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F. B. MORRISON.  
ANGLE COCK FOR PRESSURE BRAKE SYSTEMS.

APPLICATION FILED AUG. 15, 1902.

NO MODEL.

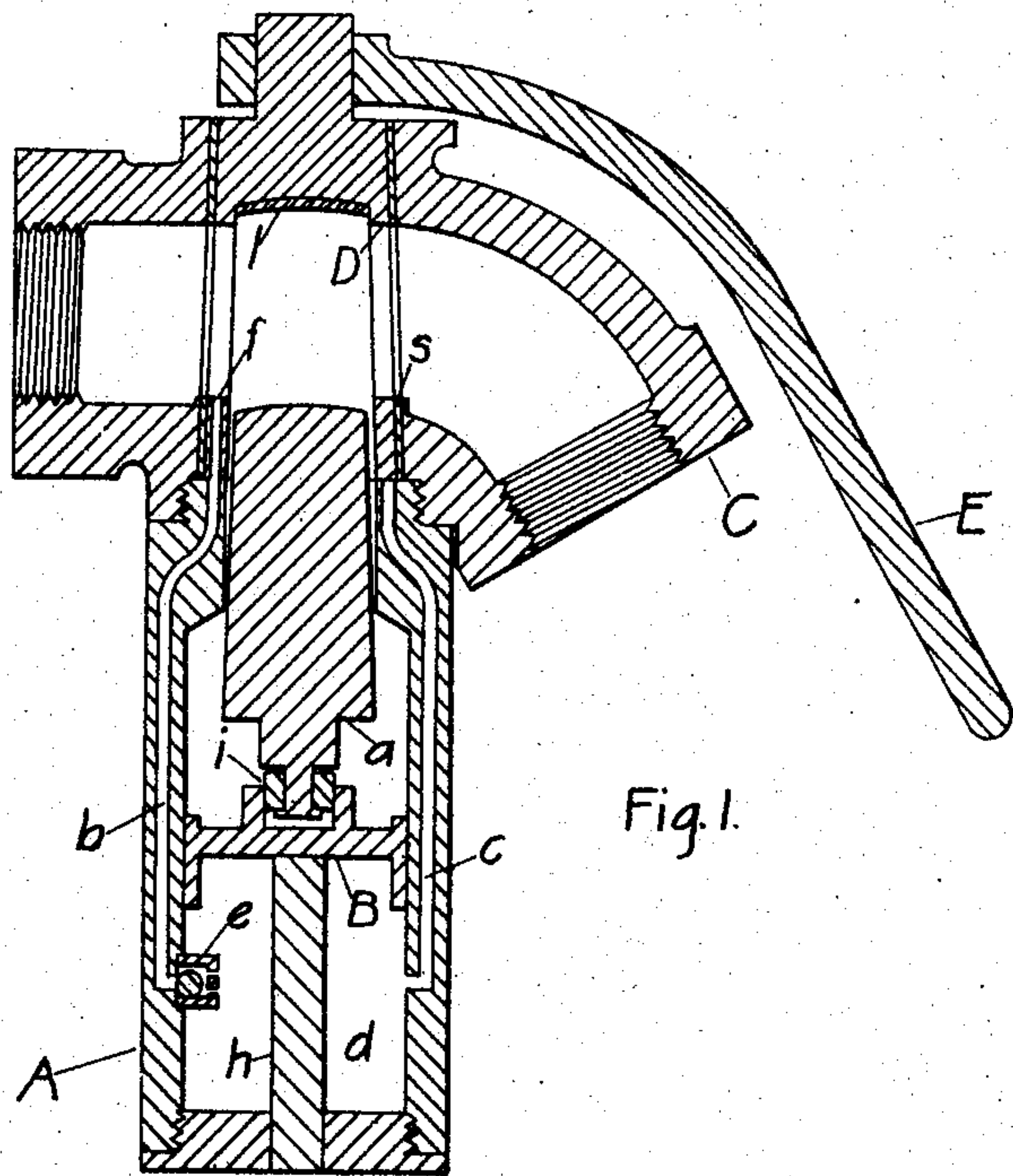


Fig. 1.

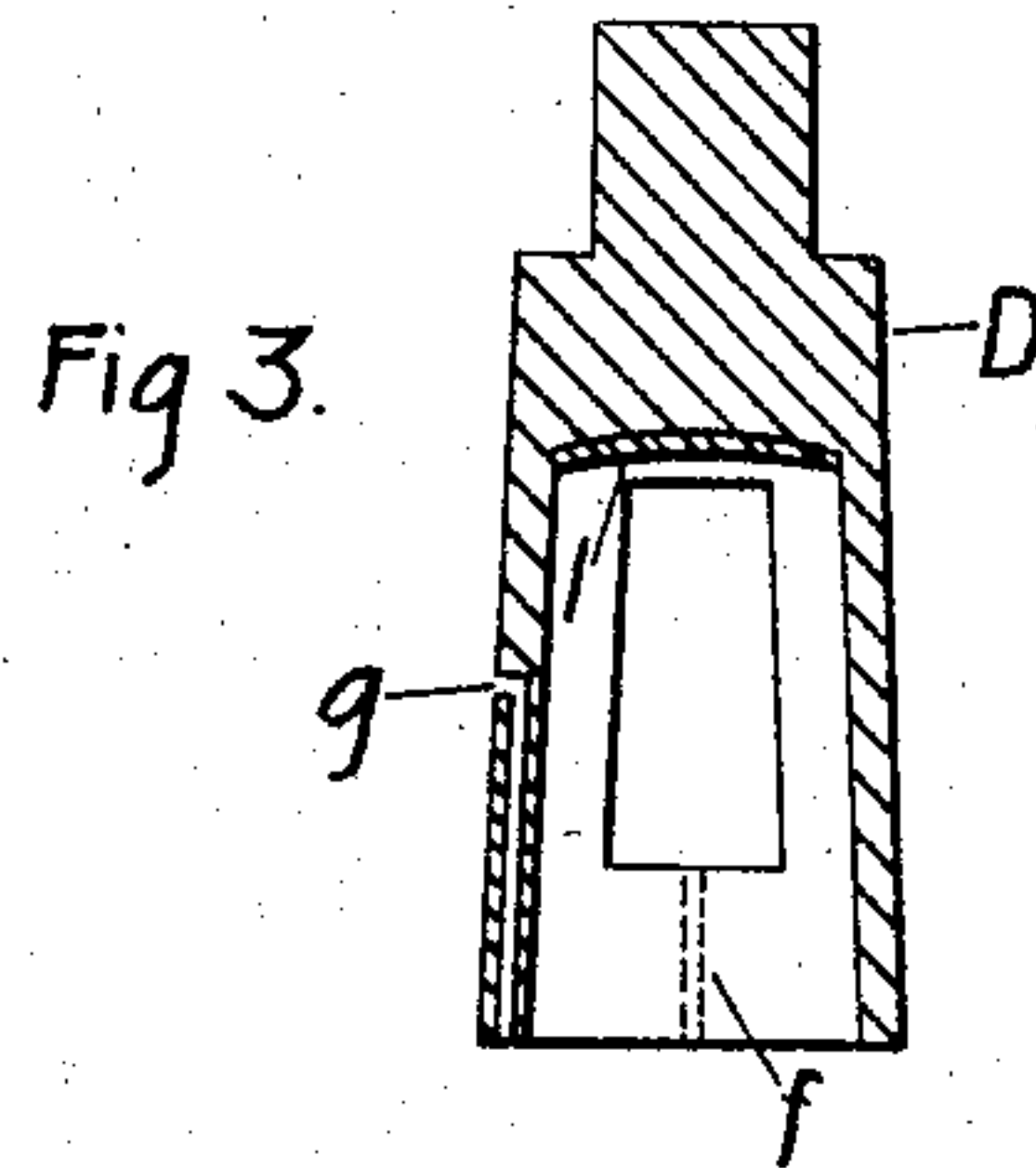


Fig. 3.

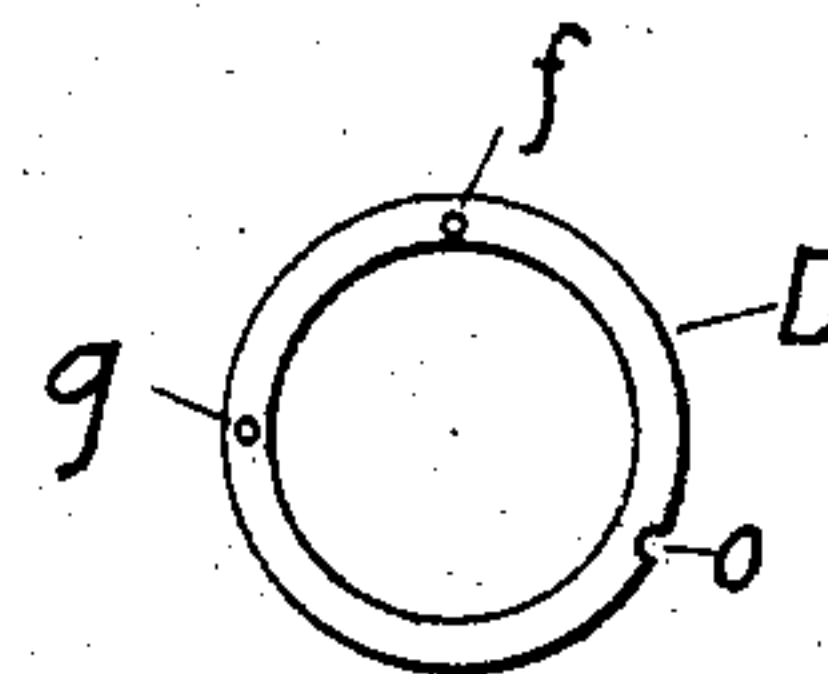


Fig. 4.

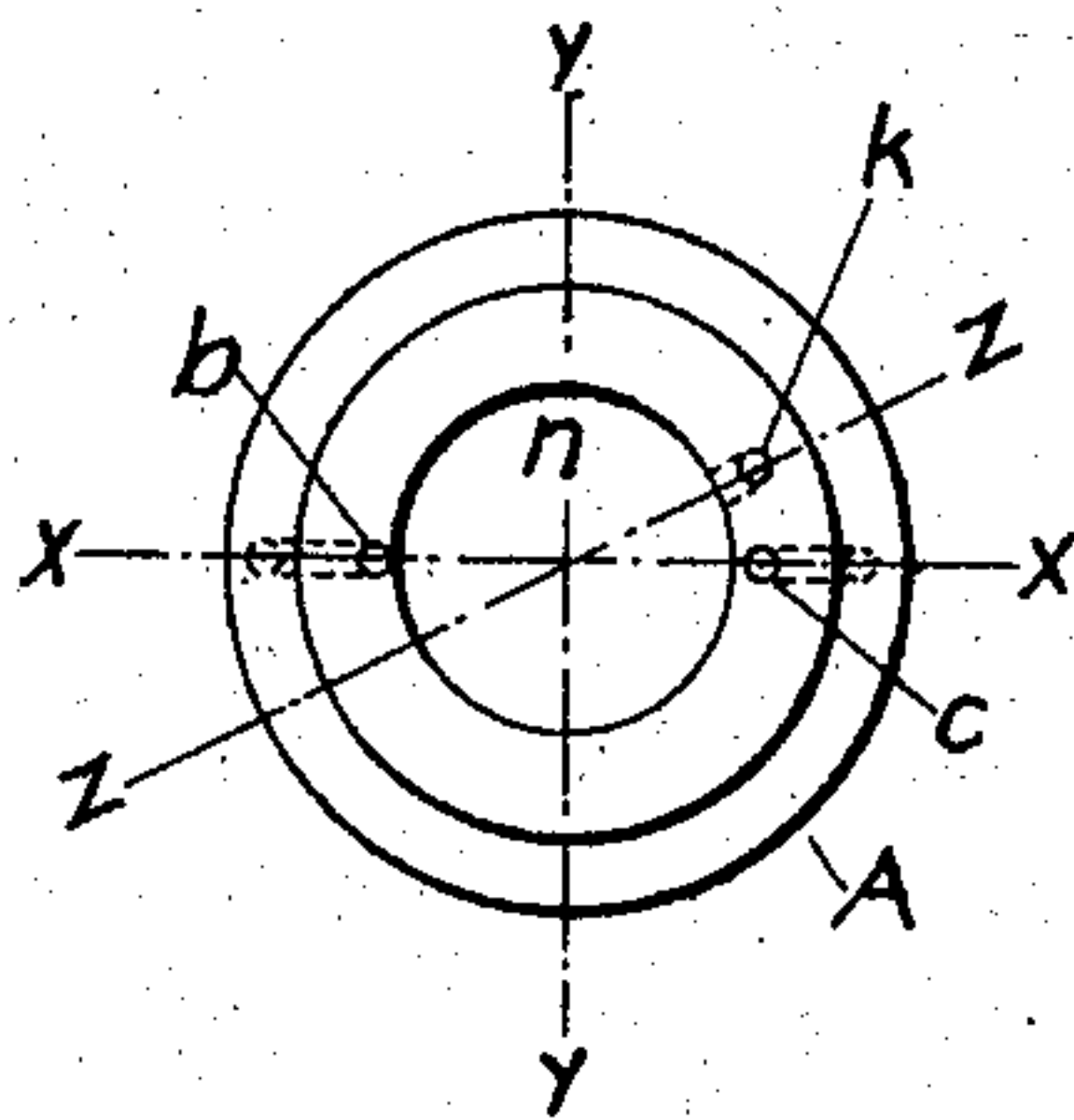


Fig. 2.

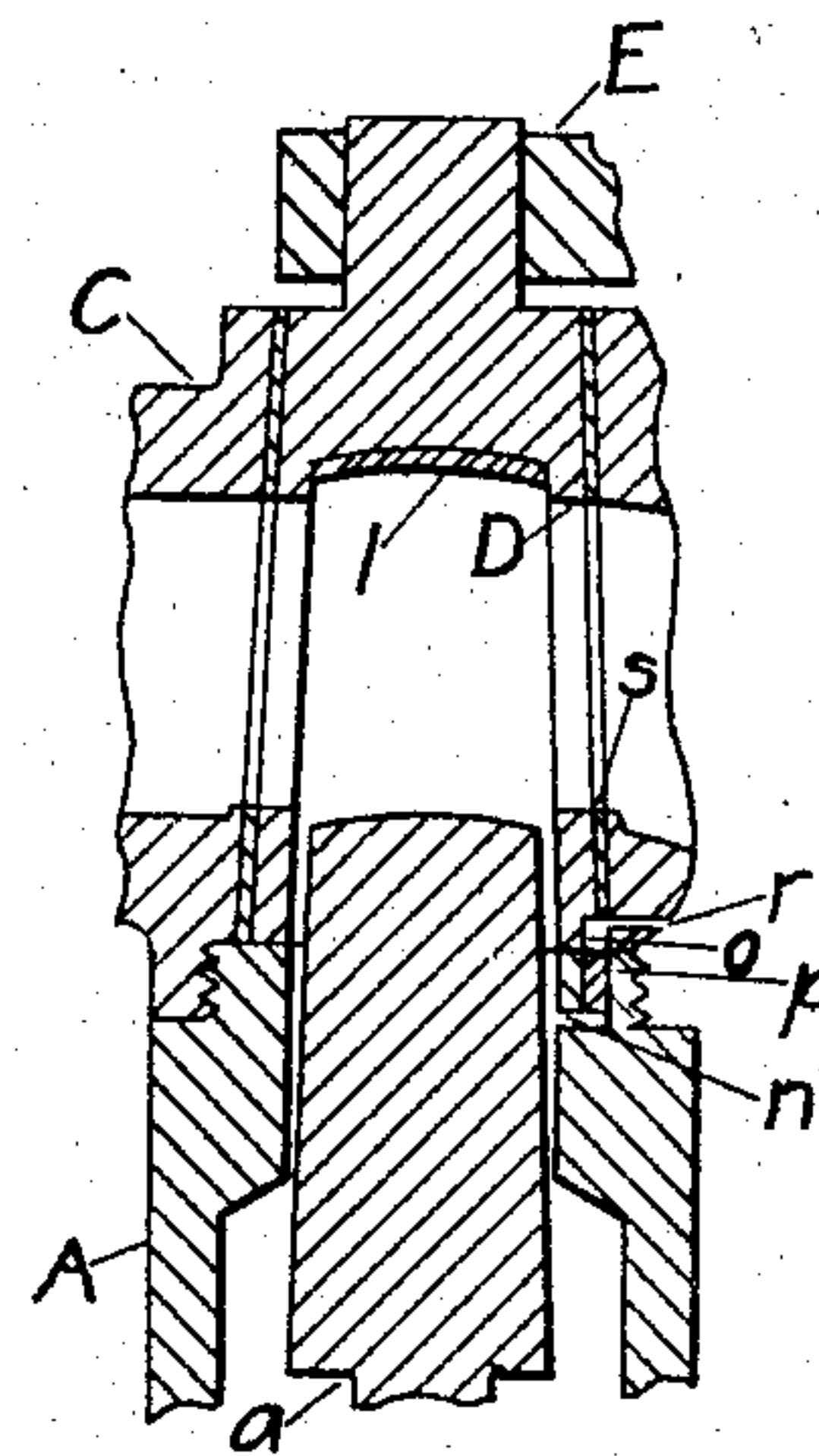


Fig. 5.

Witnesses.  
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# UNITED STATES PATENT OFFICE.

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## ANGLE-COCK FOR PRESSURE BRAKE SYSTEMS.

SPECIFICATION forming part of Letters Patent No. 772,952, dated October 25, 1904.

Application filed August 15, 1902. Serial No. 119,770. (No model.)

*To all whom it may concern:*

Be it known that I, FRANK B. MORRISON, a citizen of the United States, residing at Toledo, in the county of Lucas, State of Ohio, have  
5 invented certain new and useful Improvements in Angle-Cocks for Fluid-Pressure Brake Systems, of which the following is a specification.

In air-brake systems it is customary to employ hand-operated cocks or valves in the ends  
10 of train-pipe sections at each end of each car and the rear ends of the locomotive and tender. The coupling-hose sections are connected with these cocks, and when two cars are coupled the cocks are opened by the trainmen in order  
15 to connect the train-pipe sections of the two adjoining cars. The locomotive and tender are connected in a similar manner. In this way when the train is made up a free passage is established through the train-pipe and an-  
20 gle-cocks from the engine to the rear car connected up. The train-pipe is filled with compressed air from the engine, and when the air in the train-pipe attains a determined pressure the brakes are held off. By relieving the  
25 pressure the brakes throughout the train may be applied. Sometimes the train-pipe bursts or the coupling-hose bursts or is broken by the train parting. When this occurs, unless  
30 some provision is made to prevent it, the pressure in the train-pipe is suddenly reduced to such an extent that the brakes are suddenly applied on the cars of the train equipped with the air-brakes. If the cars of the rear por-  
35 tion of the train are not equipped with air-brakes, the cars without brakes continue at full speed and sometimes collide with the front portion of the train upon which the brakes have so suddenly become set, causing great danger to life and property. My invention  
40 permits the engineer to keep control of the front section and continue its speed to avoid the rear section.

The objects of my improvements are, first, to prevent a sudden reduction of pressure in the train-pipe line, such as occurs in case the  
45 train breaks in two or the hose bursts, &c., and the emergency action of the brakes inci-

dent thereto; second, to prevent the angle-cock being turned by unauthorized persons, and thus cutting out the brakes on all cars  
50 following.

In carrying out my invention I substitute in place of the common angle-cock now in use my improved form of angle-cock, which auto-  
55 matically controls the air in the pipe-line and automatically locks itself when the pressure is on the line and automatically unlocks itself when the pressure is released.

In the accompanying drawings, Figure 1 is a vertical section on the line *x x* in Fig. 2. 60 Fig. 2 is a top view of the cylinder portion of the angle-cock. Fig. 3 is a vertical section of the "plug-valve" (or heart of the angle-cock) on the line *y y* in Fig. 2. Fig. 4 is a bottom view of the plug-valve. Fig. 5 is a  
65 vertical section on the line *z z* of Fig. 2.

Similar letters refer to similar parts throughout the several views.

The cylinder A, containing the piston B, is screwed into the angle-cock C, Fig. 1. It is  
70 connected with the plug *a* by a loose joint *i* to prevent plug *a* from binding at any part of its course. The walls of the cylinder A contain ports *b* and *c*, Figs. 1 and 2. The chamber *d* in the bottom of the cylinder being in  
75 communication with the train-pipe when the main opening in the angle-cock is "open" to the pipe-line through the check-valve *e*, the port *b*, and the port *f* in the rim of the plug-valve, permits the air to flow into the chamber *d*.  
80 When the angle-cock is open, the port *c* is closed by the plug-valve D. When there is a sudden reduction of pressure in the train-line above the piston B, due to the train part-  
85 ing or the hose bursting, &c., the piston B and plug *a* are forced upward by the air in chamber *d*, the air in chamber *d* being retained by check-valve *e*. The plug *a* thereby closes the main opening in the plug-valve D and prevents the escape of air in the train-  
90 line and the consequent emergency action of the brakes. In case of a train parting this action takes place on both the forward and rear sections of the train, the rear section



coming gradually to a stop as the pressure in the train-line is reduced by gradual leakage, the forward section being under the control of the engineer, because the front section is  
 5 in communication with the main reservoir upon the engine and any loss of air due to leakage is replaced from the main reservoir. Before the train-line is connected up after breaking in two the handle E of the angle-  
 10 cock is turned through about ninety degrees, closing the port *b* and putting the port *c*, Figs. 1 and 2, in communication with the atmosphere through the port *g*, Figs. 3 and 4, in the plug-valve D and permitting the air below  
 15 the piston B to escape, when the piston drops by gravity until it strikes the stop *h*. The stop *h* is used to limit the downward travel of the piston B. To prevent the plug *a* unduly sticking in the plug-valve D, leather washer  
 20 *l*, Fig. 5, may be inserted in the top of the plug-valve.

To prevent the angle-cock being turned by unauthorized persons, a hole *o*, Figs. 4 and 5, is drilled between the plug-valve D and the  
 25 lining *s*, half being in each piece. A corresponding hole *k*, Fig. 2, containing the pin *p*, Fig. 5, is drilled in the cylinder A in such a position that when the angle-cock is open the two holes coincide, and when air is ad-  
 30 mitted to the train-line it enters the port *n*, forcing the pin *p* up into the hole *o* between the plug-valve D and the lining *s*, locking the angle-cock open. A small port *r*, Fig. 5, extending from the hole *o* to the atmosphere,  
 35 may be employed to reduce the pressure on top of the pin *p* and permit the pressure beneath to hold the pin up.

To unlock the angle-cock, the hose is uncoupled, allowing the air in the train-pipe to  
 40 escape and with it the air under the pin *p*, the pin being drawn down by the suction of the escaping air and by gravity unlocks the angle-cock. The reduction of pressure in the train-line caused by uncoupling the hose causes  
 45 the piston B and plug *a* to rise, preventing any further escape of air, and the angle-cock being unlocked is free to be closed.

There is always more or less leakage of the compressed air in an air-brake system, due to  
 50 the difficulty of retaining the air in the train-line. When I speak of the plug *a* closing the main opening through the angle-cock, I do not mean that it prevents this normal leakage in the train-line.

I do not show the external wall of the plug  
 55 *a* parallel to the internal wall of the opening in the plug-valve D, because I prefer to have it fit loosely therein to operate easily, and thereby allow compressed air to escape after  
 60 the plug has risen. It may, however, be made to fit more closely and depend upon the gradual leakage in the line for the gradual lowering of the air-pressure after an emergency action of the angle-cock. It is appar-  
 65 ent that these parts may be so formed and

adjusted as to retain and allow the escape of the proper amount of compressed air to control the brakes and the resultant speed of the cars, as desired, this being a matter of mere mechanical adjustment.

70

I do not restrict my invention to the form, dimension, or location of parts shown, since, for example, the cylinder or other parts may obviously be changed in form and dimension. Likewise the parts may be changed in loca-  
 75 tion. For example, the hole *o*, which I have located between the plug-valve D and the lining *s*, may be located in other positions in plug-valve D, and the hole *o*, containing the pin, be located to operate in conjunction.

80

What I claim as my invention, and desire to secure by Letters Patent, is—

1. An angle-cock of an air-brake system having a cylinder with a piston and connected  
 85 plug, a port or passage-way and check-valve adapted to admit the passage of air under pressure into the cylinder below the piston and retain it there, and a second port or passage-  
 90 way adapted to release the air under pressure below the piston when the handle of the angle-cock is turned.

2. An angle-cock of an air-brake system having a cylinder with a piston therein, a port or passage-way with a check-valve adapted  
 95 to admit air under pressure below the piston and retain it there, a second port or passage-way to permit the air under pressure below the piston to escape, and means to permit air under pressure to also pass into the cylinder  
 100 above the piston and escape therefrom.

3. An angle-cock of an air-pressure line having a cylinder with a piston therein; a port or passage-way with a check-valve admitting  
 105 air under pressure into the cylinder below the piston and retaining it there, a second port or passage-way connected with the cylinder below the piston and adapted to release the air under pressure below the piston when the  
 110 handle of the angle-cock is turned; and a plug connected to the piston by a loose joint, and so loosely fitting in its casing that the fluid under pressure will pass around the same into the cylinder above the piston.

4. An angle-cock of an air-brake system, an air-chamber with a piston therein, a port or  
 115 passage-way with a check-valve so connecting the cylinder below the piston with the main air-passage in the "plug-valve" or turning portion of the angle-cock, that the air under pressure will pass into the cylinder be-  
 120 low the piston when the angle-cock is turned "open," a plug connected with the piston adapted to be moved by the piston into the heart or "plug-valve" of the angle-cock, to close the large air-passage therein when the  
 125 air-pressure is suddenly released or lowered.

5. An angle-cock of an air-brake system, an air-chamber with a piston therein, a port or passage-way with a check-valve so connecting  
 130 the cylinder below the piston with the main



air-passage in the "plug-valve" or turning portion of the angle-cock, that the air under pressure will pass into the cylinder below the piston when the angle-cock is turned "open," and be there retained; a second port or passage-way communicating with the cylinder below the piston and so connecting with the "plug-valve" that the air under pressure below the piston will be released when the angle-cock is turned "closed," a plug connected with the piston adapted to be moved by the piston into the heart or "plug-valve" of the angle-cock, to close the large air-passage therein when the air-pressure is suddenly released or lowered.

6. An angle-cock of an air-brake system having a heart or plug-valve connected with the handle of the angle-cock, more than one passage-way in said plug-valve for the passage of air under pressure, an air-chamber with a piston therein, a plug connected to said piston and adapted to be urged by air under pressure to close the large air passage-way through the angle-cock, said plug-valve also having a slot or opening adapted to receive a movable key or pin urged by air under pressure to lock the plug-valve until the air under pressure is released or lowered.

7. The combination in an angle-cock of an air-brake system, of a plug-valve in the angle-cock turnable by hand; a cylinder with a piston carrying a plug adapted to pass into and close the main air passage-way through the angle-cock, a port or passage-way and a check-valve adapted, when the angle-cock is open, to admit the air under pressure below the piston and retain it there until the handle of the angle-cock is turned; and means to also admit the air under pressure above the piston.

8. The combination in an angle-cock of an air-brake system, of a plug-valve in the angle-cock turnable by hand; a cylinder with a piston carrying a plug adapted to pass into and close the main air-passage of the angle-cock, a port or passage-way and a check-valve adapted when the angle-cock is open to admit the air under pressure below the piston and retain it there until the handle of the angle-cock is turned; means to also admit the air under pressure above the piston; and an air passage-way connected with the cylinder containing a movable means adapted to be forced by the air-pressure into a position where it will lock the plug-valve turnable by hand until the air-pressure is released.

9. An angle-cock of an air-brake system having, a plug-valve or heart turnable by hand with more than one air-passage therein, an air-chamber containing a piston connected to a plug adapted to enter the plug-valve and close or partially close the large air-passage therein, a small air-passage in the plug-valve adapted to act in conjunction with one connected with the cylinder below the piston when the handle of the angle-cock is turned

"open," and another small air-passage in the plug-valve adapted to act in conjunction with one connected with the cylinder below the piston when the handle of the angle-cock is turned "closed."

10. An angle-cock of an air-brake system having, a plug-valve or heart turnable by hand with more than one air-passage therein, an air-chamber containing a piston connected to a plug adapted to enter the plug-valve and close or partially close the large air-passage therein, a small air-passage in the plug-valve adapted to act in conjunction with one connected with the cylinder below the piston when the handle of the angle-cock is turned "open," and another small air-passage in the plug-valve adapted to act in conjunction with one connected with the cylinder below the piston when the handle of the angle-cock is turned "closed," and an air passage-way connected with the cylinder containing a pin or plug adapted to move in and out of the plug-valve under gravity and air influence.

11. The combination with an angle-cock of an automatic safety-valve, said valve comprising a piston and stem, and a casing having two chambers each in communication with a passage through the cock.

12. The combination with an angle-cock, of an automatic valve embracing a movable element operated by gravity in one direction and by fluid-pressure in the other direction.

13. The combination with an angle-cock, of a movable element located in a chamber outside the passage through the cock, and means for causing the element to close the said passage.

14. The combination with an angle-cock of an automatic safety-valve, said valve being embraced as a part of the cock and having an element movable in a line at an angle to the passage through the cock, whereby the passage is normally unobstructed, and means for allowing a gradual discharge of fluid under pressure when the movable element closes the passage.

15. The combination with an angle-cock of an automatic safety-valve provided with means in direct connection with the cock and movable in a line at right angles to the passage through the angle-cock for closing the passage in the cock when the hose-couplings are separated, and means for allowing a gradual discharge of compressed air to the atmosphere.

16. The combination with a fluid-pressure brake and an angle-cock of means located outside the passage through the cock, but adapted to close the said passage and operated by fluid-pressure which, when the couplings are separated will retain the fluid under pressure within the train-pipe and gradually exhaust the same to the atmosphere.

17. The combination with a fluid-pressure brake and angle-cock of an automatic safety-



valve; said valve embracing a chamber, a piston and stem, means containing an open passage from the angle-cock to the chamber, and means for allowing the gradual discharge of  
5 air from the train-pipe when the normally open passage in the angle-cock is closed.

18. The combination with an angle-cock of a movable element located in a chamber outside the passage through the cock, means  
10 whereby when the couplings are separated the movable element will be actuated by fluid under pressure and will close the said passage, and means for allowing a gradual discharge of air to the atmosphere.

19. An angle-cock of an air-brake system having a cylinder with a piston and connected plug, a port or passage-way adapted to admit the passage of air under pressure into the cylinder below the piston and a second port  
20 or passage-way adapted to release the air under pressure below the piston when the handle of the angle-cock is turned.

20. An angle-cock of an air-brake system having a cylinder with a piston and connect-

ed plug, a port or passage-way adapted to admit the passage of air under pressure into the cylinder below the piston when the angle-cock is turned "open," and a second port or passage-way adapted to permit the air under pressure below the piston to escape when the  
30 handle of the angle-cock is turned "closed."

21. An angle-cock of an air-pressure line having a cylinder with a piston therein, a port or passage-way admitting air under pressure into the cylinder below the piston, a second  
35 port or passage-way connected with the cylinder below the piston and adapted to release the air under pressure below the piston when the handle of the angle-cock is turned, and a plug connected to the piston by a loose joint,  
40 and so loosely fitting in its casing that the fluid under pressure will pass around the same into the cylinder above the piston.

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