

F. H. WOLEVER.  
PNEUMATIC DESPATCH TUBE SYSTEM.  
APPLICATION FILED MAR. 3, 1909.

948,714.

Patented Feb. 8, 1910.

3 SHEETS—SHEET 1.

Fig. 1.

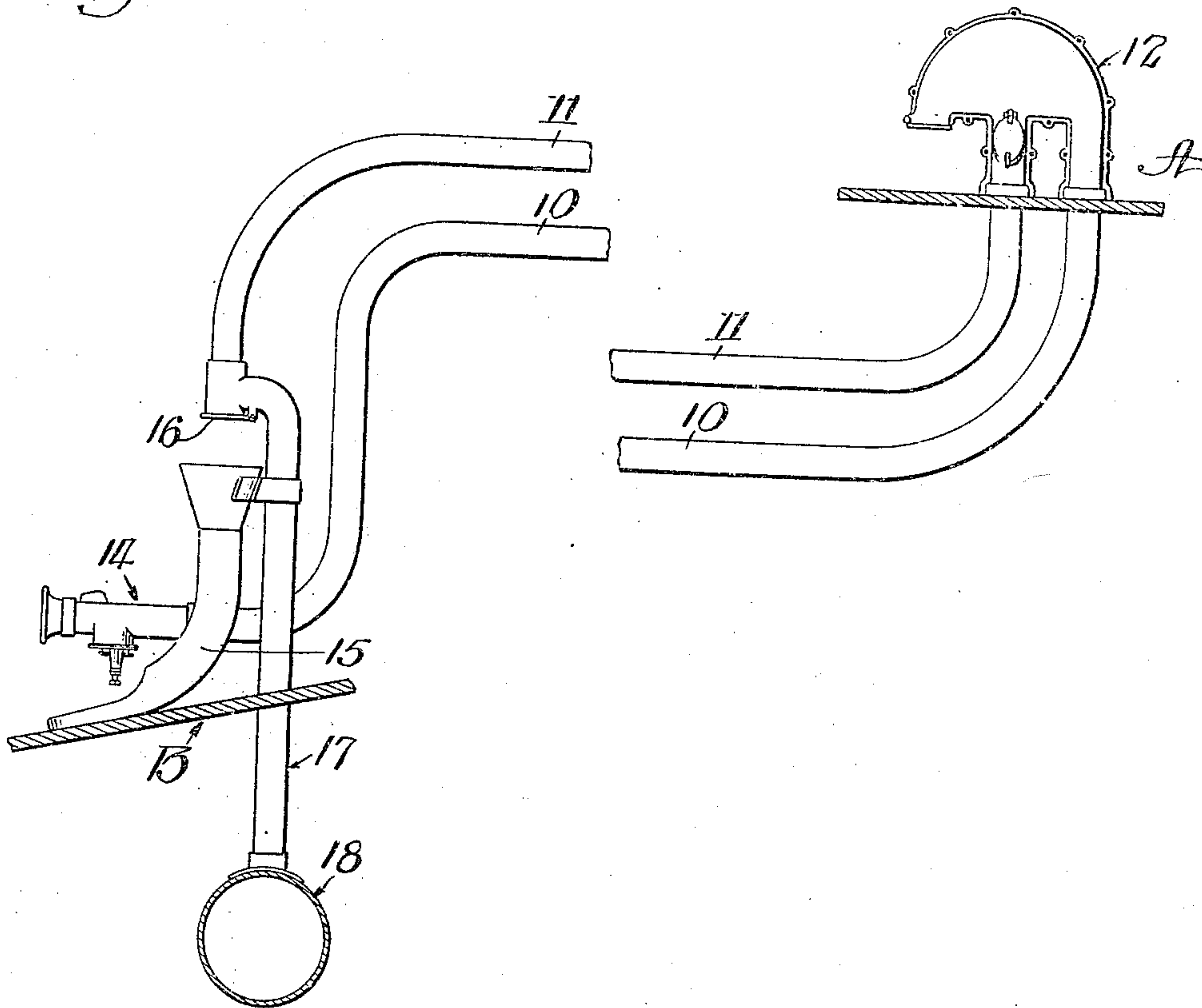
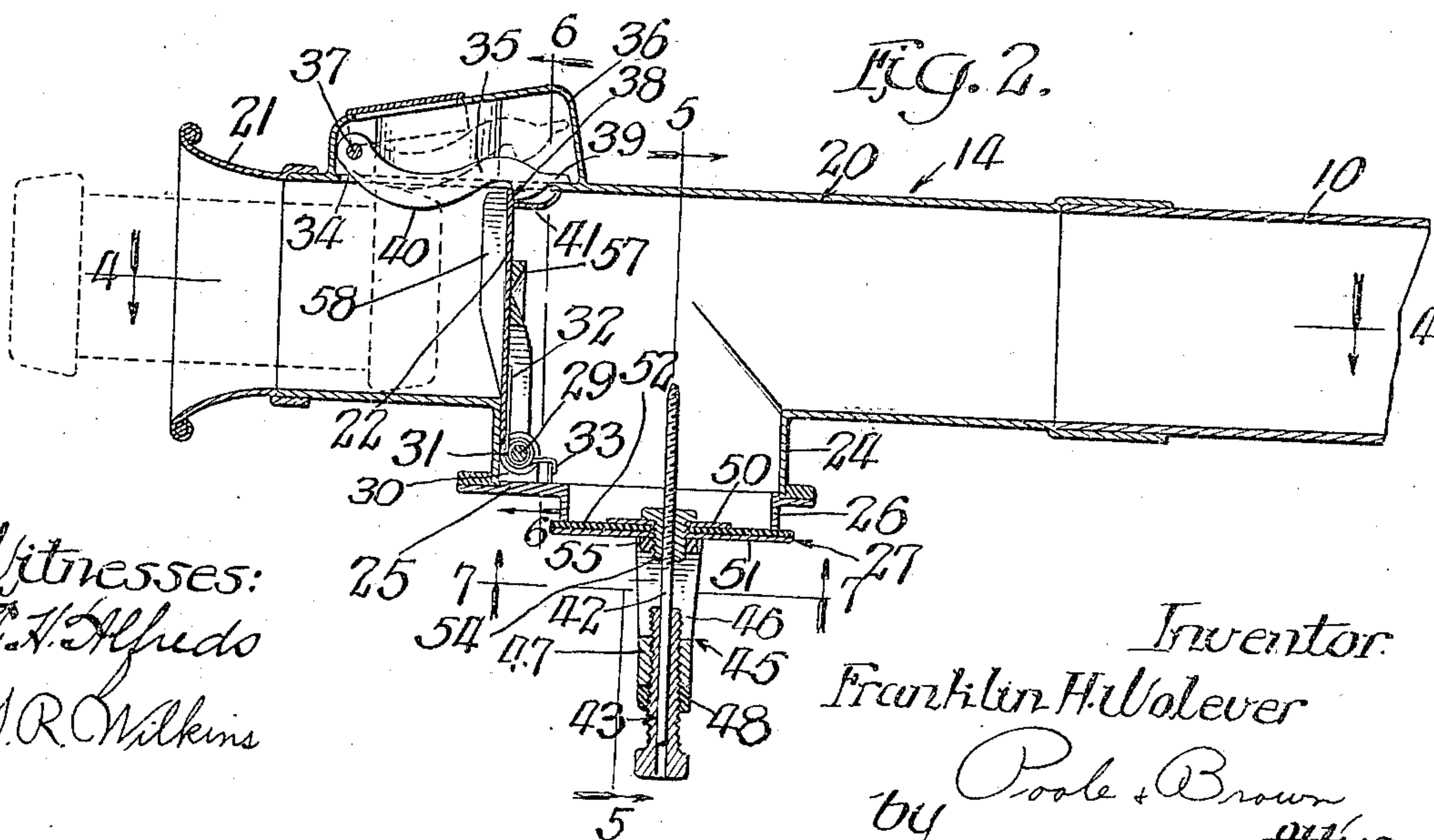


Fig. 2.



Witnesses:  
J. A. H. Huds  
J. R. Wilkins

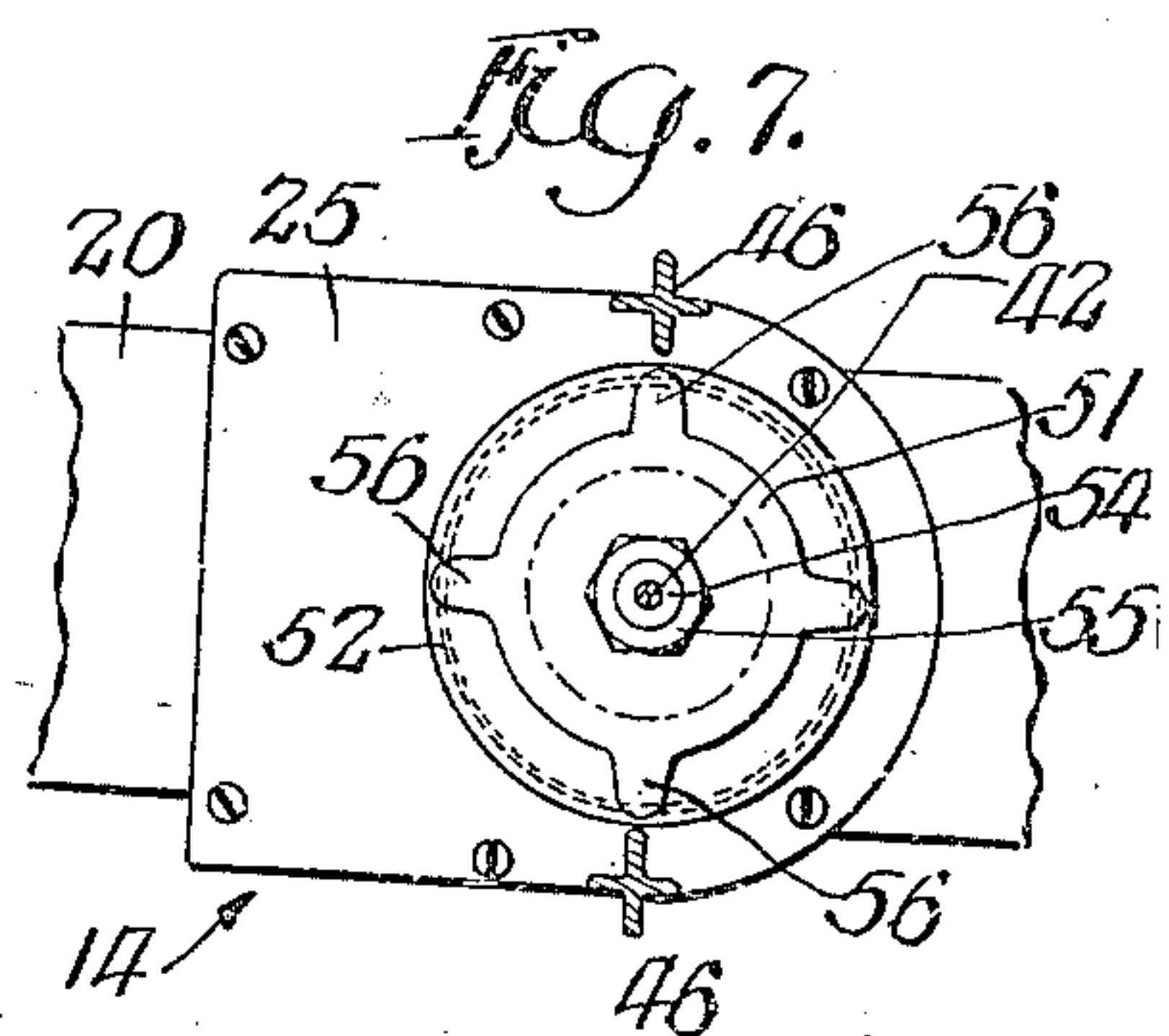
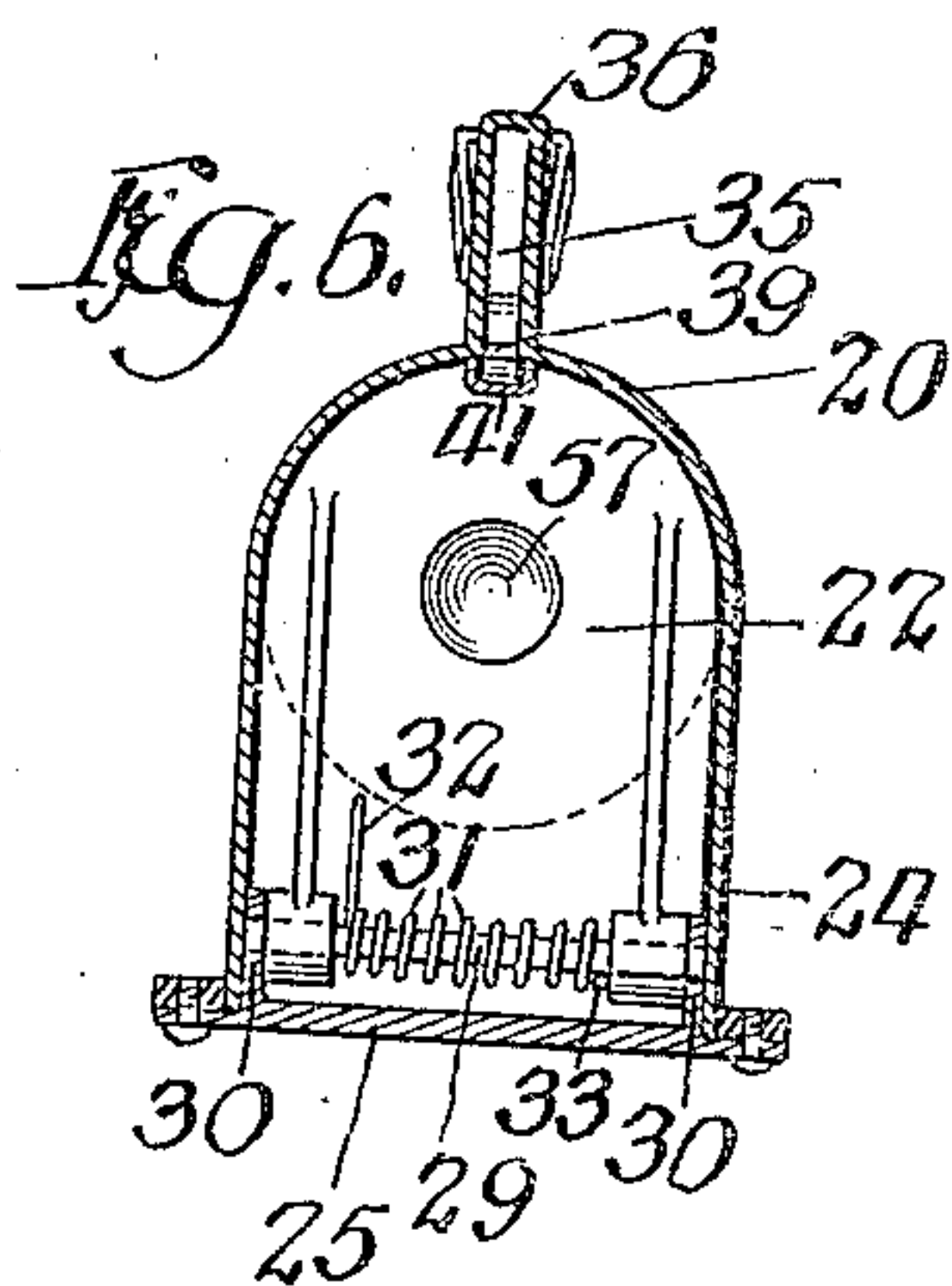
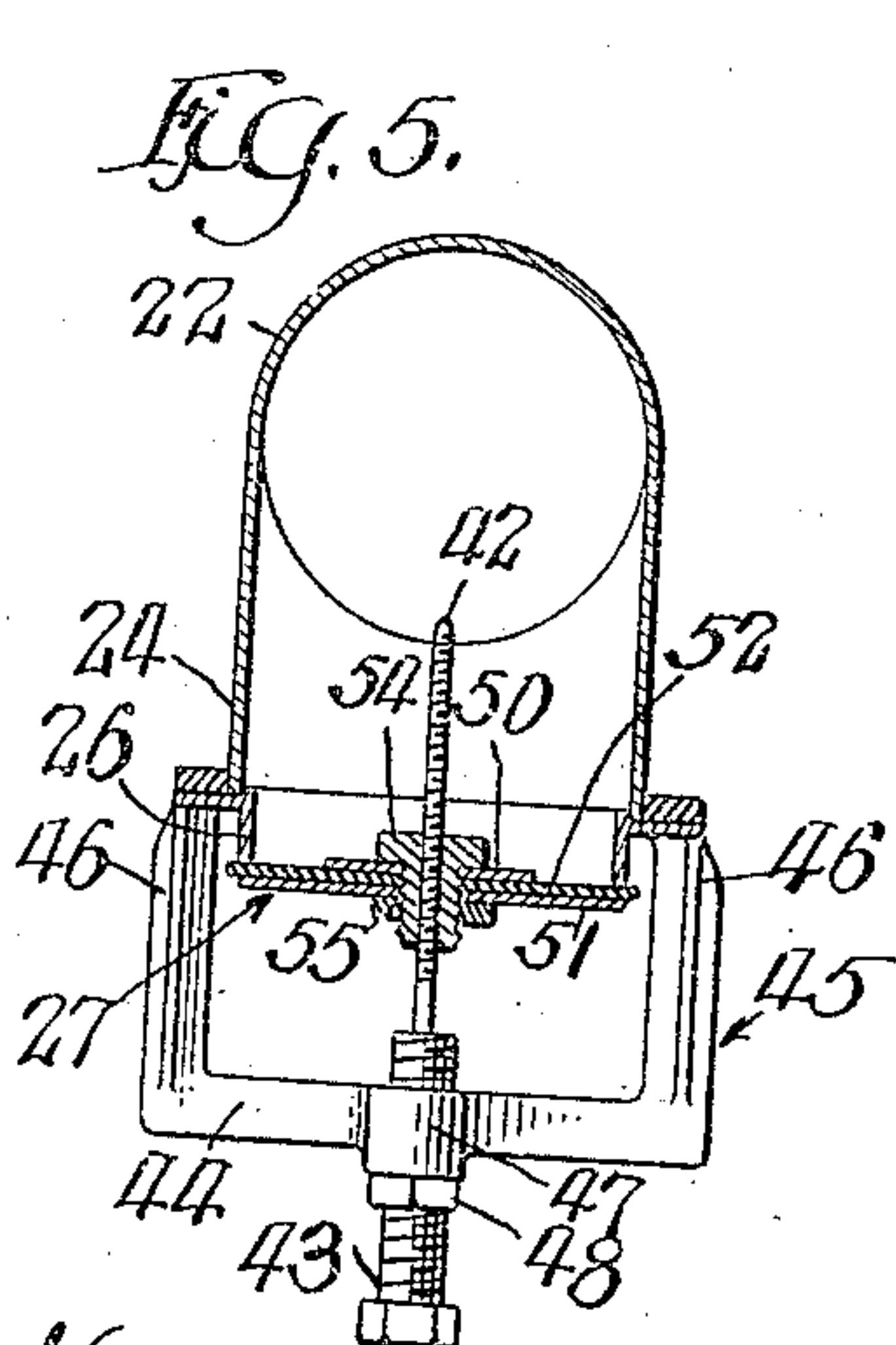
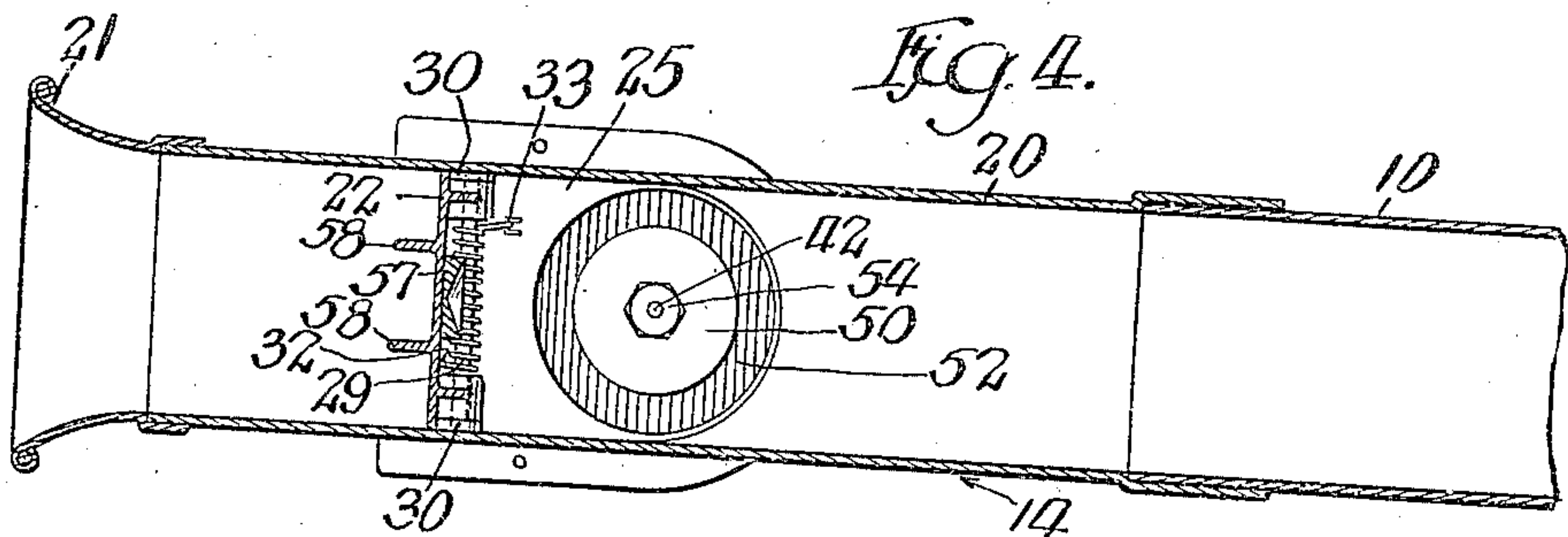
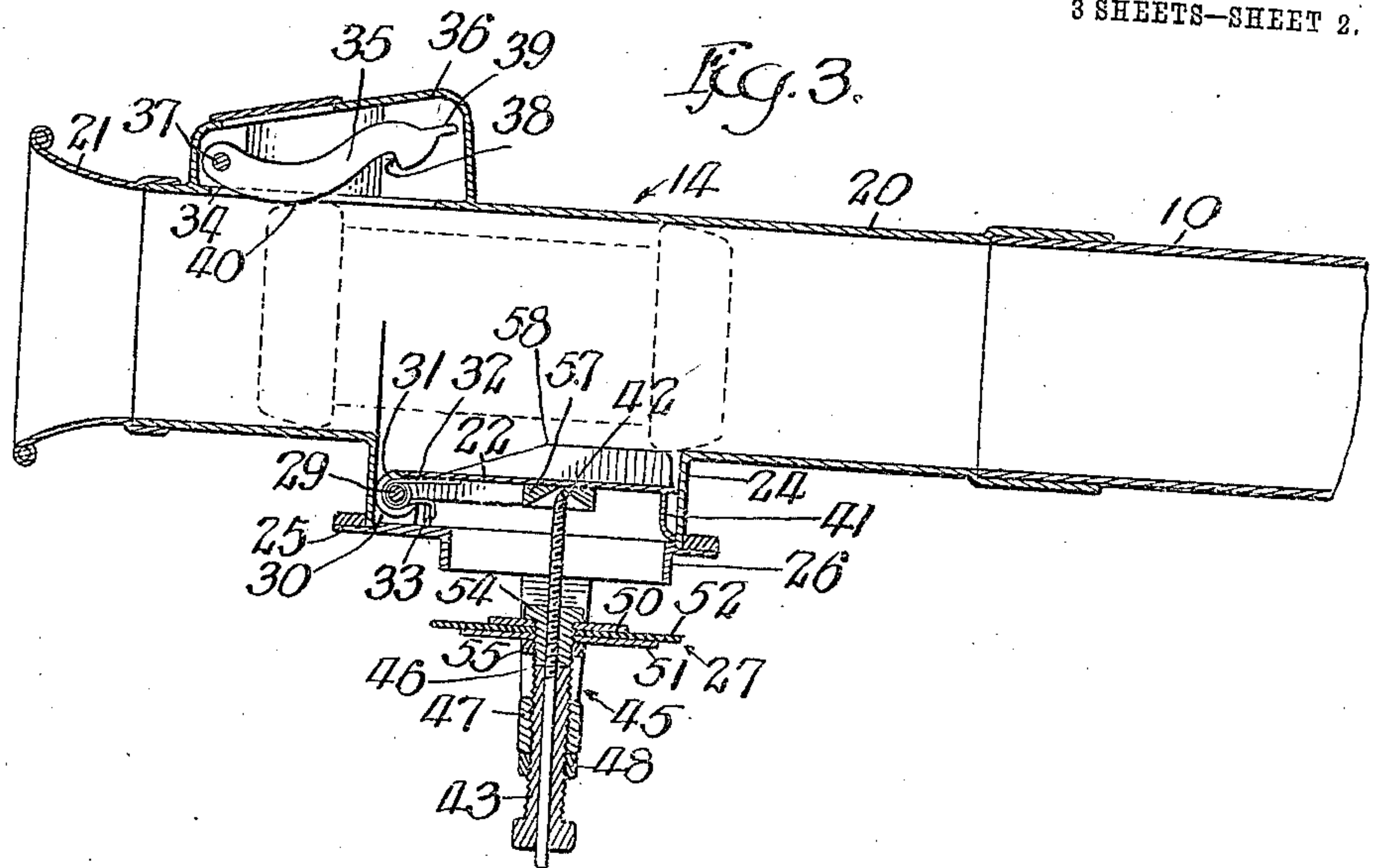
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3 SHEETS—SHEET 2.



Witnesses:  
J. H. Alfords  
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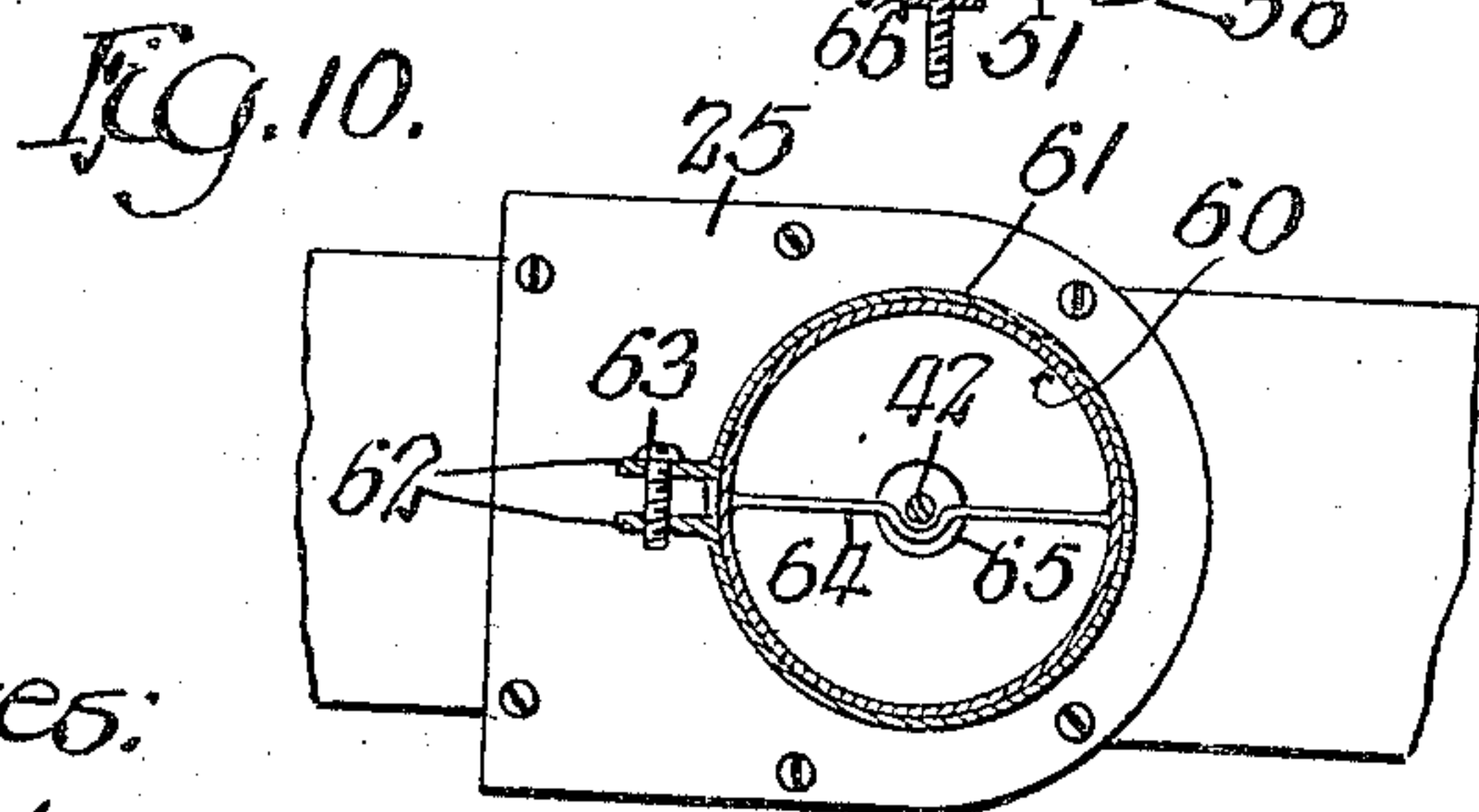
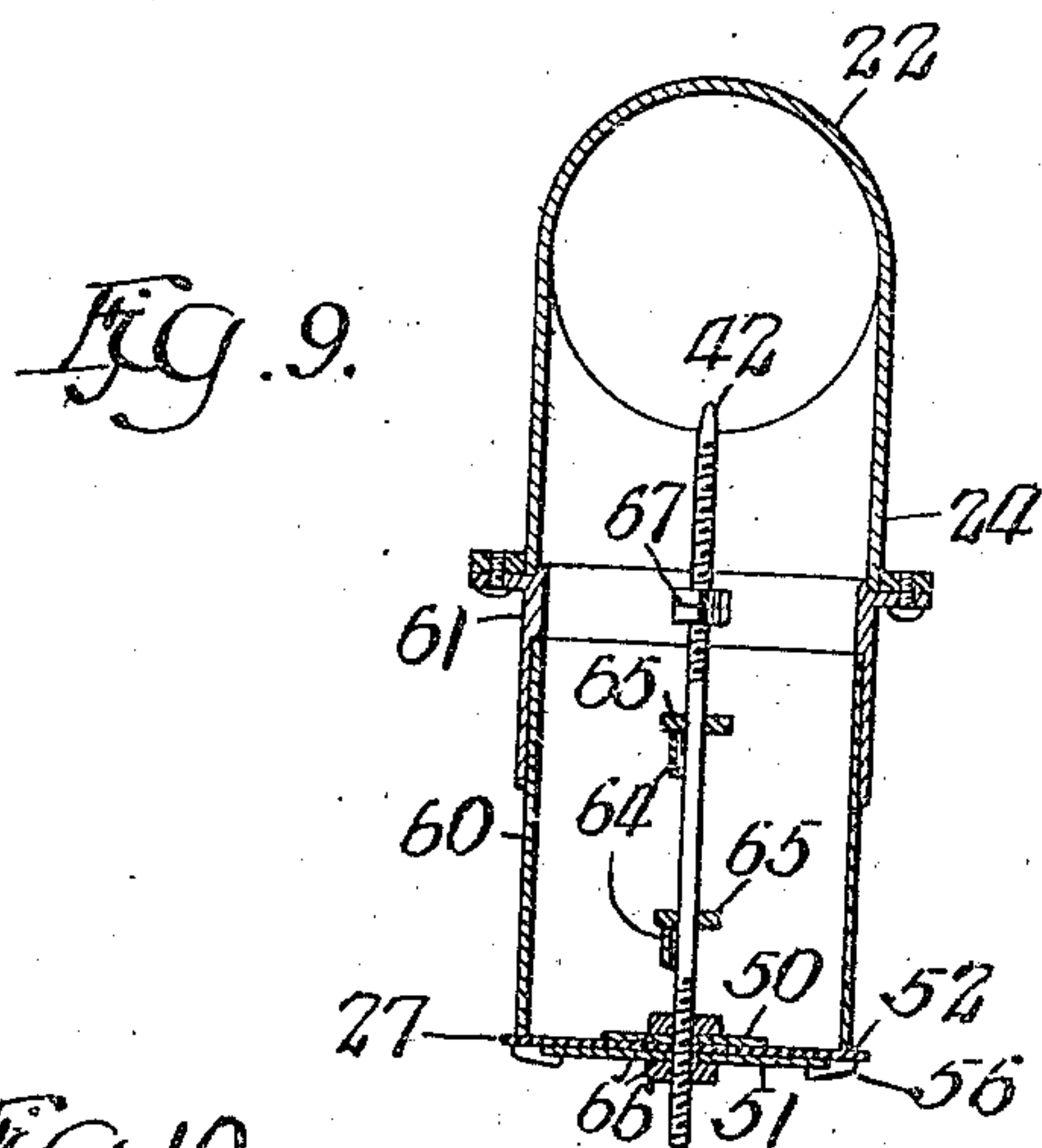
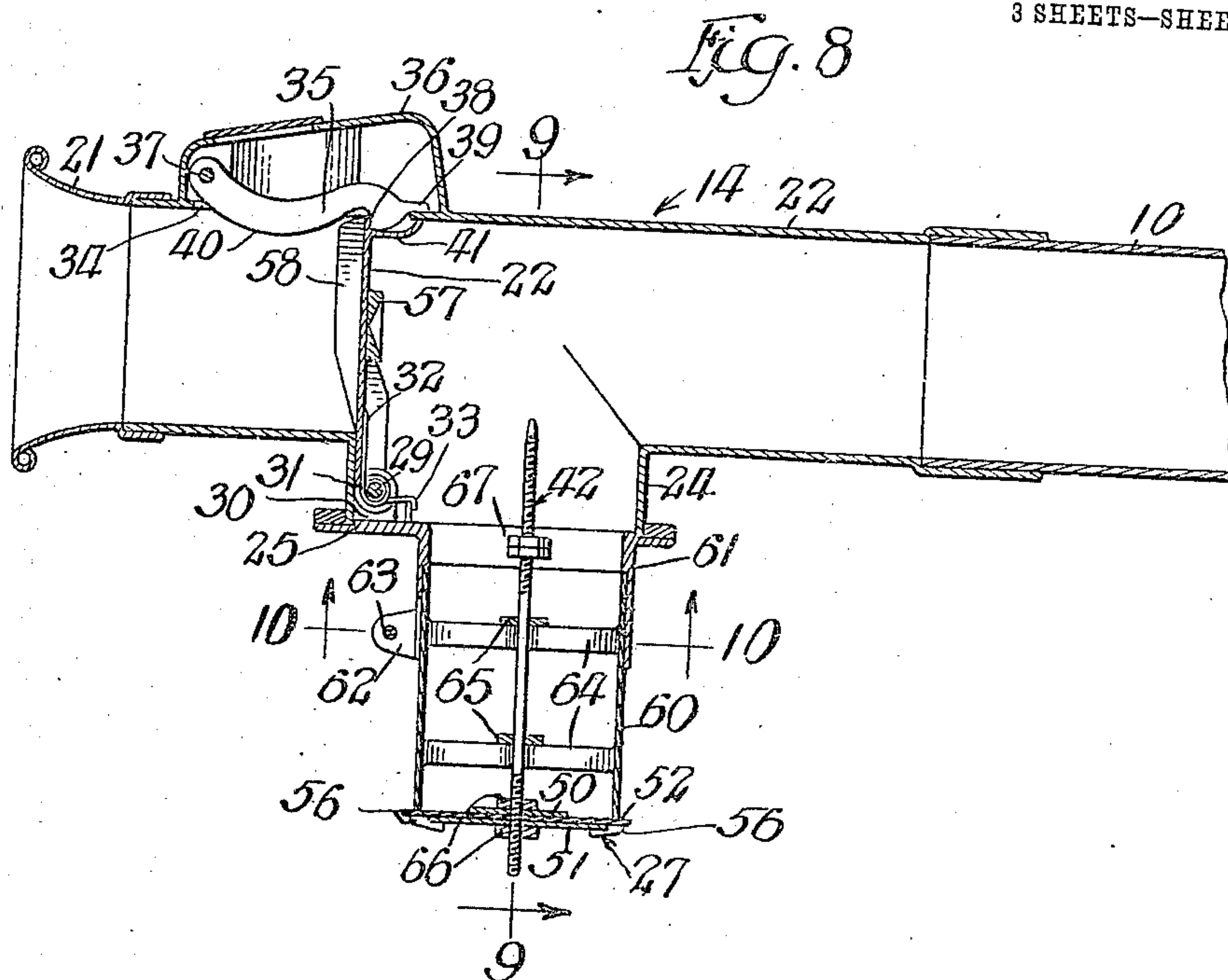
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3 SHEETS—SHEET 3.



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# UNITED STATES PATENT OFFICE.

FRANKLIN H. WOLEVER, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS,  
TO SAMUEL FEIST, OF CHICAGO, ILLINOIS.

## PNEUMATIC-DESPATCH-TUBE SYSTEM.

948,714.

Specification of Letters Patent.

Patented Feb. 8, 1910.

Application filed March 3, 1909. Serial No. 481,170.

*To all whom it may concern:*

Be it known that I, FRANKLIN H. WOLEVER, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Pneumatic-Despatch-Tube Systems; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in pneumatic despatch tube systems and relates more specifically to means for economizing power used in operating such systems and to an improved sending terminal therefor.

The invention consists in the matters hereinafter set forth and more particularly pointed out in the appended claims.

In the drawings:—Figure 1 is a diagrammatic view, with parts broken away, of a portion of a pneumatic despatch tube system equipped with my improvements. Fig. 2 is a vertical axial section of the sending terminal. Fig. 3 is a similar view showing the sending gate open to admit a cartridge to the terminal. Fig. 4 is a horizontal section on line 4—4 of Fig. 2. Fig. 5 is a transverse section on the line 5—5 of Fig. 2. Fig. 6 is a transverse section on the line 6—6 of Fig. 2. Fig. 7 is a horizontal section on the line 7—7 of Fig. 2, looking upwardly. Fig. 8 is a vertical axial section of a sending terminal showing a modification of my improvements. Fig. 9 is a transverse vertical section on line 9—9 of Fig. 8. Fig. 10 is a horizontal section on line 10—10 of Fig. 8, looking upwardly.

As shown in the drawings, and referring first more specifically to Fig. 1, 10 designates the cashier's sending tube, and 11 the salesman's return tube. The sending and return tubes are connected at the salesman's station A by a combined receiving and sending terminal 12 of familiar form, whereby the two lines of tubes constitute a closed loop through which the air current is maintained in a proper direction to transmit the cartridges therethrough from station to station.

At the cashier's station B, the cashier's sending tube is provided with a sending terminal, designated as a whole by 14, and with a receiving terminal 15 located, as herein shown, vertically below the discharge end

of the salesman's return tube. Said discharge end of the return tube has a downwardly or outwardly opening, self-closing gate 16 which is normally closed and is open to permit a cartridge to pass from the return tube to the delivery terminal. The return tube is connected, at a point above said gate, through the medium of a pipe 17 with a vacuum main or trunk 18. The system herein illustrated is of that type wherein the sending and delivery terminals are normally closed and the tubes normally sealed during periods of disuse of the system. When a cartridge is inserted into one of the sending terminals, air is admitted to the system and the arrangement is such that air is admitted to the system only as long as a cartridge is in transit therethrough, the system being automatically sealed as soon as the cartridge is discharged therefrom. A complete system of the type herein illustrated usually embraces a plurality of loops extending from a number of salesmen's stations to a single station, with the discharge end of each salesman's return tube connected with the main vacuum trunk 18.

Referring now to the construction and arrangement of the sending terminal at the cashier's station and to my improvements as applied thereto, the parts are made as follows: The said sending terminal embraces a tube section 20 which is connected at one end with the receiving end of the salesman's sending tube and is formed at its other end with a flaring mouth 21 to receive a cartridge. An inwardly opening swinging gate 22 normally closes the cartridge thoroughfare of the sending terminal. Opening into the terminal just inside the gate is an air inlet branch 24, which may be made an integral part of the terminal. 25 designates a plate removably fitted to the lower end of the branch, and said plate is provided with a short cylindric flange 26 which constitutes a reduced extension of the branch 24. In other words, the air inlet branch may be said to consist of the two sections 24 and 26. 27 designates a check valve which engages an annular seat formed on the lower end of the extension 26 of the branch and said valve is arranged to control the passage of air into the terminal through the air inlet branch.

The sending gate 22 is herein shown as hinged to a horizontal pin 29 arranged



transversely in the branch 24 and supported, as indicated in Figs. 3 and 6, on lugs 30, 30 extending upwardly from the plate 25 at points below the bottom or floor of the tube section 20 of the sending terminal. A spiral spring 31 surrounding said hinge pin and bearing at one end 32 against the gate and attached at its other end 33 to the plate 25 serves to normally hold the gate in its closed position and to automatically close the gate after a cartridge has been inserted into the terminal. The arrangement shown permits the gate 22 to be withdrawn from the terminal by removal of the plate 25, said plate being detachably fixed to the branch section 24 in the manner indicated in Fig. 2.

The gate is locked in its closed position by means of a gravity latch 35 arranged above the gate and inclosed within a suitable casing 36 attached to the upper side of the terminal tube section. The lever is pivoted at one end to a pin 37 extending transversely across the casing 36 and is provided at its other end with a tooth or shoulder 38 arranged to engage the upper marginal part of the gate, when the latter is closed, in a manner to lock the gate in its closed position. The terminal section 20 is provided with a slot 34 in line with said latch to permit the latch to pass into and out of engagement with the gate. The said latch is provided with an end extension or lug 39 which is adapted to rest on the wall of the terminal section at the end of the slot 34 to prevent the latch dropping downwardly at a time when the gate is open. The latch is provided between its ends with a downwardly curved portion 40 which normally extends into the top of the terminal section through the slot 34 in position to be engaged by a cartridge when the latter is introduced into the terminal. Engagement of a cartridge with said latch, when the cartridge is inserted into the terminal, raises the forward end of the latch and releases the gate and the gate is swung inwardly and downwardly to admit the cartridge to the terminal by pressure applied through the cartridge, in the manner indicated in Fig. 3. The gate 22 may be provided at its upper end with a wing 41 which, when the gate is in its closed position, covers the inner end of the slot 34 to avoid leakage of air into the terminal at this point.

The check valve 27, which closes the branch air passage, is normally closed. Said check valve is arranged to be opened at or before the closing of the gate, which is automatically effected by the spring 31, and the valve remains open to supply air to the system behind the cartridge as long as the cartridge remains in the system. The construction and arrangement of the valve and its manner of operation will now be described.

The valve herein shown has the general

form of a flat disk and is fixed to the upper end of a vertically reciprocating valve stem 42 that extends through and has guiding engagement with a vertical tube 43. Said tube is supported on the lower horizontal member 44 of a yoke 45 that is suspended from the plate 25, the said arms 46 of said yoke being herein shown as made integral with said plate (Fig. 5). The guide tube is shown as exteriorly screw-threaded to engage interior screw-threads in a nut 47 integral with the horizontal member of the yoke. Said screw-threaded connection of the sleeve with the yoke is provided in order to adjust the valve toward and from its seat. The sleeve is arranged to be locked in adjusted positions by a lock nut 48 adapted to engage the lower end of the nut 47. The valve disk herein illustrated comprises upper and lower rigid disks 50, 51, respectively, and an intermediate relatively flexible member 52 which may be made of leather or like material, and which is adapted for direct contact with the seat surrounding the air inlet branch. The upper disk is made of smaller diameter than the lower disk and said disks are connected, and the flexible member clamped between the same, by a bolt 54 extending through axial apertures in the upper and lower plates and the intermediate part of the valve. The bolt has a head at one end and a nut 55 at the other end, whereby the upper and lower plates are clamped on the intermediate flexible member of the valve. The lower disk is provided at its margins with radial arms 56 which extend substantially to the margins of the flexible member of the valve. Thus, the flexible member is supported at circumferentially separated points by the relatively rigid arms of the lower disk, and in the portions intermediate the said supporting arms the flexible member is sufficiently flexible to adapt itself to the seat, notwithstanding slight irregularities of the seat and disk valve. The connection between the stem 42 and the disk valve is, in the present instance, a screw-threaded connection, the bolt 54, for this purpose, being provided with an axial screw-threaded opening, and the upper end of the stem being screw-threaded to extend there-through and engage the screw-threads thereof. The said stem 42 extends a distance above the disk valve and the upper end of the stem is arranged to be engaged by the gate when the latter is swung downwardly into its horizontal or open position, as indicated in Fig. 3. This action of the sending gate positively opens the check valve. The screw-threaded connection of the stem with the valve disk is provided in order to adjust the stem relatively to the disk, and this adjustment may be otherwise effected.

Normally, when the system is out of operation, the parts occupy the positions shown



in Fig. 2. When a cartridge is introduced into the terminal it first strikes the downwardly curved portion 40 of the latch 35 and releases the latch from the gate, and the further inward movement of the cartridge opens the said gate to the position shown in Fig. 3. The gate is opened in the first part of its movement by pressure applied to the outer end of the cartridge, and in the latter part of its movement by atmospheric pressure acting to force the cartridge into the tube. The gate, in moving inwardly and downwardly when it is being opened, engages the upper end of the stem 42 of the check valve and has the effect to mechanically force the disk valve off its seat and open the branch air inlet passage. Preferably, the gate is provided centrally on its inner side with a recessed contact piece 57 for engagement with the upper end of the check valve stem 42. The gate, when moved to its lowermost position, lies slightly below the plane of the bottom or floor of the terminal section, and the gate is provided on its exterior side with ribs 58, 58 which afford surfaces, in line with the floor of the terminal, over which the cartridge rides as it is moved past the inlet branch. Said flanges 58 also have the effect of stiffening the gate. After the cartridge has passed the gate, the gate is automatically closed by its spring. At this time, by reason of the arrangement of the gate with respect to the air inlet branch, and which, when in its open position, lies over the inlet branch or inlet passage, the cartridge has passed beyond said air inlet passage so that the air at atmospheric pressure acts on the rear end of the cartridge through said inlet passage to force the cartridge through the tube. The check valve 27 remains open until the cartridge is discharged from the system, after which the velocity of the air in the tube is increased and its pressure is decreased to such extent that atmospheric pressure acting on the lower side of the check valve closes said valve and thereby seals the tube. The tube remains sealed until another cartridge is delivered to the system for transit therethrough.

The screw-threaded arrangement of the valve stem 42 of the disk valve enables said stem to be extended more or less into the terminal to be engaged at the proper time with the downwardly swinging gate. The lower or open position of the valve is limited by contact of the lower end of the bolt 54 with the upper end of the adjusted sleeve 43. By reason of the screw-threaded engagement of said sleeve with the yoke which carries it, the said sleeve may be raised or lowered as desired to vary the extent of the opening of the valve and to thereby adjust the valve to different lengths of transit tubes.

The arrangement of the stem 42 or other

part of the check valve to be engaged by the gate when the latter is swung inwardly to open the same, and thereby positively force the valve off its seat, is advantageous inasmuch as it secures a prompt and full opening of the valve and insures that the valve will be held fully open until the cartridge is fully delivered into the terminal and the sending gate closed. The location and arrangement of the sending gate 22 relatively to the branch inlet passage, as herein shown, is advantageous, however, regardless of the means for positively opening the check valve, inasmuch as the raising of the pressure in the tube, when the sending gate is opened, will ordinarily have the effect of balancing the pressure on opposite ends of the check valve and allow it to drop to its open position; and the extension of the open gate over the inlet branch at this time insures that the cartridge shall be delivered entirely past the air inlet branch before the gate is closed. Thereby, the check valve is prevented from being prematurely closed with a cartridge partially delivered to the terminal.

In Figs. 8, 9 and 10 I have shown a modified arrangement wherein the support for the valve stem 42 of the check valve 27 is contained within and supported by a tube extension 60 that is telescoped into the lower end of the branch section 61, which latter corresponds to the branch section 26 of the previously described construction. The branch section 61 is longitudinally slitted at one side and is provided at the sides of its slit with lugs 62, 62 through which extends a clamping screw 63 by which to clamp the branch section of the tube extension 60 and lock it in place. In this construction, the seat for the check valve is formed on the lower end of the tube extension 60. The said tube extension 60 carries interior spider arms 64, 64 having central guide members 65, 65 upwardly through which the valve stem 42 extends. The lower end of the stem is screw-threaded to engage upper and lower screw-threaded nuts 66, 66 by which the parts of the disk valve are clamped together. The said stem is screw-threaded for a sufficient length to enable the valve stem to be adjusted relatively to the valve to extend at a greater or less distance into the terminal for the same purpose as described in connection with the other construction. The opening movement of the check valve is limited by a shoulder on the stem comprising a nut 67 which has screw-threaded engagement with the upper end of the stem above the uppermost spider 64. The screw-threaded engagement of said nut 67 with the stem permits the adjustment of the valve to vary its distance from the seat when the valve is open. The operation of this form of device is essentially the same as in the



device previously described. In this construction it will be noted that the adjustment for the valve 27 to vary its distance from its seat is wholly inclosed so as to prevent such adjustment from being accidentally disarranged.

It will be understood that the structural details of the device described and the general arrangement and application thereof may be varied within the scope of the invention, and that the invention is not thus limited except as hereinafter made the subject of specific claims.

I claim as my invention:—

1. In a pneumatic despatch tube system, the combination with a despatch tube arranged to be normally sealed and connected with means for exhausting air therefrom, a sending terminal provided with a self closing sending gate and provided in rear of the gate with an air inlet branch, a check valve for closing said branch, and subjected at one side to the pressure within the tube and at the other side to atmospheric pressure, and mechanical means operated by the gate for unseating the check valve when the gate is open.

2. In a pneumatic despatch tube system, the combination with a despatch tube arranged to be normally sealed and connected with means for exhausting air therefrom, a sending terminal provided with a self closing sending gate and provided in rear of the gate with an air inlet branch, and a check valve for closing said branch, and subjected at one side to the pressure within the tube and at the other side to atmospheric pressure, said check valve having a part arranged to be engaged by the gate, when the latter is opened, to unseat the check valve.

3. In a pneumatic despatch tube system, the combination with a despatch tube arranged to be normally sealed and connected with means for exhausting air therefrom, a sending terminal provided with a sending gate and provided in rear of the gate with an air inlet branch, and a check valve for closing said branch, said check valve being subjected at one side to the pressure within the tube and at its other side to atmospheric pressure and being provided with a part adapted for engagement by the gate, when the gate is opened, to unseat the check valve.

4. In a pneumatic despatch tube system, the combination with a despatch tube arranged to be normally sealed and connected with means for exhausting air therefrom, a sending terminal provided with an inwardly opening sending gate, and provided in rear of said gate with an air inlet branch, a check valve for closing the branch, said valve being subjected at one side to the pressure within the tube and at the other side to atmospheric pressure, and a guide stem for said check valve arranged to project into

the terminal to be engaged by the sending gate when the latter is swung inwardly to its open position.

5. In a pneumatic despatch tube system, the combination with a despatch tube arranged to be normally sealed and connected with means for exhausting air therefrom, a sending terminal provided with an inwardly opening sending gate, and provided in rear of said gate with an air inlet branch, a check valve for closing the branch, said valve being subjected at one side to the pressure within the tube and at the other side to atmospheric pressure, and a guide stem for said check valve arranged to project into the terminal to be engaged by the sending gate when the latter is swung inwardly to its open position, said stem having screw-threaded engagement with the check valve whereby it may be adjusted toward and from the center of the terminal relatively to the check valve.

6. In a pneumatic despatch tube system, the combination with a despatch tube arranged to be normally sealed and connected with means for exhausting air therefrom, a sending terminal provided with an inwardly opening sending gate, and provided in rear of said gate with an air inlet branch, a check valve for closing the branch, said valve being subjected at one side to the pressure within the tube and at its other side to atmospheric pressure, a guide stem for said check valve arranged to project into the terminal to be engaged by the sending gate when the latter is swung inwardly to its open position, and means for adjusting the stem toward and from the center of the terminal relatively to said check valve.

7. In a pneumatic despatch tube system, the combination with a despatch tube arranged to be normally sealed and connected with means for exhausting air therefrom, a sending terminal provided with a swinging, inwardly opening sending gate and provided in rear of the gate with an air inlet branch, a check valve adjustable toward and from the branch for closing the branch and subjected at one side to the pressure within the tube and at the other side to atmospheric pressure, and a part on the check valve arranged to be engaged by the gate, when the latter is swung inwardly, to unseat said check valve.

8. In a pneumatic despatch tube system, the combination with a despatch tube arranged to be normally sealed and connected with means for exhausting air therefrom, a sending terminal provided with a swinging, inwardly opening self-closing sending gate and immediately inside the gate with an air inlet branch, a check valve for closing the branch, subjected at one side to the pressure in the tube and at the other side to atmospheric pressure, means whereby the check



valve is positively moved to be unseated when the gate is opened, and a latch for locking the gate closed arranged to be engaged by a cartridge and to be released from the gate upon the admission of a cartridge to the terminal.

9. In a pneumatic despatch tube system, the combination with a despatch tube arranged to be normally sealed and connected with means for exhausting air therefrom, a sending terminal provided with a swinging, inwardly opening, self-closing sending gate and immediately inside the gate with an air inlet branch, a check valve for closing the branch, subjected at one side to the pressure in the tube and at the other side to atmospheric pressure, means whereby the check valve is positively moved to be unseated when the gate is opened, and a pivoted latch for locking the gate closed, said latch being provided at a point within the receiving mouth of the terminal at the outer side of the gate with a part arranged to be engaged by a cartridge entering the terminal in a manner to be released from the gate when a cartridge is inserted into the terminal.

10. In a pneumatic despatch tube system, the combination with a despatch tube arranged to be normally sealed and connected with means for exhausting air therefrom, a sending terminal provided with a swinging, inwardly opening, self-closing gate, a gravity locking latch pivoted at one end to the terminal in front of the gate and engaging at its other end the gate in a manner to lock the same closed, the terminal being slotted and the latch being provided with a part which extends into the terminal through said slot to be engaged by a cartridge when inserted into the terminal and to be released from the gate.

11. In a pneumatic despatch tube system, the combination with a despatch tube arranged to be normally sealed and connected with means for exhausting air therefrom, a sending terminal provided with a swinging, inwardly opening, self-closing gate, and provided immediately inside the gate with an air inlet branch, and a check valve, controlled by variations of pressure within the tube to cut off the passage of air through said branch, said gate, when swung in its open position, extending over and covering the opening of the branch into the terminal.

12. In a pneumatic despatch tube system, the combination with a despatch tube arranged to be normally sealed and connected with means for exhausting air therefrom, a sending terminal provided with a swinging, inwardly opening, self-closing gate and provided immediately inside the gate with an air inlet branch, and a check valve, controlled by variations of pressure within the tube, to cut off the passage of air through the branch, said gate being hinged at a

point below the floor of the terminal and arranged, when swung downwardly into its open position, to close the opening of the branch into the terminal, and the gate being provided on its outer side with ribs which, when the gate is in its horizontal position, lie flush with the floor of the terminal.

13. In a pneumatic despatch tube system, the combination with a despatch tube arranged to be normally sealed and connected with means for exhausting air therefrom, a sending terminal provided with a sending gate and in rear of said gate with an air inlet branch, a check valve for closing said branch and subjected at one side to the pressure within the tube and at the other side to atmospheric pressure, a guide stem for said check valve, and a guide for the stem, said branch embracing a telescopic extension which contains said guide.

14. In a pneumatic despatch tube system, the combination with a despatch tube arranged to be normally sealed and connected with means for exhausting air therefrom, a sending terminal provided with a swinging, inwardly opening, self-closing gate and provided immediately inside the gate with an air inlet branch, and a check valve, controlled by variations of pressure within the tube, to cut off the passage of air through the branch, said gate being hinged at a point below the floor of the terminal and arranged, when swung downwardly into open position, to close the opening of the branch into the terminal, and the gate being provided on its outer side with ribs which, when the gate is in its horizontal position, lie flush with the floor of the terminal, and means within the branch for varying the opening movement of the check valve.

15. A sending terminal for a pneumatic despatch tube, provided with a swinging, inwardly opening sending gate and with an air inlet branch in rear of the gate, means for locking the gate closed and arranged to release the gate when a cartridge is inserted into the terminal, a check valve for closing the air inlet branch, and a part on the check valve arranged to be engaged by the gate when the latter is swung open to unseat the valve.

16. A sending terminal for a pneumatic despatch tube, provided with a swinging, inwardly opening sending gate and with an air inlet branch in rear of the gate, means for locking the gate closed and arranged to release the gate when a cartridge is inserted into the terminal, a check valve for closing the air inlet branch, a stem on which said check valve is mounted, and a guide engaging the stem for guiding the check valve toward and from its seat, said stem extending into the terminal in position to be engaged by the gate when swung to its open position.



17. A sending terminal for a pneumatic despatch tube, provided with a swinging, inwardly opening sending gate and with an air inlet branch in rear of the gate, means  
 5 for locking the gate closed and arranged to release the gate when a cartridge is inserted into the terminal, a check valve for closing the air inlet branch, a stem on which said check valve is mounted, a guide engaging  
 10 the stem for guiding the check valve toward and from its seat, said stem extending into the terminal in position to be engaged by the gate when swung to its open position, and said branch embracing a removable extension on the outer end of which is formed a seat for the check valve and in which said guide is mounted.

18. A sending terminal for a pneumatic despatch tube, provided with a swinging, inwardly opening sending gate and with an air inlet branch in rear of the gate, means  
 20 for locking the gate closed and arranged to release the gate when a cartridge is inserted into the terminal, a check valve for closing the air inlet branch, a stem on which said check valve is mounted, a guide engaging the stem for guiding the check valve toward and from its seat, said stem extending into the terminal in position to be engaged by  
 30 the gate when swung to its open position, and said branch embracing a removable extension on the outer end of which is formed a seat for the check valve in which said guide is mounted.

19. A sending terminal for a pneumatic despatch tube, provided with a swinging, inwardly opening sending gate and with an air inlet branch in rear of the gate, means  
 35 for locking the gate closed and arranged to release the gate when a cartridge is inserted into the terminal, a check valve for closing the air inlet branch, a stem on which said check valve is mounted, guides engaging the stem for guiding the check valve toward  
 40 and from its seat, said stem extending into the terminal in position to be engaged by the gate when swung to its open position, and means for adjusting the stem relatively

to the check valve toward and from the terminal.

20. A sending terminal for a pneumatic despatch tube, provided with a swinging, inwardly opening self-closing sending gate, and provided in rear of the gate with an air inlet branch, said gate being arranged to  
 55 bridge the opening into said air inlet branch when occupying its open position, and a check valve for governing said air inlet branch arranged to be acted directly upon by pressure in the tube at one side, and at  
 60 its other side by atmospheric pressure.

21. A sending terminal for a pneumatic despatch tube comprising a tubular section having a flaring mouth, a swinging, inwardly opening, self-closing gate for closing  
 65 the terminal, and a latch pivoted at one end to the terminal, and provided at its other end with a tooth for engaging the gate to lock the gate closed, said terminal being located in line with the latch, and the  
 70 latch having a part extending through the slot into the path of the cartridge, whereby the latch is released from the gate to permit the gate to be forced open by a cartridge when a cartridge is inserted into the  
 75 terminal.

22. A terminal for a pneumatic despatch tube, provided with a swinging, inwardly opening gate, an air inlet branch opening into the terminal in rear of said gate, over  
 80 which the gate is swung when opened, said branch comprising a fixed member and a removable member joined in a plane transverse to the axis of the branch, said gate being hinged to the removable member and  
 85 being adapted to be removed therewith, and a check valve for controlling said branch.

In testimony, that I claim the foregoing as my invention I affix my signature in the presence of two witnesses, this 5th day of 90 February A. D. 1909.

FRANKLIN H. WOLEVER.

Witnesses:

W. L. HALL,  
 GEORGE R. WILKINS.