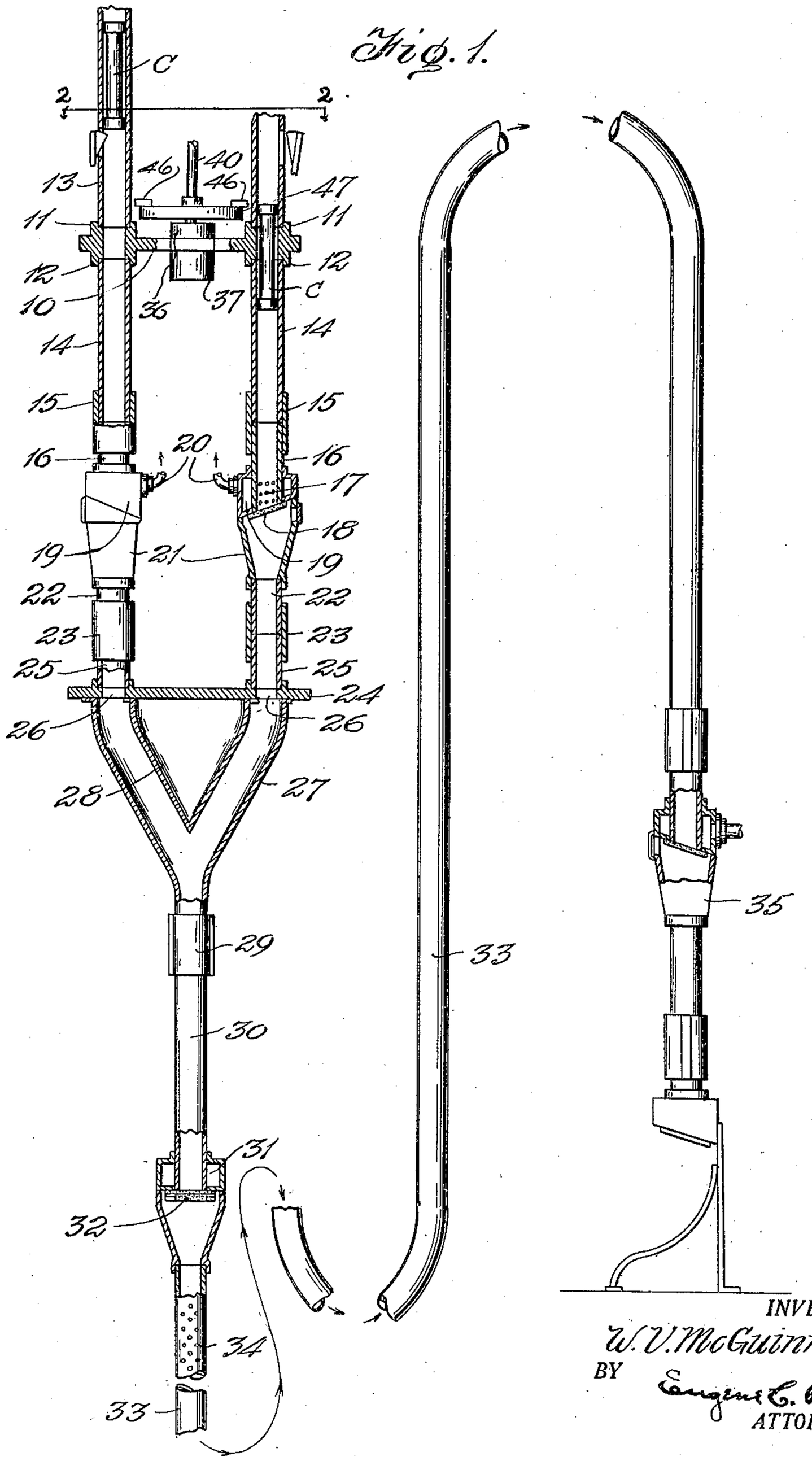
Dec. 16, 1930. W. V. McGUINNESS 1,784,968

PNEUMATIC TUBE SYSTEM

Filed Jan. 20, 1930 3 Sheets-Sheet 1

Fig. 1.



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Filed Jan. 20, 1930 3 Sheets-Sheet 2

Fig. 2.

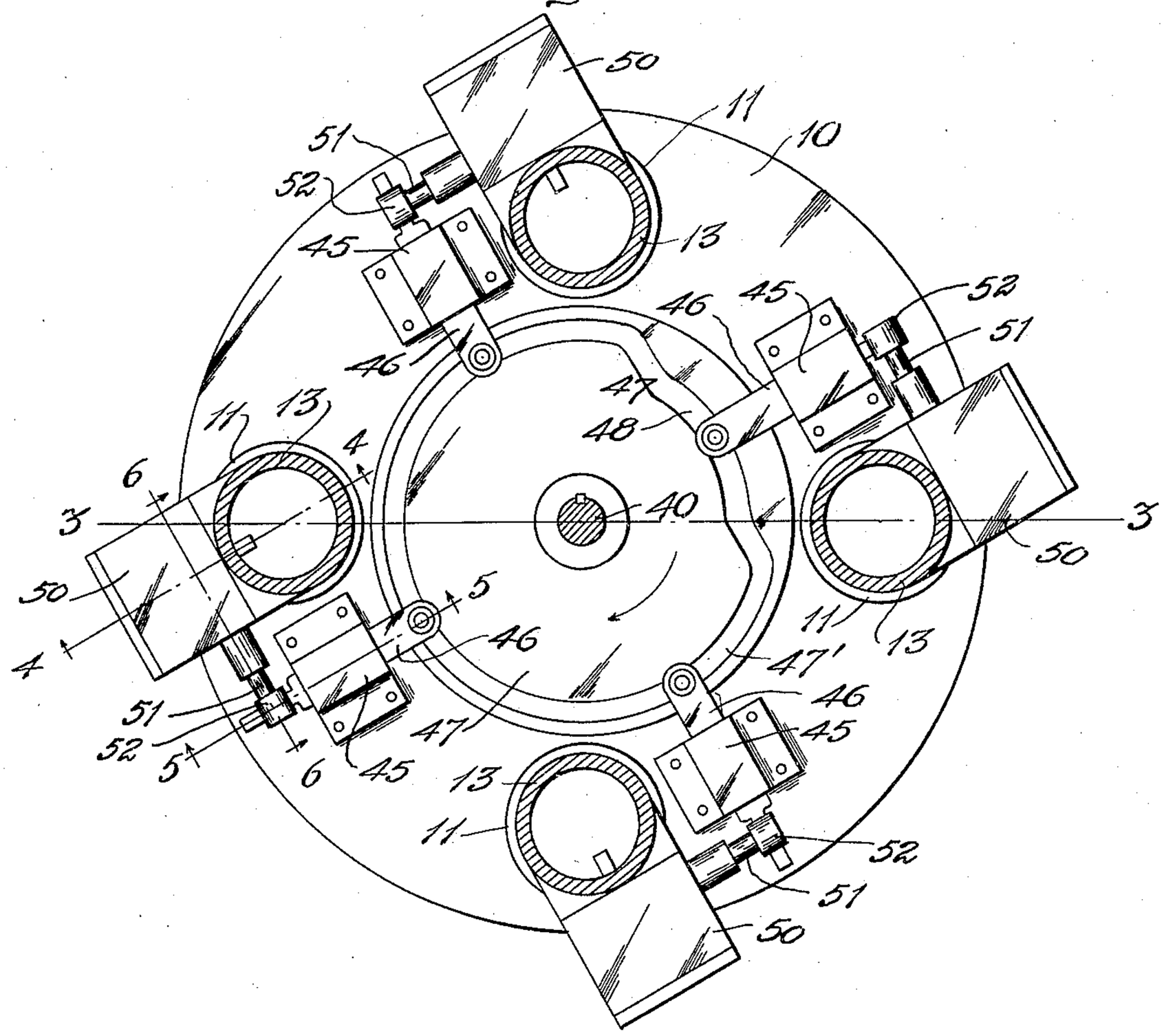
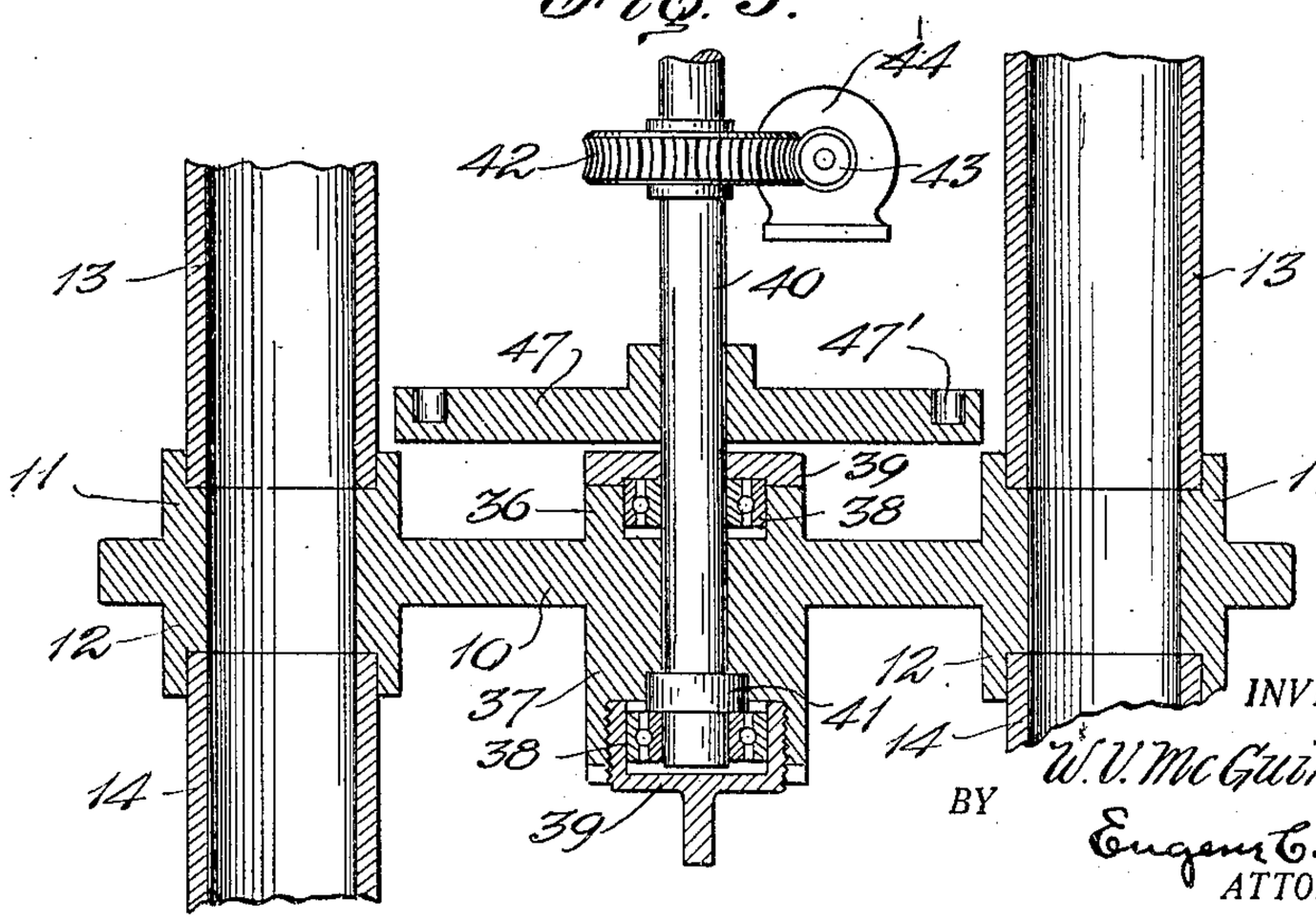


Fig. 3.



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Filed Jan. 20, 1930 3 Sheets-Sheet 3

Fig. 4

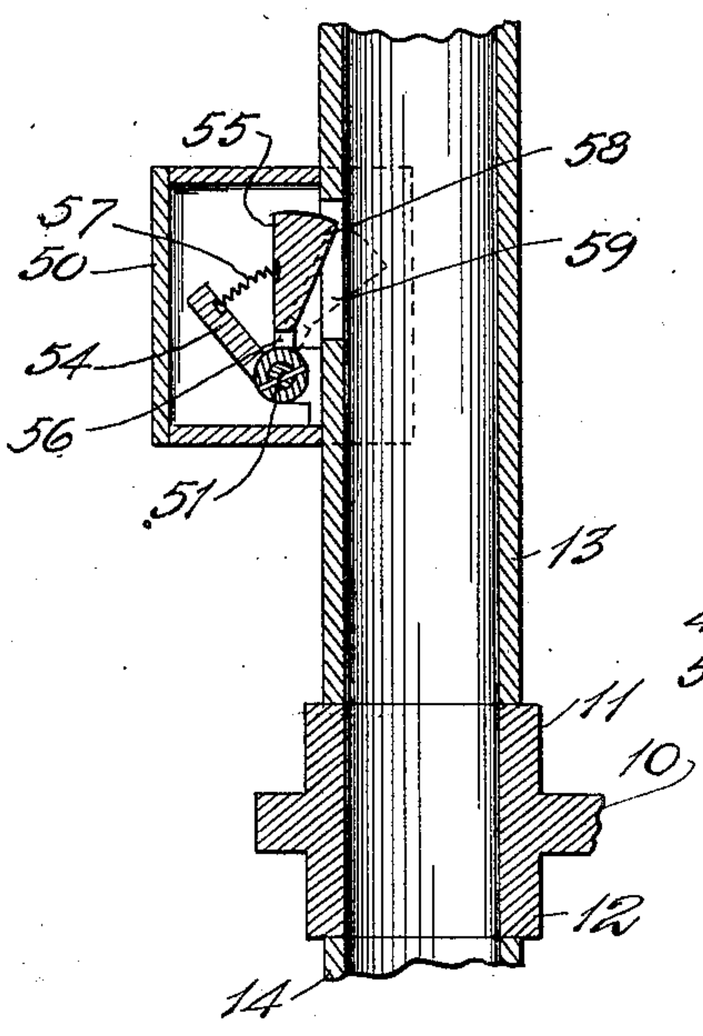


Fig. 5.

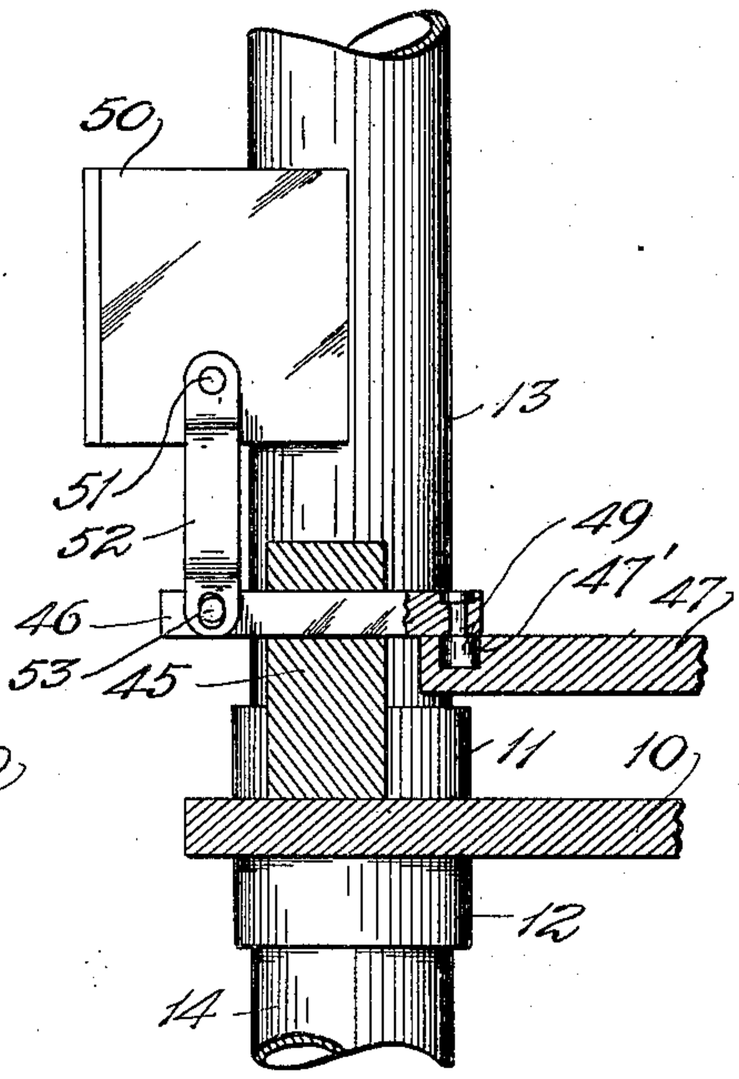
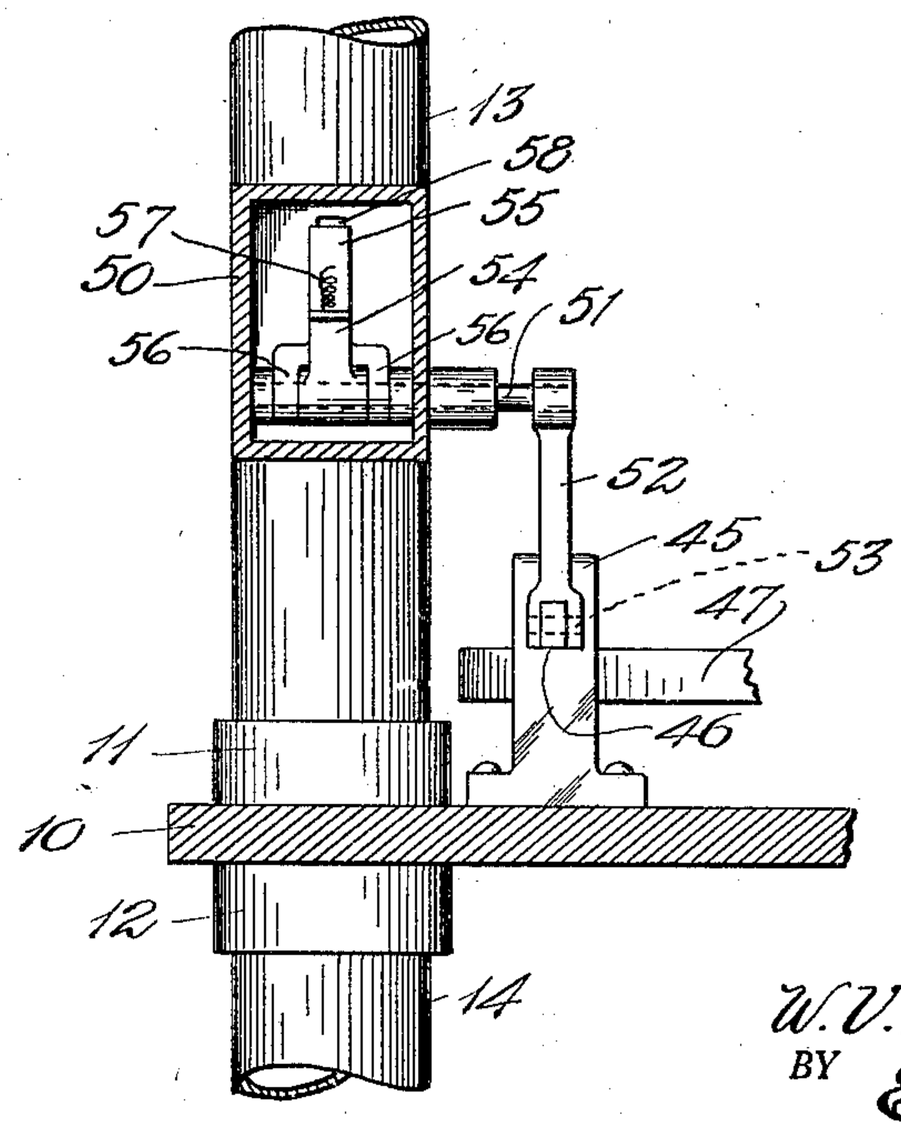


Fig. 6.



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UNITED STATES PATENT OFFICE

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PNEUMATIC-TUBE SYSTEM

Application filed January 20, 1930. Serial No. 422,195.

This invention relates to pneumatic tube systems wherein tubular carriers are employed to carry messages and the like through transmission tubes under pneumatic pressure.

In systems of this character it is desirable to keep the amount of transmission tubing used as low as possible and to do this it is necessary to keep the number of long tubes, such as run between main points or stations as few in number as will suffice for the number of carriers to be sent between such main stations. To this end it has been customary to have short tube lines between various branch stations and an adjacent main station, the carriers from a number of these short tube lines being received at the main station and redispatched through a single main tube line. To do this it has been necessary to employ the services of an attendant constantly, since the branch tubes could not open directly into the main tube without liability of a carrier from the branch tube and a carrier moving in the main tube colliding and jamming the tubes.

Among the objects of the present invention are to provide a novel and effective arrangement for controlling the passage of carriers from branch tubes into a main tube so that possibility of collision and jamming will be eliminated; to provide a novel arrangement of gathering head or chute wherefrom the main tube leads and whereto branch tubes having carrier stops connect, the branch tubes being provided with carrier stops for opening but one tube at a time for the passage of a carrier to the chute; and to provide a simple means for operating the carrier stops of such branch tubes in succession.

With the above and other objects in view the invention will now be described in detail and then specifically claimed, reference being had to the accompanying drawings, wherein:—

Figure 1 is a view partly in elevation and partly in section showing an embodiment of the invention;

Figure 2 is an enlarged section on the line 2—2 of Figure 1;

Figure 3 is a sectional view on the line 3—3 of Figure 2;

Figure 4 is a detail section on the line 4—4 of Figure 2;

Figure 5 is a similar view on the line 5—5 of Figure 2;

Figure 6 is a detail section on the line 6—6 of Figure 2.

While I have illustrated four branch station tubes feeding to a single tube it will be obvious that, by slight modifications any desired number of branch station tubes may deliver to a single tube, the same principles being used in each case. It is, therefore, to be understood that in any reference made herein to four branch station tubes, no restriction to this number is meant or is to be understood.

In this embodiment there is illustrated a multiple union consisting of a plate or disk 10 having adjacent its periphery equally spaced upwardly extending hollow bosses 11 and alined downwardly extending hollow bosses 12, the alined bosses being bored through from top to bottom and the bores being provided with shouldered countersunk extremities. Branch station tubes 13 are fitted in the upper bosses 11 and nipples 14 are fitted in the lower bosses and extend downwardly therefrom. Union sleeves 15 are fitted on the lower ends of these tubes 14 and receive the upper ends of nipples 16, which have their lower ends provided with perforations 17. The bottoms of these nipples 16 are bevelled and are each normally closed by a downwardly opening flap valve 18. Suction heads 19 surround the perforated portions 17 of the nipples 16 and vacuum pipes 20 lead from these heads to a suitable vacuum pump (not shown). Tapered housings 21 lead downwardly from the suction heads, the valves 16 being housed therein, and nipples 22 lead from the lower ends of these housings to union sleeves 23. A base plate 24 is located beneath the sleeves 23 and nipples 25 are mounted on this base plate which is provided with suitable shouldered openings 26 to receive the lower ends of these nipples.

An inverted substantially conical carrier

collector chute 27 is secured by its base to the plate 24, the wall of this chute surrounding the openings 26, while centrally of this chute is an inverted conical guide 28 also secured by its base to the plate 24. This guide prevents the carriers C from moving to take a position across the chute. A sleeve 29 connects the lower end of this chute to a nipple 30 which has its lower end connected to a housing 31, wherein is a flap valve 32 normally closing the lower end of the nipple 30. A transmission tube 33 leads from the housing 31 and has air admission perforations or ports 34 formed near the housing. This tube leads to a main receiving station and is there provided with a receiving head 35.

A bearing box 36 projects upwardly from the center of the disk 10 and a similar bearing box 37 projects downwardly from the disk in alinement with the box 36. Ball bearings 38 are mounted in these boxes and are held in position by caps 39. A shaft 40 extends through the disk 10 centrally thereof and is supported in the ball bearings 38, this shaft being provided just above the lower ball bearing with a thrust collar 41 to take the downward thrust of the shaft. A worm wheel 42 is fixed on this shaft for engagement by a worm 43 driven by a suitable motor 44. Adjacent each of the bosses 11 is a radially disposed guide 45 wherein a plunger 46 is slidably mounted for radial movement with respect to the shaft 40. A cam disk 47 is keyed or otherwise fixed on the shaft 40 just below the plungers 46 and is provided with a cam groove 47′ extending around the disk adjacent its periphery. The greater portion of this groove is concentric to the shaft 40 but for a short distance the groove 47′ is offset toward the shaft, this part constituting what may be termed the active portion 48 of the cam. It will be noted that there is but one such active portion 48 and the arcuate extent of this portion is less than the arcuate distance between adjacent branch tubes. A cam roller 49 is mounted beneath the inner end of each plunger 46 and engages in the cam groove so that rotation of the cam effects successive movement of the several plungers, first inwardly and then outwardly. Because of the shortness of the active portion of the cam groove, only one plunger is moved from its outer or normal position at a time and each plunger is restored to its normal position prior to actuation of the next successive plunger. A stop housing 50 is mounted on each tube 13 and a stop shaft 51 is journalled in the side walls of this housing and lies at right angles to the respective plunger with one end projecting from the housing to a position above the outer end of said plunger. A rock arm 52 is fixed on this shaft end and is forked at its lower end to straddle the plunger, a pin 53 securing the two together. A second rock arm 54 is fixed on the shaft within its housing and projects upwardly and normally outwardly from the shaft. A stop arm 55 is provided with a downwardly extending pair of bearing legs 56 which straddle the rock arm 54 and support the arm 55 revolubly on the shaft 51. A coiled spring 57 has its ends fixed respectively to the rock arm 54 and stop arm 55 so that movement of the plunger 46 inwardly by the cam will rock the stop arm outwardly and outward movement of the plunger will tend to rock the stop arm inwardly. A stop 58 is carried on the inner face of this arm 55 and projects, upon inward movement of said arm, through a slot 59 in the side of the tube 13. Obviously, when thus projected inwardly a carrier moving through the tube 13 will be stopped and, as this inwardly projected position is the normal position of these stops, carriers cannot pass down these tubes until the cam acts to move the stop outwardly. Since but one stop at a time can occupy this outward or release position, the carriers from only one tube at a time can pass into the gathering chute and from there into the transmission tube. Thus, interference of the carriers with each other and consequent jamming of the system is prevented.

The purpose of the spring 57 is to permit the rock arm 54 to move to normal position in case a carrier happens to be opposite the slot 59 at a time when such movement takes place so that the stop 58 engages the side of the carrier. Under such circumstances the spring yields and no damage is done, either to the carrier or to any part of the stop mechanism.

It is obvious that my invention is not restricted to the exact form and construction shown herein for purposes of illustration and that various changes and modifications will be obvious to engineers familiar with pneumatic tube systems.

I claim:

1. In a pneumatic tube system, a plurality of transmission tubes, a collector chute to which said tubes lead, a single tube leading from said chute, and means governing the passage of carriers through the plurality of tubes and arranged to permit carriers from only one tube to enter the chute at a time.

2. In a pneumatic tube system, a set of transmission tubes, a collector chute to which the tubes of the set lead, a single tube leading from said collector chute, carrier stops each normally extending into a respective tube of said set, and means for successively withdrawing and replacing said stops.

3. In a pneumatic tube system, a set of transmission tubes, a collector chute to which the tubes of the set lead, a single tube leading from said collector chute, carrier stops each normally extending into a respective tube of said set, a rotating cam member having a single active portion and operative connections between said stops and cam mem-

ber whereby the stops are successively withdrawn and replaced.

4. In a pneumatic tube system, a collector chute, a plurality of tubes leading thereto and normally closed against the passage of carriers, and means for alternately opening and closing said tubes in succession against the passage of carriers.

5. In a pneumatic tube system, a collector chute, a plurality of tubes leading thereto and normally closed against the passage of carriers, and means for alternately opening and closing said tubes in succession and arranged to close each tube against the passage of carriers prior to opening the next tube.

6. In a pneumatic tube system, an inverted substantially conical chute having a delivery opening at its apex, a plurality of pneumatic tubes leading to the base of said chute and opening into the chute, carrier stops each associated with a respective tube and normally positioned to stop a carrier moving through said tube, and means to move said stops from and to normal position in succession.

7. In a pneumatic tube system, an inverted substantially conical chute having a delivery opening at its apex, an inverted conical guide coaxial with said chute and having its base in the plane of the base of the chute, a plurality of pneumatic tubes opening through the base of the chute around the guide, carrier stops each associated with a respective tube and normally positioned to stop a carrier moving through said tube, a rotating cam member having a single active portion and operative connections between said cam member and said stops, said active cam portion being arranged to engage said connections singly in succession.

In testimony whereof I affix my signature.

WILLIAM V. McGUINNESS.