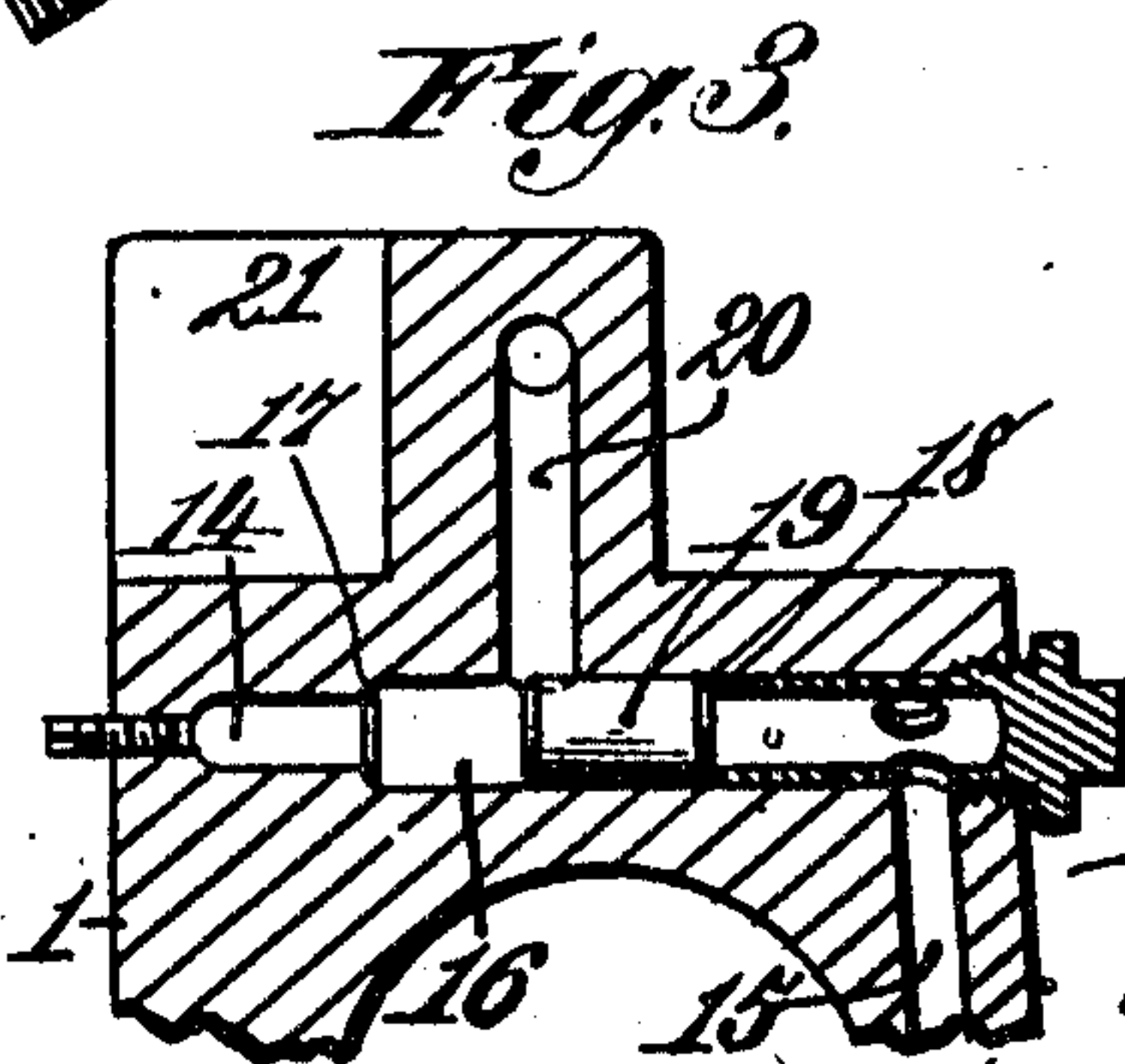
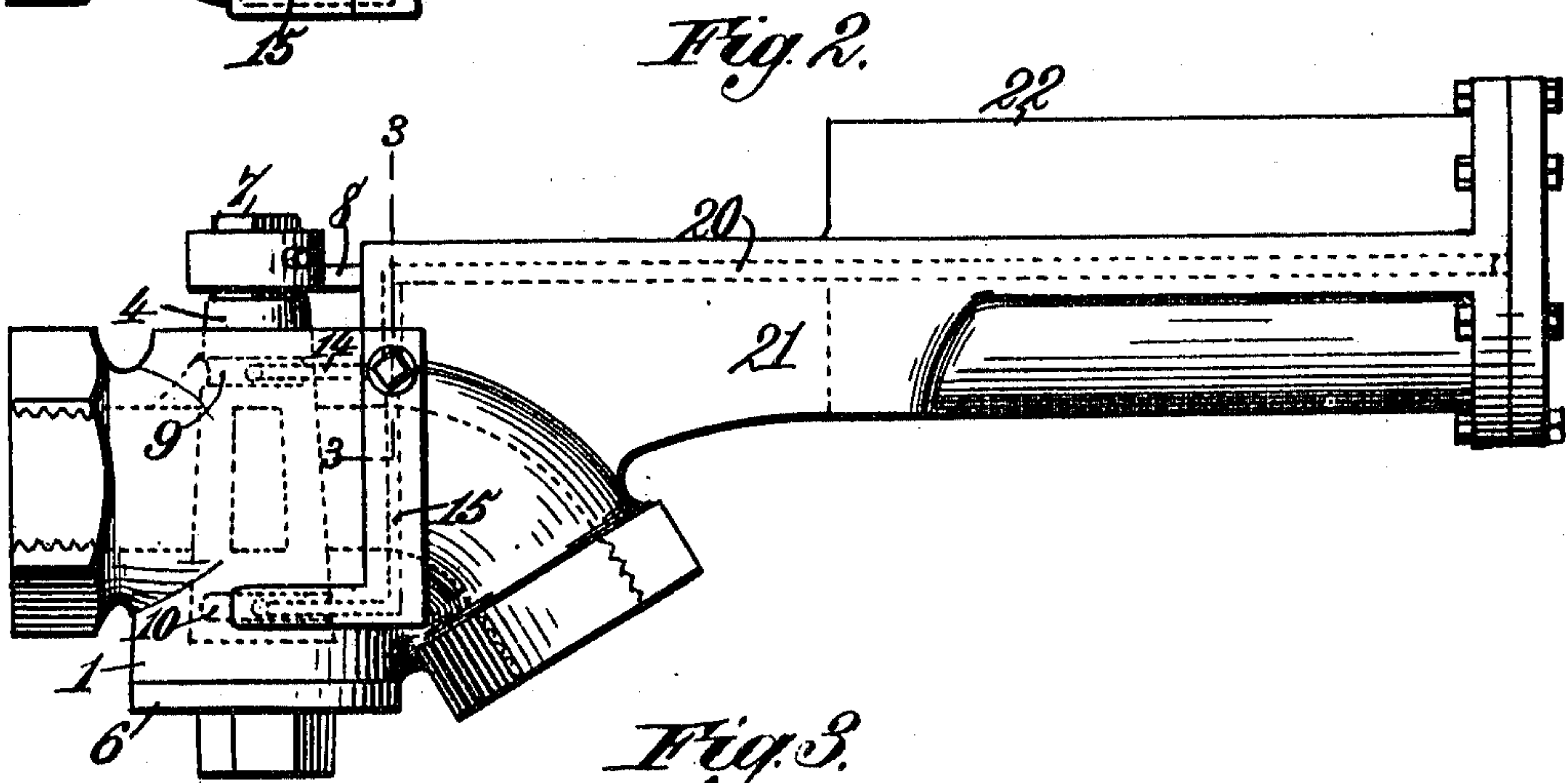
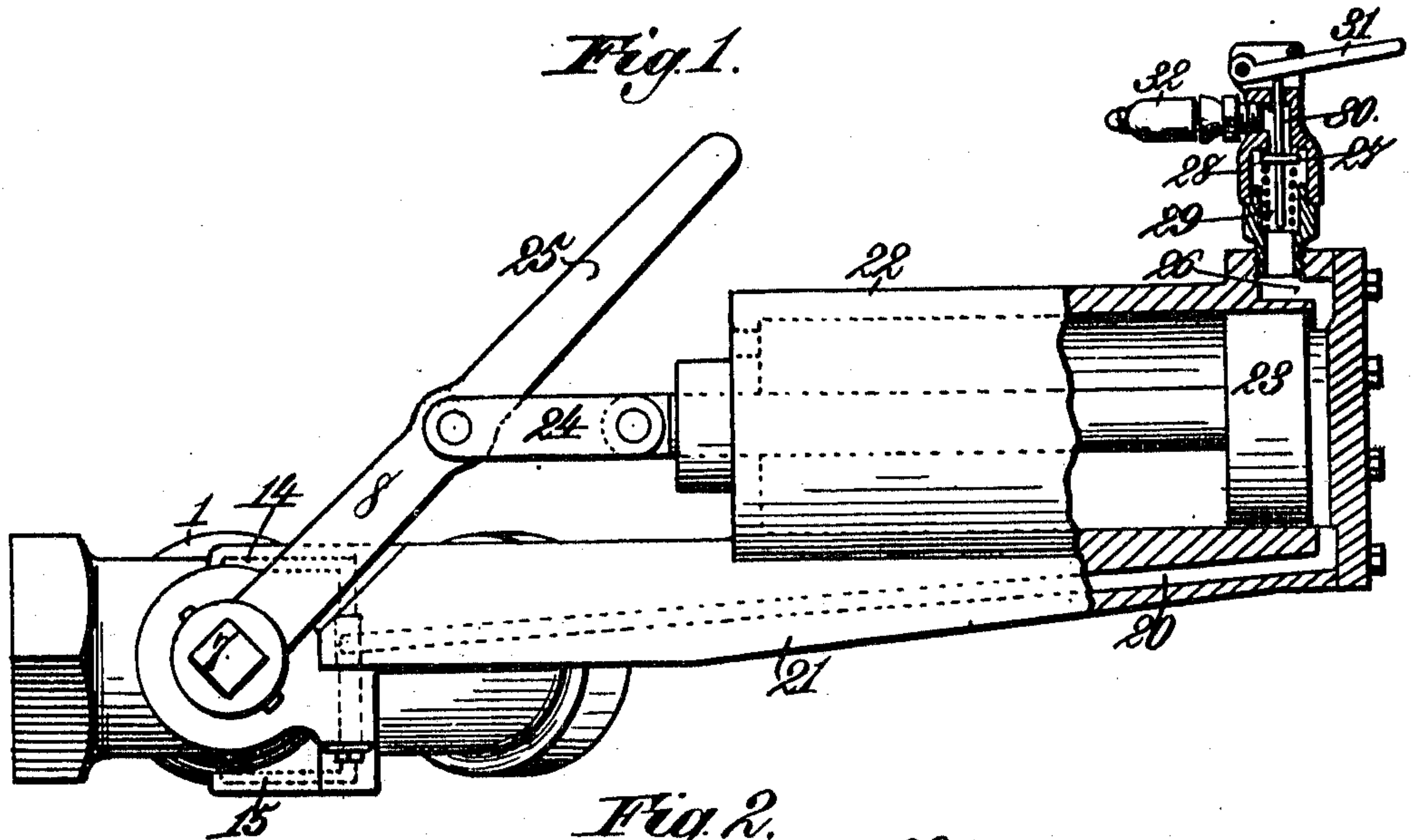


F. S. CRAVENS.  
AIR BRAKE MECHANISM.  
APPLICATION FILED AUG. 8, 1910.

988,864.

Patented Apr. 4, 1911.

2 SHEETS—SHEET 1.



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AIR BRAKE MECHANISM.  
APPLICATION FILED AUG. 6, 1910.

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2 SHEETS—SHEET 2.

Fig. 4.

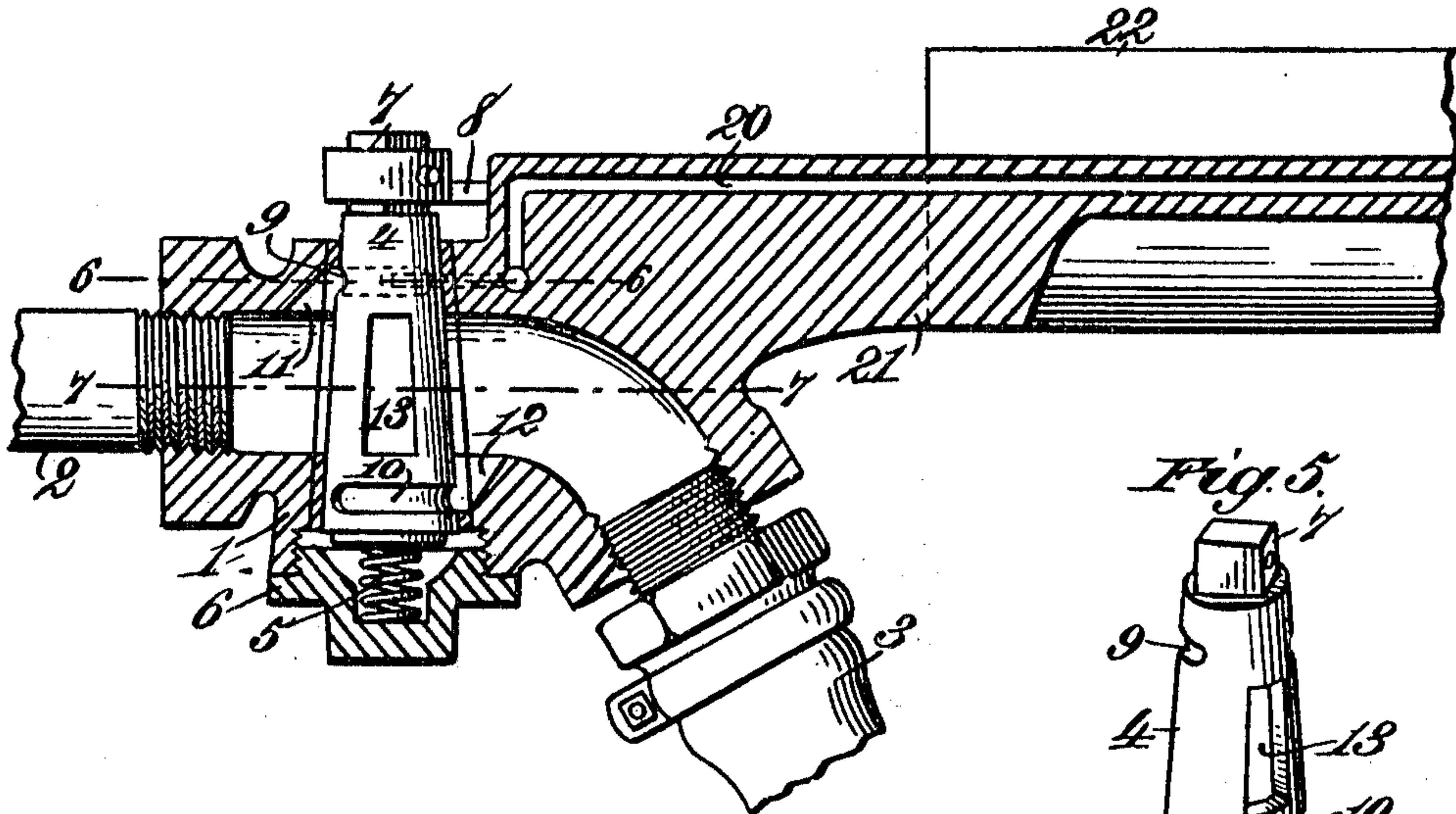


Fig. 5.

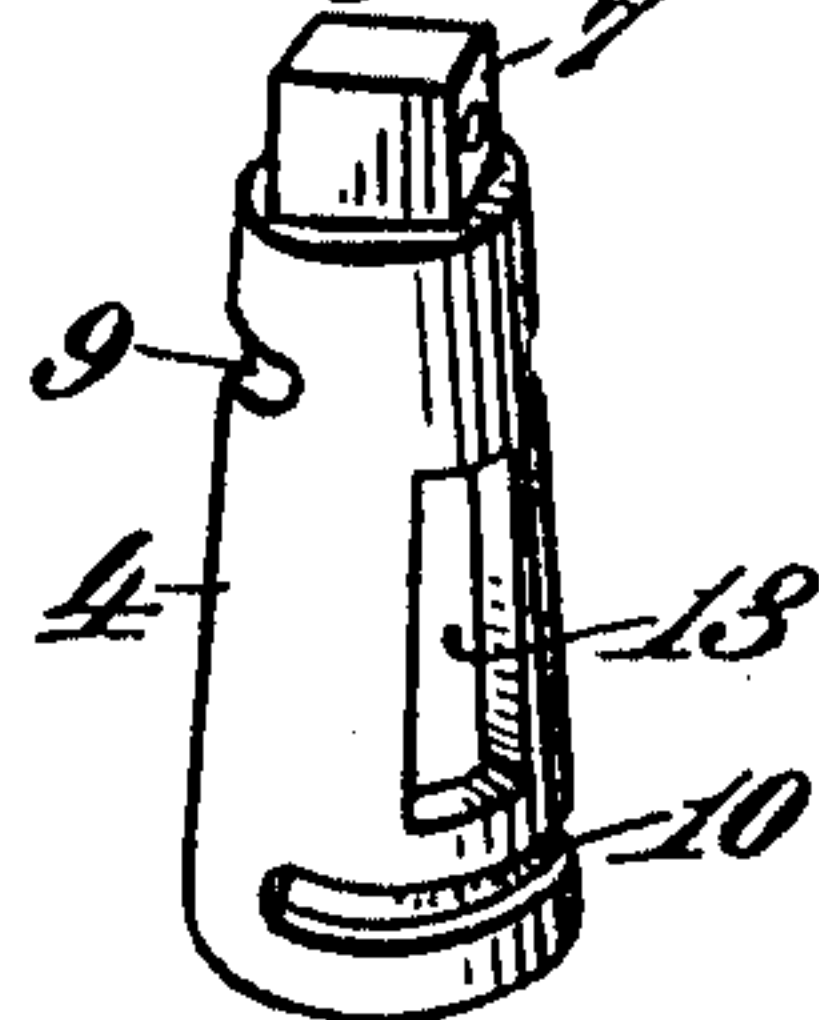


Fig. 6.

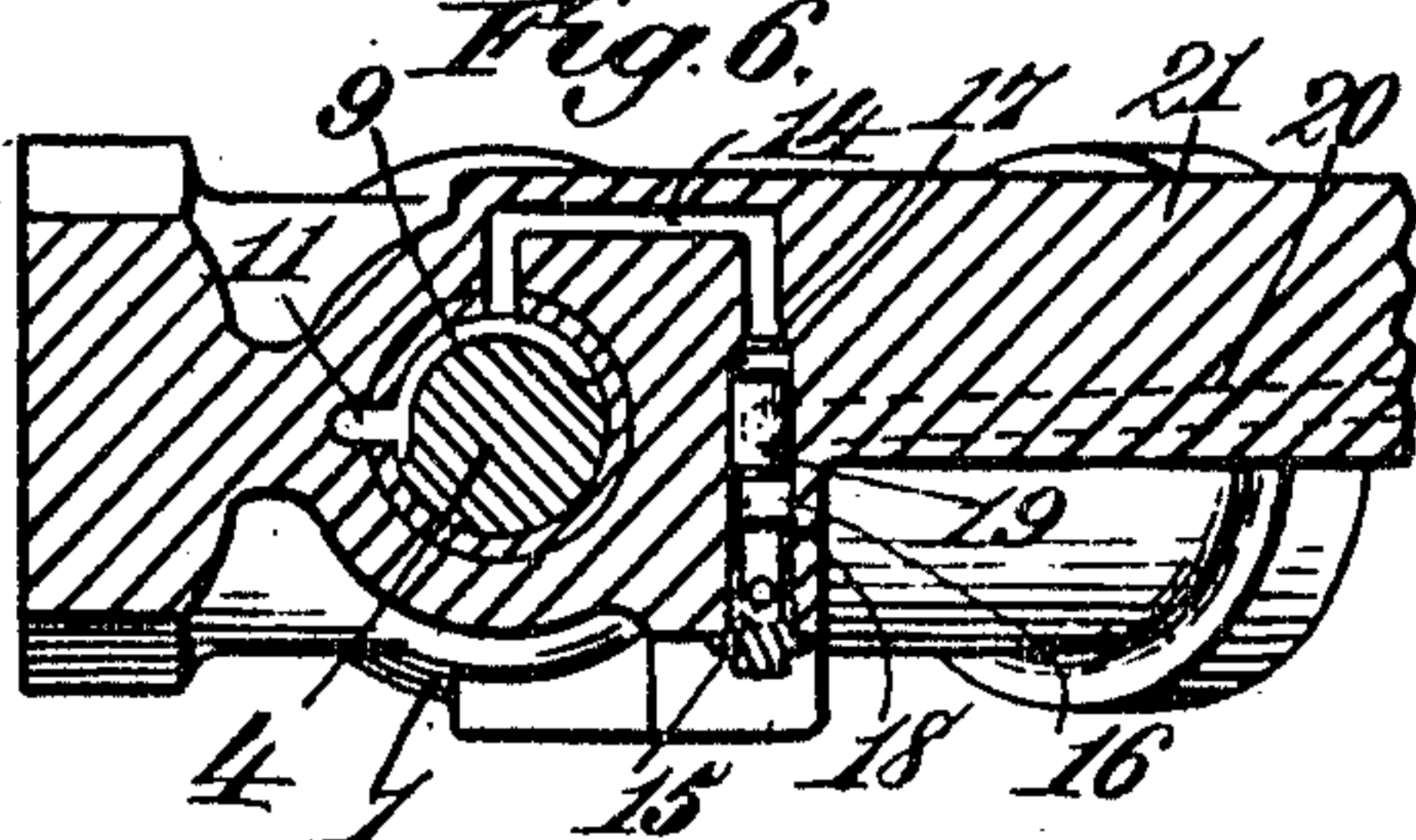


Fig. 8.

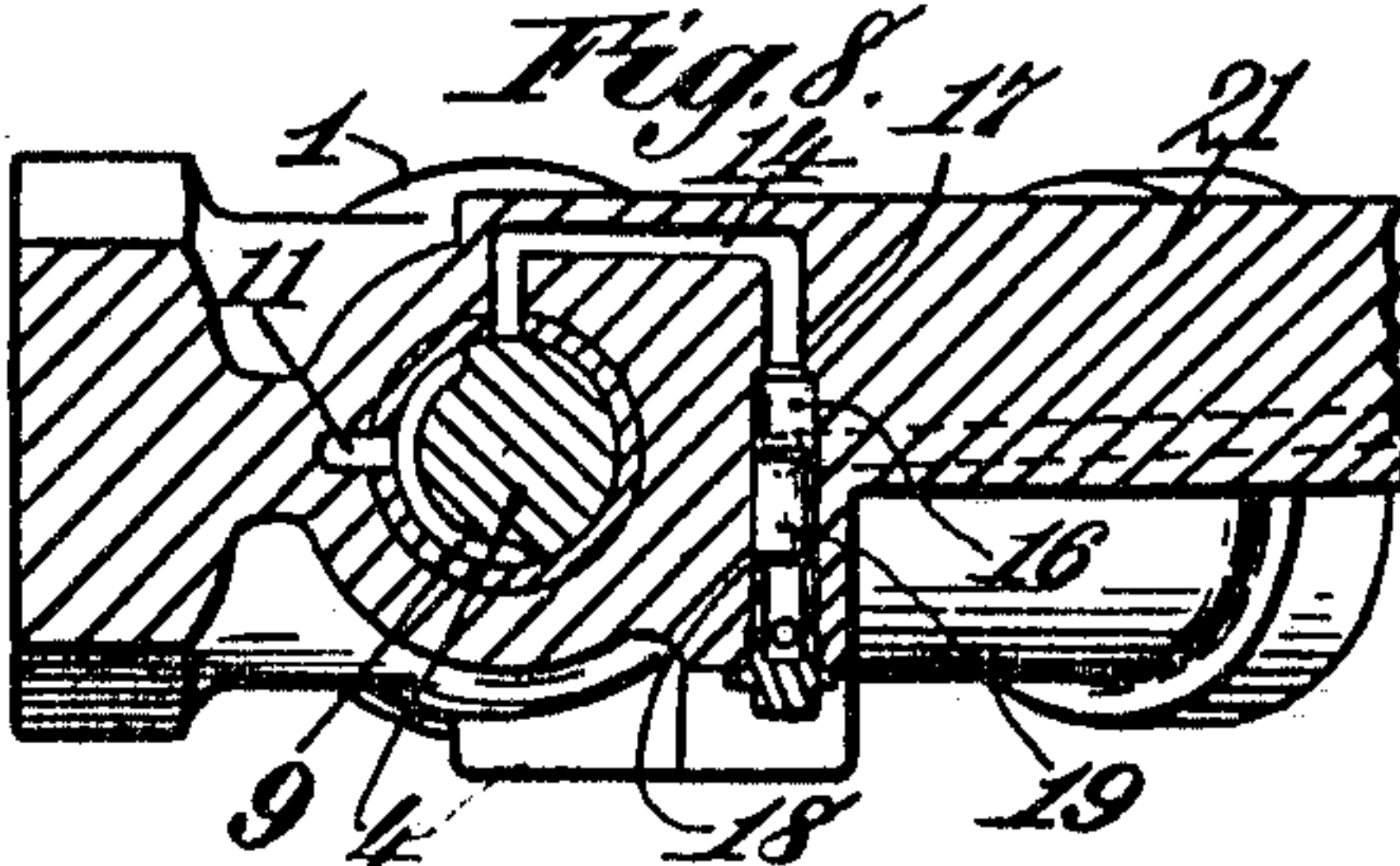


Fig. 7.

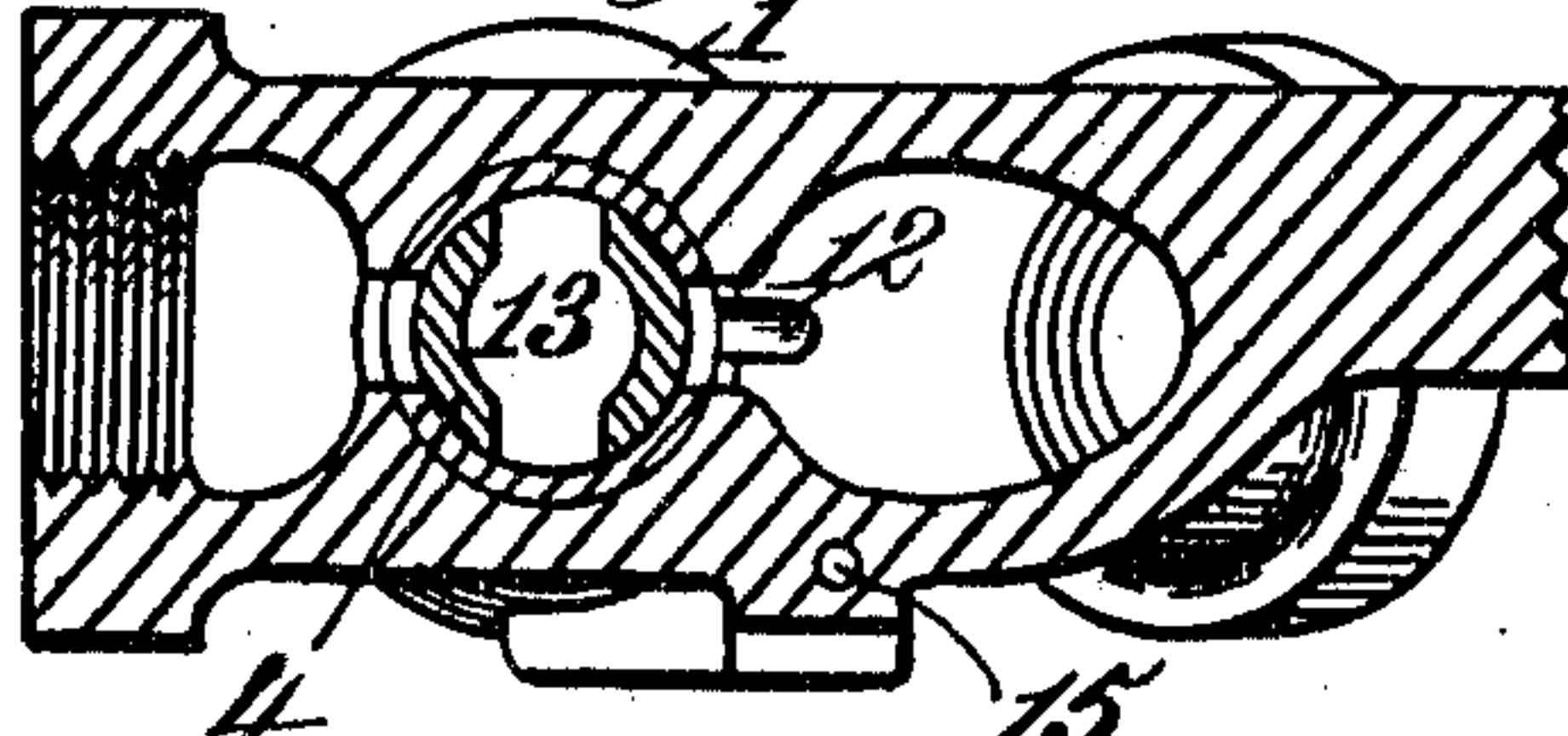
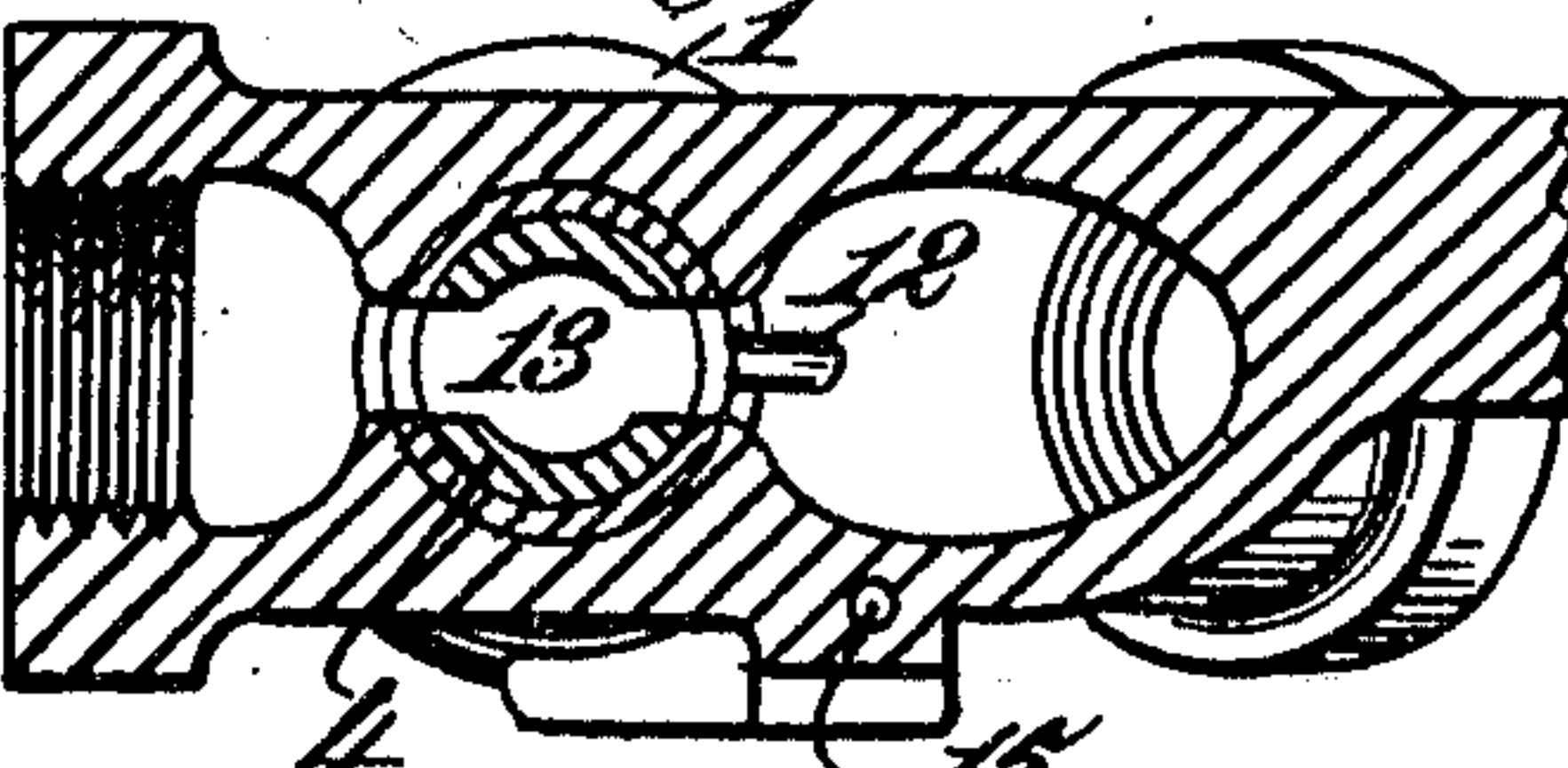


Fig. 9.



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# UNITED STATES PATENT OFFICE.

FRANK S. CRAVENS, OF LEXINGTON, KENTUCKY.

## AIR-BRAKE MECHANISM.

988,864.

Specification of Letters Patent.

Patented Apr. 4, 1911.

Application filed August 6, 1910. Serial No. 575,936.

*To all whom it may concern:*

Be it known that I, FRANK S. CRAVENS, a citizen of the United States, residing at Lexington, in the county of Fayette and State of Kentucky, have invented new and useful Improvements in Air-Brake Mechanism, of which the following is a specification.

My present invention relates to improvements in air brake apparatus for railway trains, and it pertains particularly to the angle cocks, the object of the present invention being to provide means whereby all the angle cocks throughout the length of the train shall be opened automatically and with certainty when air at normal pressure is admitted to the train pipe from the locomotive to place the air brake apparatus in normal operative condition and while the brake system is in such condition, it will be practically impossible for any of the angle cocks in the train to close either by accident or otherwise.

In air brake apparatus as commonly used the train pipe is provided at the end of each car with what is known as an "angle cock", and these cocks have been heretofore operated by hand and serve to control the flow of air through the usual flexible hose connecting the different cars of the train. In air brake systems of the automatic type, the brakes upon each car are set by a reduction of pressure in the train pipe and they are released and the auxiliary reservoirs on the cars are recharged by a restoration of the normal pressure of air in the train pipe from air stored in the main reservoir upon the locomotive. In dividing or splitting up a train, these angle cocks upon the cars are closed to prevent setting of the brakes and loss of air from the auxiliary reservoirs upon the cut-out cars and in making up a train, all the angle cocks upon the train, excepting the one upon the rear end, are supposed to be opened by hand. In practice, the memory of the trainman is relied upon to insure the opening of all the angle cocks upon the train, but it sometimes happens that one or more angle cocks upon a train are closed either accidentally or through malicious tampering. When an angle cock upon a train is closed, it renders inoperative all the brakes upon the cars in rear of the closed cock, and this has been the cause of numerous accidents.

My present invention renders it unneces-

sary to manually open the angle cocks, as these cocks are immediately and automatically opened with certainty throughout the length of the train when the train is coupled and air is admitted to the train pipe from the locomotive to release the brakes and to charge the auxiliary reservoirs upon the cars, these angle cocks being opened with certainty under the normal pressure which is admitted to the train pipe for the purposes stated and, moreover, it is practically impossible for any of the angle cocks to be closed either accidentally or through malicious tampering, while the train pipe contains air at the normal train pipe pressure or while the air brake system is in normal operative condition.

The present invention provides a very simple and efficient means for accomplishing the objects above stated and for overcoming the defects hereinbefore noted.

To these and other ends, the invention consists in certain improvements, and combination and arrangements of parts, all as will be hereinafter more fully described, the novel features being pointed out particularly in the claims at the end of the specification.

In the accompanying drawing:—Figure 1 is a plan view partly in section of an angle cock provided with automatic operating means constructed in accordance with my present invention; Fig. 2 represents a side elevation of the angle cock and its attachment as shown in Fig. 1; Fig. 3 represents a section on the line 3—3 of Fig. 2; Fig. 4 represents a central vertical section through the angle cock and a portion of the passage which leads therefrom to the fluid pressure cylinder or motor which serves to open the cock; Fig. 5 is a detail perspective view of the plug of the angle cock; Figs. 6 and 7 represent sections on the lines 6—6 and 7—7 respectively, of Fig. 4, the cock in these two positions being represented as closed; and Figs. 8 and 9 are views similar to Figs. 6 and 7, the cock in these latter views, however, being represented in open position.

Similar parts are designated by the same reference characters in the several views.

In the present instance, I have shown my invention applied to the ordinary or standard angle cock modified slightly, however, to adapt it for use in connection with my present invention. This cock consists generally of a casing 1, one end of which is



threaded to receive the section 2 of the train pipe which extends beneath the car while its opposite end is turned downwardly and is threaded or otherwise adapted to receive the usual flexible coupling hose 3 by means of which the train pipe is rendered continuous throughout the length of the train. The plug 4 of the cock is rotatably fitted as usual in the casing, it being pressed upon its seat by a spring 5 which is supported by a cap 6, and the upper end of the plug is provided with a squared or angular portion 7 to receive the operating handle or lever 8.

According to the present invention, the rotatable plug of the angle cock is provided with means for controlling the flow of air to the piston or motor which serves to automatically open the cock. For this purpose it is provided toward its upper end with a circumferential port or groove 9 which extends around the plug for approximately one-half its circumference and the lower portion of the plug is provided with a similar port or groove 10 which also extends around the plug for approximately one-half its circumference, the ports or passages 9 and 10 being arranged at opposite sides of the plug. The casing in which the plug fits is provided with a port or feed groove 11 which leads from one side of the cock and communicates with the upper groove 9 when the cock is in closed position, and a port or feed groove 12 leads from the opposite side of the cock and communicates with the lower port or groove 10 of the plug when the cock is in closed position.

13 represents the usual port in the plug through which the train pipe pressure flows. The casing of the cock is also provided with a passage 14 which is preferably arranged at approximately a quarter turn from the port or feed groove 11 and when the cock is in closed position, this passage 14 communicates with the upper groove 9 of the plug. A passage 15 is also formed in the casing of the angle cock and is arranged therein at approximately a quarter turn from the position of the port or feed groove 12 and when the angle cock is closed, this passage 15 is in communication with the lower groove 10 of the plug. The passages 14 and 15 in the casing both lead into the opposite ends of a chamber 16, this chamber having a pair of valve seats 17 and 18 arranged at its opposite ends and it contains a shiftable valve 19 which is adapted to seat upon one or another of the valve seats and thereby control the back flow of air through one or another of the passages, as will be hereinafter described. A passage 20 is formed in the casing of the cock and leads centrally from the chamber 16, and this passage 20 extends through a bracket or extension 21 attached to or formed as a part of the angle cock casing and leads into the rear end of a fluid pres-

sure cylinder 22, the latter being mounted in fixed relation to the angle cock casing. This fluid pressure cylinder 22 contains a reciprocating piston 23 the rod of which is connected by a link 24 to the lever 8, a portion of the lever 8 being extended beyond the link 24 to provide a handle 25 whereby the cock may be operated by hand when desirable or necessary. The rear portion of the fluid pressure cylinder 22 is provided with a vent 26 and a valve 27 which controls the escape of air from the cylinder through this vent. This valve may be of any suitable type and normally it is held upon its seat in the casing 28 by a compression spring 29, the stem 30 of the valve extending through the valve casing and a lever 31 may be provided to operate upon this valve stem and thereby open it against the action of its spring and vent air from the rear of the piston 23. The handle 31 is depressed to release air from the fluid pressure cylinder 22 preparatory to a closing of the angle cock by manipulation of the handle 25. In order to prevent persons from maliciously tampering with the angle cock, a whistle or other signal 32 may be attached to the discharge opening of the valve so that when this valve is opened the air vented from the cylinder will sound a warning or will act as an alarm.

The operation of the apparatus may be described as follows: Assuming that the train pipe is free from train pipe pressure and that the angle cock is closed, there will be no pressure in rear of the piston 23. As soon, however, as the cars of the train are coupled by the usual hose and air is admitted at normal pressure from the locomotive to release the brakes and to recharge the auxiliary reservoirs upon the cars, a portion of the air so induced into the train pipe will serve to open all of the angle cocks through the length of the train automatically and with certainty, irrespective of the direction in which the air from the locomotive approaches each angle cock. If the air approaches the angle cock from the direction of the car, then a portion of this air will flow into the port or feed groove 11, from the latter it will enter the upper port or groove 9 in the valve plug which at this time is in closed position, and such air will flow from the upper port or groove 9 into the passage 14. The air from the passage 14 will act upon the valve 19 to shift it, it seating upon the valve seat 18 to prevent such air from escaping into the passage 15, and from the valve chamber 16 the air flows through the passage 20 into the cylinder 22 in rear of its piston 23. The piston 23 when subject to a relatively low pressure of air will move toward the left in Fig. 1 and owing to its operative connection with the lever 8, it will open the angle cock.



During the latter portion of the closing movement of the plug of the angle cock, the upper port or passage 9 will lap and close the passage 14, the remainder of the stroke of the piston 23 being effected by the expansion of the air admitted to the cylinder during the first part of the closing movement of the cock. By closing the passage 14 just before the final opening of the angle cock, a leakage of air from the train pipe to the operating cylinder and piston is prevented although should it be attempted to close the angle cock while air at normal train pipe pressure is contained in the train pipe, the first part of the closing movement would again establish communication between the upper groove 9 of the plug and the passage 14 which would again admit air to the cylinder and would cause the cock to be immediately reopened. If the air approaches the cock from the hose, a portion of this air will flow through the port or groove 12 into the lower groove 10 of the plug and from the latter, it will enter the passage 15, this passage 15 registering with the lower groove 10 when the cock is in closed position. The air so entering the passage 15 will act upon the valve 19, shifting it into a position to close the passage 14, and the air will then proceed through the passage 20 to the rear side of the piston 23 and the cock will be automatically opened in the same manner as before described. In this case also the passage 15 will be lapped and closed during the final portion of the opening movement of the cock so as to prevent leakage of air into the cylinder while the train pipe contains air at normal train pipe pressure. In both instances, however, the operating cylinder and piston will receive a fresh supply of air from the train pipe after the cock has been partially closed so that the cock will be maintained in open position with certainty as long as the train pipe contains air at train pipe pressure. In order to close the cock, it is only necessary to press upon the handle or lever 31 and to then turn the lever 8 by hand into the position shown in Fig. 1, the air being thereby vented from the operating cylinder and permitting its piston 23 to be retracted by operation of the lever 8. As before stated, however, a venting of the air from the operating cylinder will sound the whistle or equivalent signal as a warning or alarm which would immediately attract attention should unauthorized persons attempt to tamper with the cock. After the cock has been closed, communication is established from the coupling hose side of the cock to the operating cylinder, through the ports 12 and 10 and passages 15 and 20, and by holding open the valve 27, the air pressure in the coupling hose may be released so as to facilitate an uncoupling of the hose. Any

suitable means may be employed to close the rear end of the train pipe. For example, a dummy coupling member may be used which will be capable of cooperating with the coupling upon the hose and thereby effectually close the train pipe.

It will be understood that I have shown and described in the present instance but one embodiment of the invention as an example. In practice, certain modifications and changes may be made in the detail construction or the relative arrangement of the parts in order to adapt the invention to the different systems, or to enable the invention to be applied to the best advantage according to the circumstances of each particular case.

I claim as my invention:

1. In air brake apparatus the combination of an angle cock, and means controlled by the angle cock and operative automatically to open the same.

2. In air brake apparatus, the combination of an angle cock, means controlled by the angle cock and operative to automatically open the same under the influence of air at or below normal train pipe pressure.

3. In air brake apparatus, the combination of a cock, and fluid pressure actuated means connected to receive fluid pressure from the train pipe under the control of said cock and operative to open the same.

4. In air brake apparatus, the combination of a train pipe having a cock connected thereto, and air operated means operative to open said cock by air taken from the train pipe when said cock is closed, said cock serving to cut off communication between the train pipe and said air operated means.

5. In air brake apparatus, the combination of a train pipe having a cock connected thereto, means operated by fluid pressure from the train pipe at either side of said cock for opening said cock from fluid pressure in the train pipe, and a device for interrupting communication between said means and either side of said cock when fluid is admitted to said means from the opposite side of the cock.

6. In air brake apparatus, the combination of a cock for the train pipe embodying a casing and a plug turnable therein, the casing and plug having ports for conducting fluid therethrough and also having supplemental ports which communicate when said cock is closed, and means connected to receive fluid pressure through said supplemental ports for automatically opening the cock.

7. In air brake apparatus, the combination of a cock for the train pipe embodying a casing and a plug turnable therein, the casing and plug having ports for conducting fluid therethrough and also having sets of supplemental ports which communicate with



the respective sides of the cock when the latter is closed, means operative by fluid pressure from either side of the cock and through the respective set of supplemental ports for  
5 opening the cock, and a double-acting valve operative automatically to close communication through either of said sets of supplemental ports when fluid pressure is admitted to said means through the other set of  
10 supplemental ports.

8. In air brake apparatus, the combination of a cock for the train pipe embodying a casing and plug turnable therein, the casing and plug having main ports for the flow  
15 of fluid pressure through the train pipe, and

also having sets of supplemental ports communicating with opposite sides of the cock, means for closing one of said sets of supplemental ports when fluid flows through the other set, and a fluid operated device connected to receive such fluid and operative to  
20 open the cock.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

FRANK S. CRAVENS.

Witnesses:

CHARLES A. ROWE,  
CHAS. S. HYER.