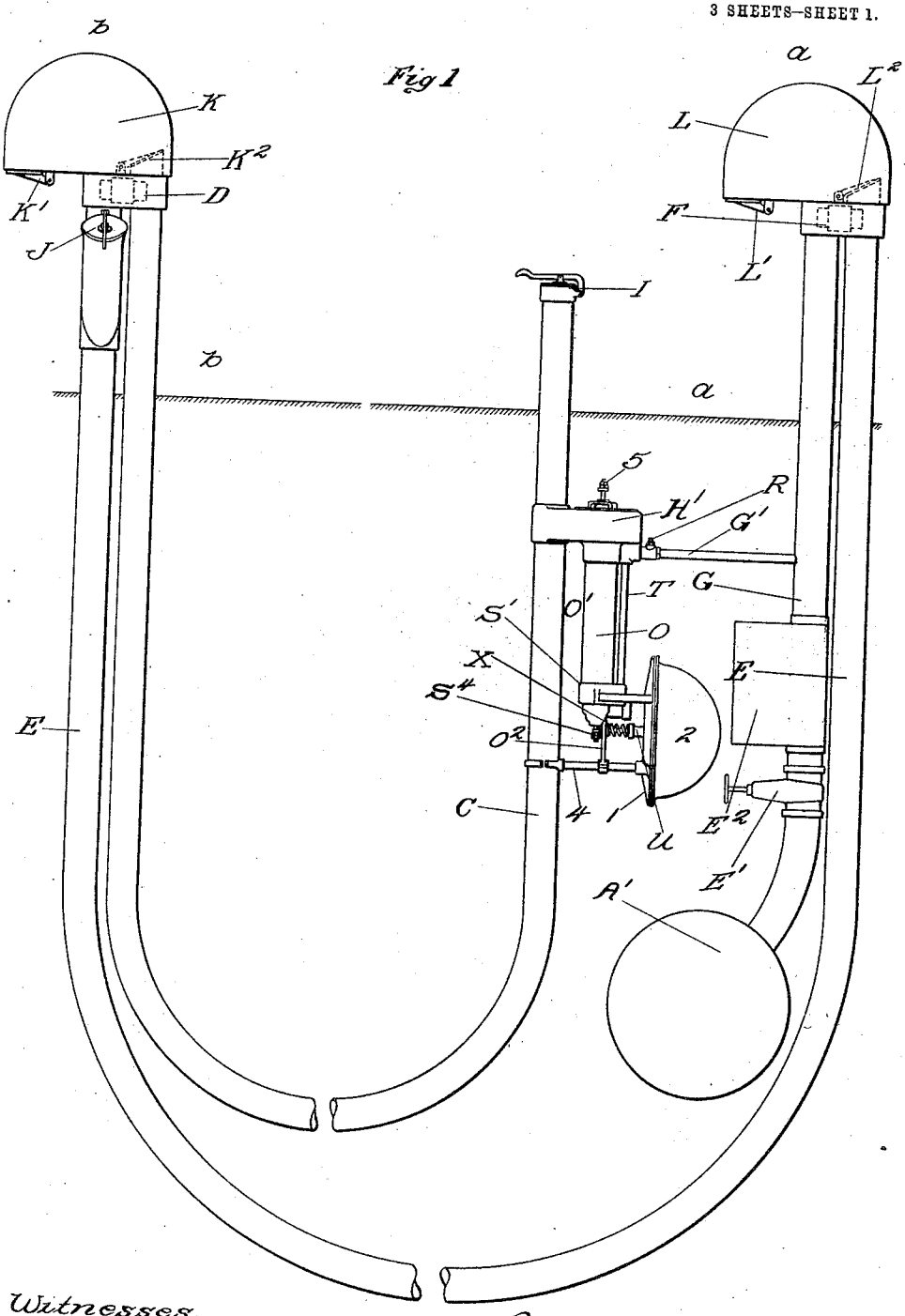
APPLICATION FILED JULY 15, 1912.

1,067,896.

Patented July 22, 1913.

3 SHEETS—SHEET 1.

Fig 1



Witnesses.
Isaac Krafsur
M. G. Macmillan

Inventor
Burley C. Batcheller
By J. J. Russ
Atty

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

B. C. BATCHELLER.

PNEUMATIC DESPATCH TUBE APPARATUS.

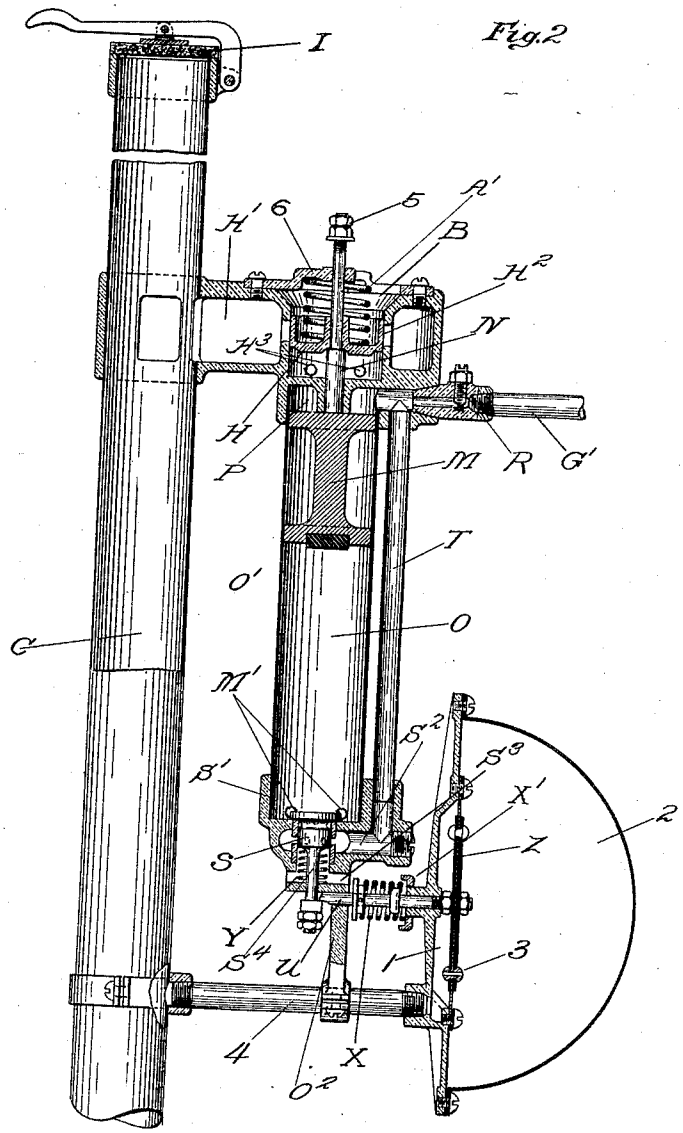
APPLICATION FILED JULY 15, 1912.

1,067,896.

Patented July 22, 1913.

3 SHEETS—SHEET 2.

Fig. 2



Witnesses:
Isaac Krafsur
M. G. Macmillan

Inventor:
Birney C. Batcheller
By D. L. Duffy Atty.

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

B. C. BATCHELLER.

PNEUMATIC DESPATCH TUBE APPARATUS.

APPLICATION FILED JULY 15, 1912.

1,067,896.

Patented July 22, 1913.

3 SHEETS—SHEET 3.

Fig. 3

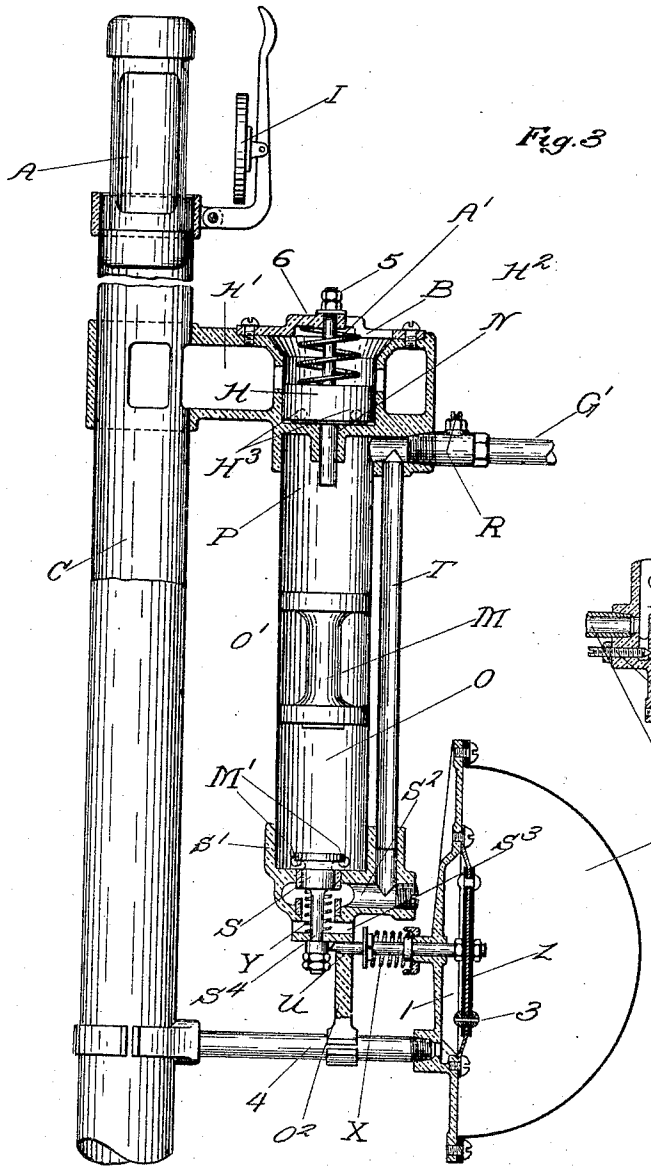
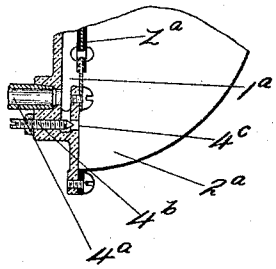


Fig. 4



Witnesses.
Isaac Krafsur
M. G. Macmillan

Inventor,
Burnay C. Batcheller
By J. Rueckheim
Atty.

UNITED STATES PATENT OFFICE.

BIRNEY C. BATCHELLER, OF NEW YORK, N. Y., ASSIGNOR TO THE LAMSON COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF NEW JERSEY.

PNEUMATIC-DESPATCH-TUBE APPARATUS.

1,067,896. Specification of Letters Patent. Patented July 22, 1913.

Application filed July 15, 1912. Serial No. 709,311.

To all whom it may concern:

Be it known that I, BIRNEY C. BATCHELLER, of New York, Brooklyn, in the county of New York and State of New York, have invented certain new and useful Improvements in Pneumatic-Despatch-Tube Apparatus, of which the following is a specification.

My invention relates to improvements in pneumatic despatch tube apparatus for the transmission of carriers and its object is to produce an apparatus on the vacuum principle which is economical and effective and through which the current of air passes only when the apparatus is in use transmitting carriers.

The accompanying drawings illustrate a construction embodying my invention.

Figure 1 is a diagrammatic view showing a tube circuit of a vacuum system showing the central or cashier's station and a salesman's station. Fig. 2 is a detail sectional view of the air inlet controlling mechanism when the apparatus is in normal condition and no carriers are being transmitted. Fig. 3 is a view similar to Fig. 2 and showing the position of the parts of the air inlet controlling mechanism upon the insertion of a carrier into the tube line for transmission. Fig. 4 is a detail sectional view or modification of the tripping mechanism.

Like letters of reference refer to like parts throughout the views.

The transit tube C leads from the central or cashier's station *a* to the salesman's station *b* where it is connected to the terminal K. Return tube E is connected to the terminal K at the salesman's station and leads to the central or cashier's station where it is connected to the terminal L. The tubes C and E at the terminal K are connected by chamber D of usual construction. Through the chamber F of usual construction the tube E is connected to the tube G, connected to the drum A which is constantly exhausted by a suitable suction blower. The outgoing tube C is closed at the central station *a* by the valve I and the return tube E is closed at the salesman's station *b* by the valve J. The delivery end of the outgoing tube C is closed by valve K^2 and the delivery end of the return tube E is closed by the valve L^2 respectively opening into the chambers K and L. All these valves I, J, K^2 and L^2 are normally held closed by the vacuum in the system which is created by the suction blower connected to the drum A.

To the outgoing tube C there is connected by the chamber H′ the air inlet controlling mechanism O′. This chamber H′ has several inner perforations H^2 in its inner wall and these perforations are normally closed by the valve H (Fig. 2) preventing communication between the tube C, chamber H′ and the atmosphere through the opening B which leads from the chamber H′ directly to the atmosphere. To the lower side of the chamber H′ is connected the cylinder O which is closed at its lower end by the chamber S′ which has a passage S^2 connecting with the pipe T which leads to the upper part of the cylinder and connects with the space P. In this chamber S′ is mounted the valve S normally held closed by the pawl *u*, but adapted upon the movement of the pawl *u* out of engagement with said stem S^4 to rise by reason of the tension of the spring Y (Figs. 2 and 3). This pawl *u* is connected to the elastic diaphragm Z separating the chambers 1 and 2. The lower end of the chamber 1 connects through the tube 4 to the transit tube C and this pipe is sufficiently large in diameter to allow the air to pass through freely between the chamber 1 and the tube C.

The tension of the spring X may be suitably regulated by the regulating device X′. When no carriers are in transit the suction blower maintains a vacuum throughout the system but with no current of air flowing. The valve H is held closed by the atmospheric pressure on the piston M bearing against the valve stem N of the valve H and this piston M is held up by the atmospheric pressure in the cylinder O entering through the ports M′ in the bottom of the cylinder O. The pressure in the upper end of the cylinder O in the space marked P is less than atmospheric since this chamber is connected through the pipe G′ to the tube G and thence to the drum A. The pipe G′ is provided with a throttle valve R which determines the speed with which the piston M rises to close the valve H and cut off the air entering through the opening B and therefore the time that the air current is maintained in the transit tubes C and E, so that for short lines the throttle valve would be

more open than it would be for long lines as the flow of air is required to be maintained longer for main lines to deliver the carrier at the opposite station. The opening 3 of the diaphragm Z allows the air to pass slowly from chamber 1 to chamber 2 or vice versa. This small opening 3 serves to equalize the pressure on both sides of the diaphragm Z and allows the spring X to move the pawl *u* and the diaphragm Z to the left, so that the pawl *u* will be in position to engage the stem S^4 when the valve S is closed by the fall of the weighted piston M. The tension of the spring X and the size of the opening 3 must be determined by experiment so that the system may not be too sensitive or not sufficiently sensitive.

It is apparent that when the diaphragm Z moves to the right in withdrawing the pawl *u*, the air in the chamber 2 must be slightly compressed and that the larger the chamber the less will be the compression for a given movement of the diaphragm. It is therefore important to have this chamber large enough so that too much pressure will not be required to withdraw the pawl *u* from the stem S^4 of the valve S.

When no carriers are being transmitted the pressure of the transit tubes C and E is considerably below atmospheric pressure and about the same as in the drum A. This vacuum holds all the valves closed and constitutes a closed system. When it is desired to transmit a carrier from central or cashier's station the valve I is open and the carrier inserted, as shown in Fig. 3. This opening of the valve I allows the atmospheric air to rush into the tube and causes a sudden or abrupt rise of the pressure in the tube. This sudden rise of pressure acts on the diaphragm Z through the pipe 4 and withdraws the pawl *u* from the position shown in Fig. 2 to that shown in Fig. 3 and opens the valve S which permits air at atmospheric pressure previously or already present in the chamber S′ to pass thence into the passage S^2 and up through the pipe T to the space P above the weighted piston M. As the pressure on both sides of the piston M equalizes the piston M drops, as shown in Fig. 3, which causes the spring A′ to open the valve H, as shown in Fig. 3, thereby allowing air to enter through the opening B, perforations H^2 into the tube C. This flow of air through the tubes C and E to the drum A causes the transmission of the carrier from the cashier's station *a* to the terminal K where it opens the valve K^2 and then is discharged through the valve K′ in the usual manner. The valve I is of course closed as soon as the carrier is inserted.

The air under pressure below the valve H escapes through the openings H^3 to the atmosphere as valve H descends, and the openings M′ in the bottom of the cylinder O allow air in the cylinder O below the piston M to escape to the atmosphere as the piston M descends.

The time during which the air current is maintained through the tubes C and E is the time required for the piston M to descend to the bottom of the cylinder O and rise again to the top. This time is regulated by the throttle valve R and in regular operation the throttle valve R will be adjusted to maintain a flow of air through the tubes C and E for a sufficient length of time to allow a carrier to traverse from one station to the other. The weighted piston M as it drops strikes the valve S and closes it against the tension of the spring Y. And the pawl *u* returning under the influence of the spring X engages the stem of the valve S and holds the valve closed, as shown in Fig. 2; this action of the pawl being possible since the pressure is withdrawn from the chamber I through the pipe 4 to the tube C by the operation of the vacuum throughout the system and the drum A. This closing of the valve S cuts off the atmospheric pressure from the pipe T and space P so that as the pump or blower exhausts the air from this space P through the pipe G′ a vacuum is produced in said space P and the piston M is raised to its upper position by atmospheric pressure below it in the cylinder O. The piston as it rises strikes the stem N and closes the valve H thereby cutting off the flow of air through the opening B and tubes C and E to the drum A.

The operation of the apparatus when inserting a carrier at the salesman's station *b* by the opening of the valve J is identical with that just described for sending a carrier from the cashier's or central station to the salesman's station. If the opening B through the valve H is made as large as the cross-section of the tube, then when the valve H is open the air would flow freely into the tube C and the opening of the valve I to insert a carrier would cause no appreciable rise in pressure in the tube C, since the pressure would be already near atmospheric. Therefore, it is necessary to have the opening through the valve H somewhat throttled in order that the pressure in the tube C may always be a little below atmospheric, even close to the valve H. The pressure in the tube C should be two or three ounces below atmospheric when the valve H is open. The opening through the valve H is throttled by the adjustment of two nuts 5 on the stem of the valve H. By screwing these two nuts down on the valve stem the motion of the valve H is reduced, since the valve is stopped in its downward motion by the impact of these nuts against the shoulder 6.

The object of the throttle valve in the

pipe E′ close to the drum A is to prevent the pulsations of the blower or other tube lines from being transmitted back through the tube G and affecting the diaphragm Z. These pulsations may be still further checked by inserting a small reservoir E^2 in the pipe G between the throttle valve and the terminal L. The pipe G′ with the needle valve R and the piston M constitute the timing device of the apparatus.

The trip mechanism consists of the diaphragm Z and the pawl *u* which is adapted to engage the stem S^4 of the valve S. The movement of said pawl is controlled by the spring X in one direction and in the opposite direction by the vacuum established in the diaphragm chamber 1. It is obvious that a cylinder and piston may be substituted for the rubber diaphragm Z.

In the modification shown in Fig. 4 the diaphragm Z^a is imperforate and separates the chambers 1^a and 2^a. There is an orifice 4^c between the chambers 1^a and 2^a through which the air exhausts from the chamber 2^a to the pipe 4^a thence to the tube line C. This orifice 4^c is controlled by the setscrew 4^b. This arrangement makes it easier to regulate the size of the opening between the chambers on the opposite sides of the diaphragm.

By the use of the tripping latch and diaphragm, a slight rising pressure sets the apparatus into operation and it is not necessary in my apparatus to hold the valve I or the valve J open until the weighted piston M drops to the bottom of the cylinder. In my apparatus, as soon as the carrier is inserted the valve I or valve J can be at once closed, as the slight rising pressure even momentarily is sufficient to operate the tripping mechanism and start the descent of the weighted piston M.

I do not limit myself to the arrangement and construction shown as it may be varied without departing from the spirit of my invention.

In my apparatus a gradual rise in pressure would not be so effectual in operating the diaphragm Z, as such a rise would give the air sufficient time to pass through the small orifice from one side of the diaphragm to the other. So that in my apparatus it is the sudden rise of pressure which operates the diaphragm positively and this sudden or abrupt rise in pressure need be but momentary or in other words for a very short interval of time such as is needed for the opening of the valve I, for example, the immediate insertion as rapidly as possible of the carrier and the immediate reclosure of said valve.

Having thus described the nature of my invention, and set forth a construction embodying the same, what I claim as new and desire to secure by Letters Patent of the United States is:

1. In a controlling mechanism for vacuum despatch tube apparatus, an air admission valve, a weighted piston adapted to control the movement of said admission valve, a catch actuated by the fluctuation of the transmitting force adapted to lock or unlock a valve, which when unlocked will permit of the descent of the weighted piston causing the opening of the admission valve.

2. In a controlling mechanism for vacuum despatch tube apparatus, an air admission valve, a weighted piston adapted to control the movement of said air admission valve, a catch actuated by the fluctuation of the transmitting force adapted to lock or unlock a valve which when unlocked will permit of the descent of the weighted piston allowing the air admission valve to open and causing the said valve to be reëngaged by the catch.

3. In a controlling mechanism for vacuum despatch tube apparatus, an air admission valve, a weighted piston adapted to control the opening or closure of said air admission valve, a catch actuated by the fluctuation of the transmitting force adapted to lock or unlock a valve, which when unlocked will destroy the vacuum holding the weighted piston in its uppermost position, allowing it to drop and by impact on said valve cause it to close and lock, establishing a timing force for raising the weighted piston and effecting the closure of the air admission valve.

4. In a vacuo-despatch system the combination of an air inlet valve, a timing device controlling said air inlet valve, and trip mechanism to set said timing device in operation by sudden rise of pressure in the tube, said mechanism including an auxiliary valve having a bias for a determined position, means for latching said valve out of said position and means, actuated by said sudden rise of pressure, for releasing said valve from said latching means.

5. In a vacuo-despatch system the combination of an air inlet valve, a timing device controlling said air inlet valve, an auxiliary valve controlling said timing device, means for restraining said auxiliary valve against movement and mechanism to trip said restraining means actuated by sudden rise of pressure in the tube.

6. In a vacuo-despatch system the combination of an air inlet valve, a timing device controlling said air inlet valve, an auxiliary valve controlling said timing device, a latch for holding said auxiliary valve closed, and a diaphragm moved by a sudden rise of pressure in the tube due to insertion of a carrier for withdrawing said latch.

7. In a vacuo-despatch system, the combination of an air inlet valve, a timing device controlling said valve, means for rendering said device normally operative upon

the occurrence of even a momentary fluctuation of air in a part of said system, when a carrier is inserted for transmission, air displacing means for creating a partial vacuum in said system, and means, interposed between said air displacing means and the part of the system aforesaid, for minimizing the effect of pulsations in the operation of said air displacing means whereby said means for rendering the timing device operative will be substantially unaffected by fluctuations in the pressure of the air displaced by the air displacing means.

8. In a vacuo-despatch system, the combination of an air inlet valve, a timing device controlling said valve, means for rendering said device normally operative upon the occurrence of even a momentary fluctuation of air in a part of said system, when a carrier is inserted for transmission, air displacing means for creating a partial vacuum in said system, and means interposed between said air displacing means and the part of the system aforesaid, for minimizing the effect of pulsations in the operation of said air displacing means whereby said means for rendering the timing device operative will be substantially unaffected by fluctuations in the pressure of the air displaced by the air displacing means, said interposed means including a reservoir chamber.

9. In a vacuo-despatch system, the combination of an air inlet valve, a timing device controlling said valve, and mechanism, responsive to sudden fluctuations only in the pressure in a part of said system for rendering said timing device operative, said mechanism including means for rendering it unresponsive to gradual variations in pressure in said system.

10. In a vacuo-despatch system, the combination of a transmission tube, air displacing means connected therewith, a timing device, means co-acting therewith for admitting air to said tube for passage to said air displacing means, said air admitting means having provisions for regulating the quantity of air admitted to said tube and said timing device having means for regulating the time of such air admission, and means, actuable only by sudden fluctuations in the pressure of the air in said tube, for rendering said air admitting and timing means operative.

11. In a vacuo-despatch system, the combination of a transmission tube, air displacing means connected therewith, a timing device, means co-acting therewith for admitting air to said tube for passage to said air displacing means, said air admitting means having provisions for regulating the quantity of air admitted to said tube and said timing device having means for regulating the time of such air admission, and means, actuable by sudden fluctuations in the pressure of the air in said tube, for rendering said air admitting and timing means operative, said last mentioned means having provisions for adjustably determining the sensitiveness thereof to said fluctuations.

12. In a vacuo-despatch system, the combination of a transmission tube, air displacing means connected therewith, a timing device, means co-acting therewith for admitting air to said tube for passage to said air displacing means, and means, actuable by sudden fluctuations in the pressure of the air in said tube, for rendering said air admitting and timing means operative, said third mentioned means having provisions for adjustably determining the sensitiveness thereof to said fluctuations.

13. In a pneumatic despatch system, the combination of an air controlling valve, a timing device for controlling said valve, and mechanism, set in operation by a sudden change in pressure in a part of said system for rendering said timing device and air controlling valve operative, said mechanism comprising a partition wall, means upon either side thereof for obstructing the free admission of air at atmospheric pressure to said sides, connections between one of the sides of said wall and the said part of said system whereby the wall may be operatively displaced by a sudden change in pressure in said part, said mechanism further having provisions for relatively rapidly equalizing the pressure upon opposite sides of said wall whereby the latter is normally substantially unaffected by a gradual change in pressure in said part.

14. In a vacuo-despatch system, the combination of a transmission tube, an air inlet valve, a timing device controlling the time during which said valve is open, trip acting mechanism to set said timing device in operation by a sudden rise in pressure in the tube, and means for regulating the amount which said valve may open, whereby to determine the pressure below that of the atmosphere, in said tube, when said valve is open.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses, this 29th day of June, A. D. 1912.

BIRNEY C. BATCHELLER.

Witnesses:

JOHN L. CLARK,

HENRY SCHOMBER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."