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E. WALKER

PLUG FOR CLEANING TUBES

Filed Nov. 17, 1926

Fig. 1.

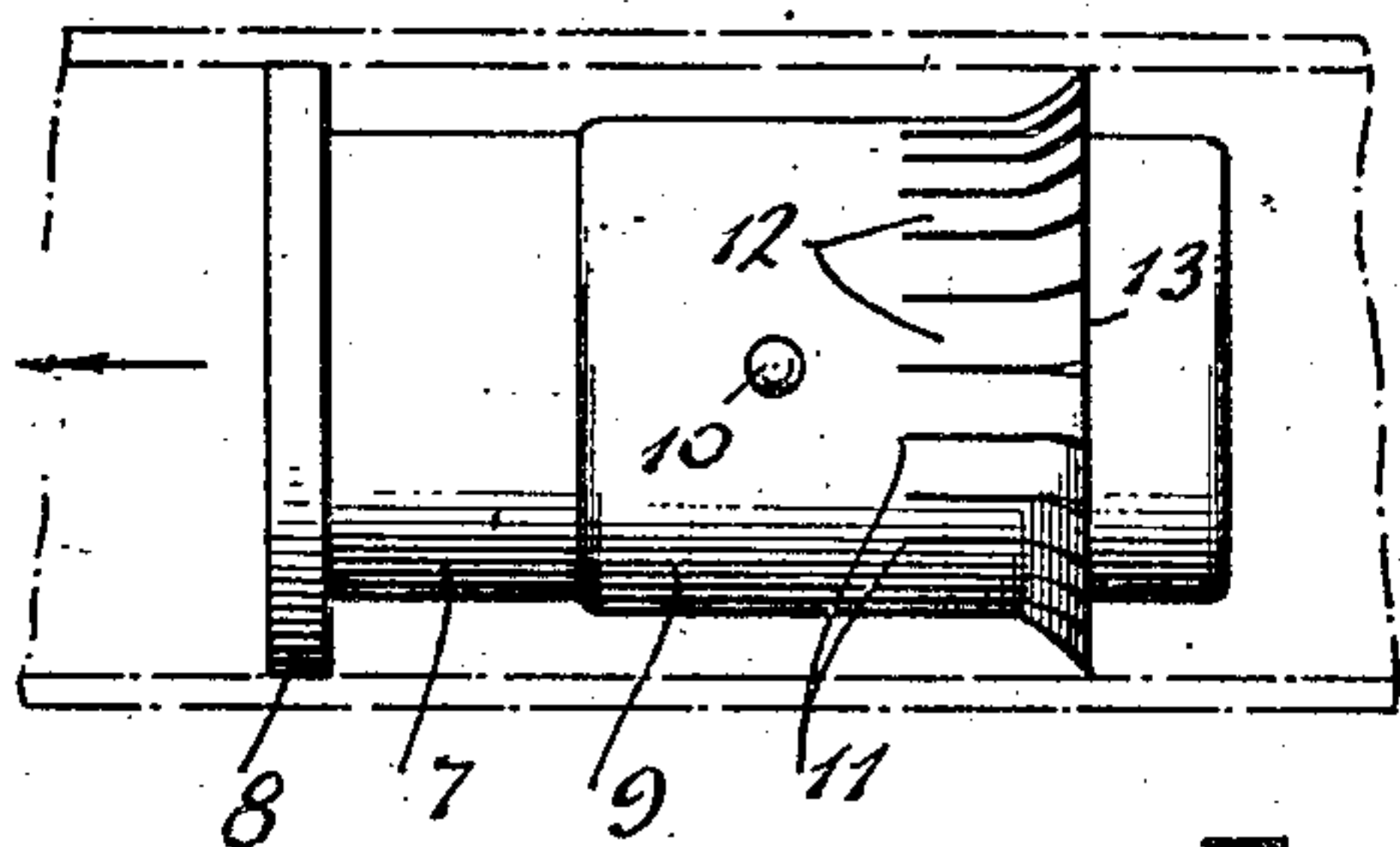


Fig. 2.

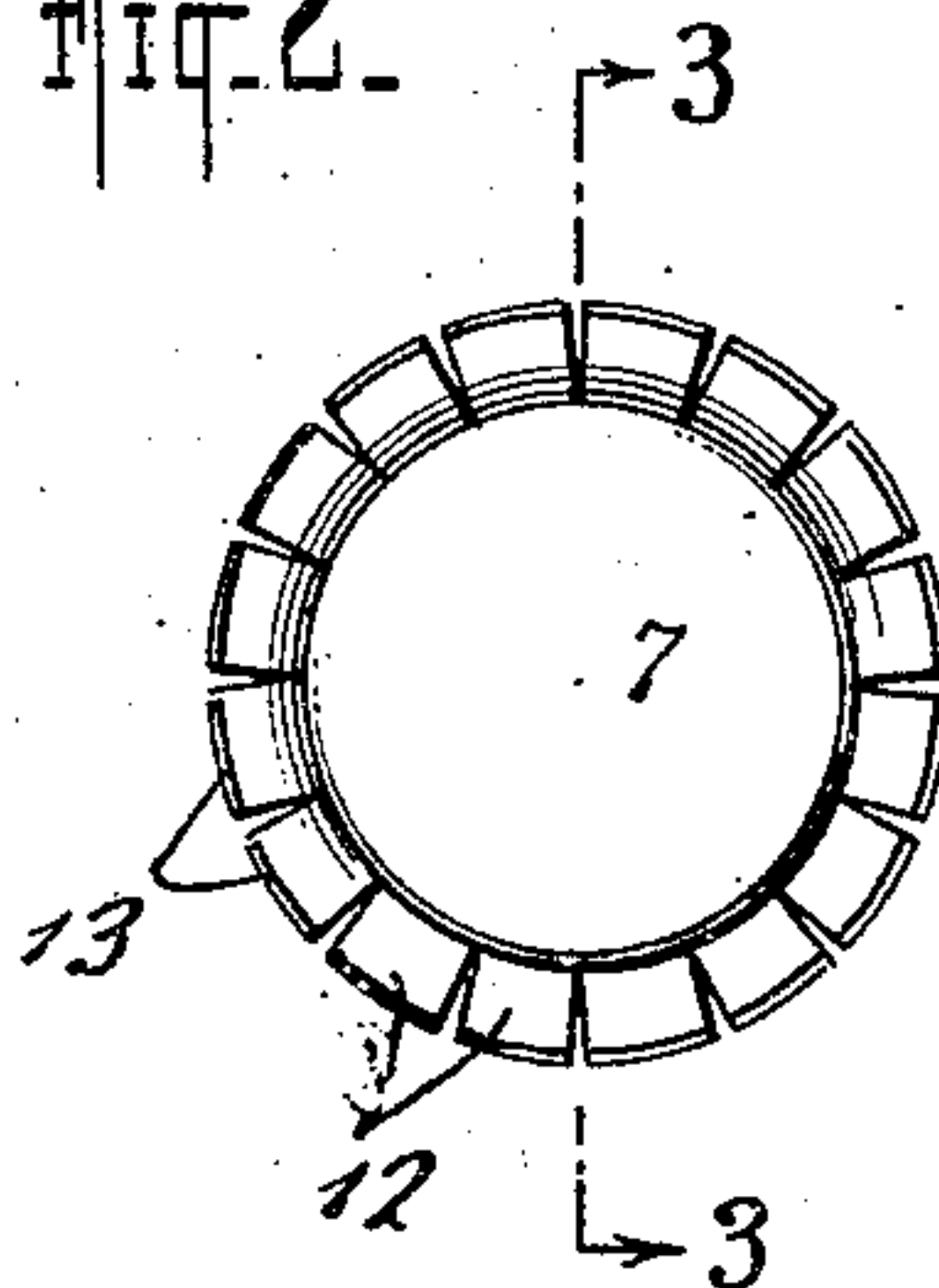


Fig. 3.

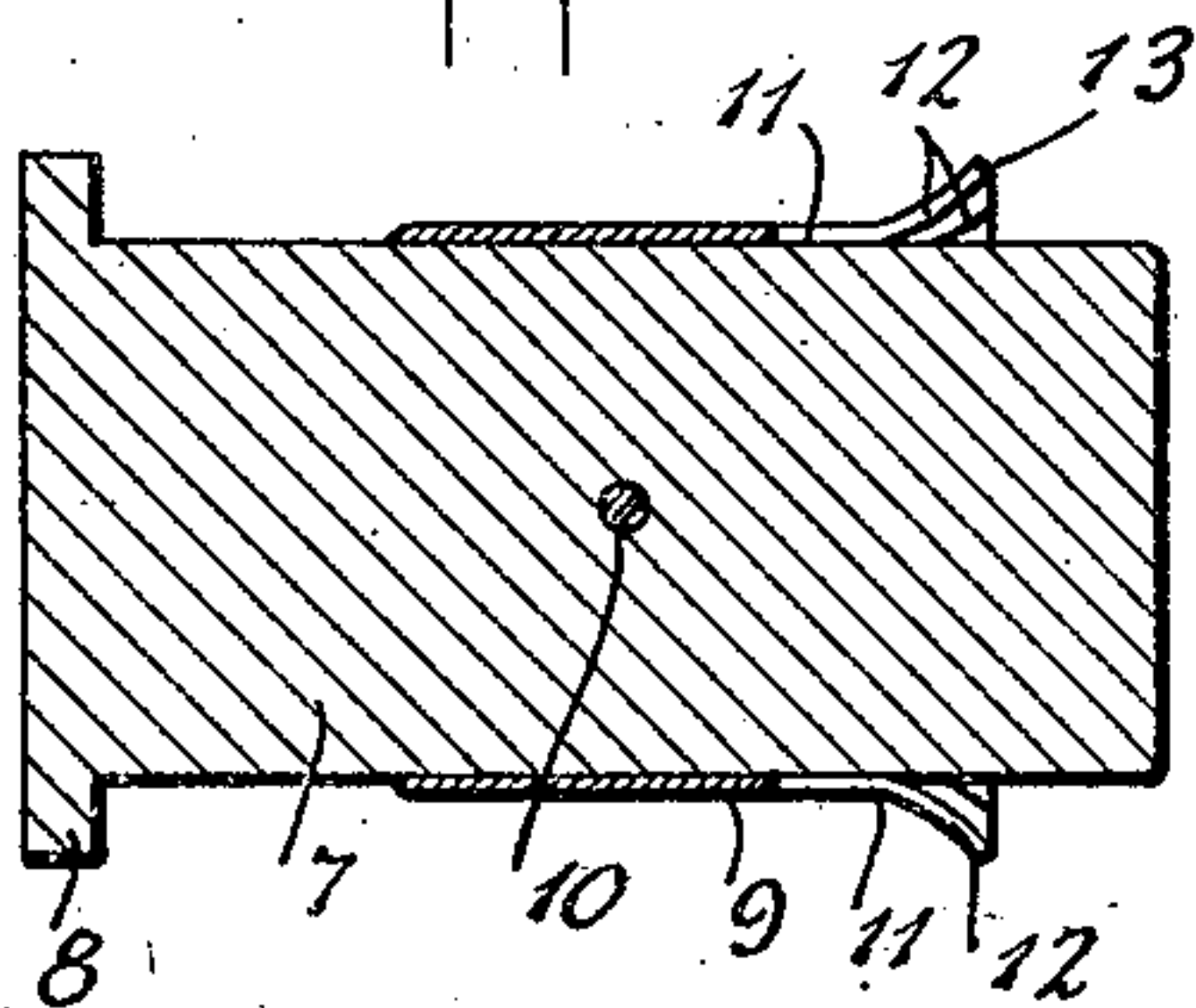


Fig. 4.

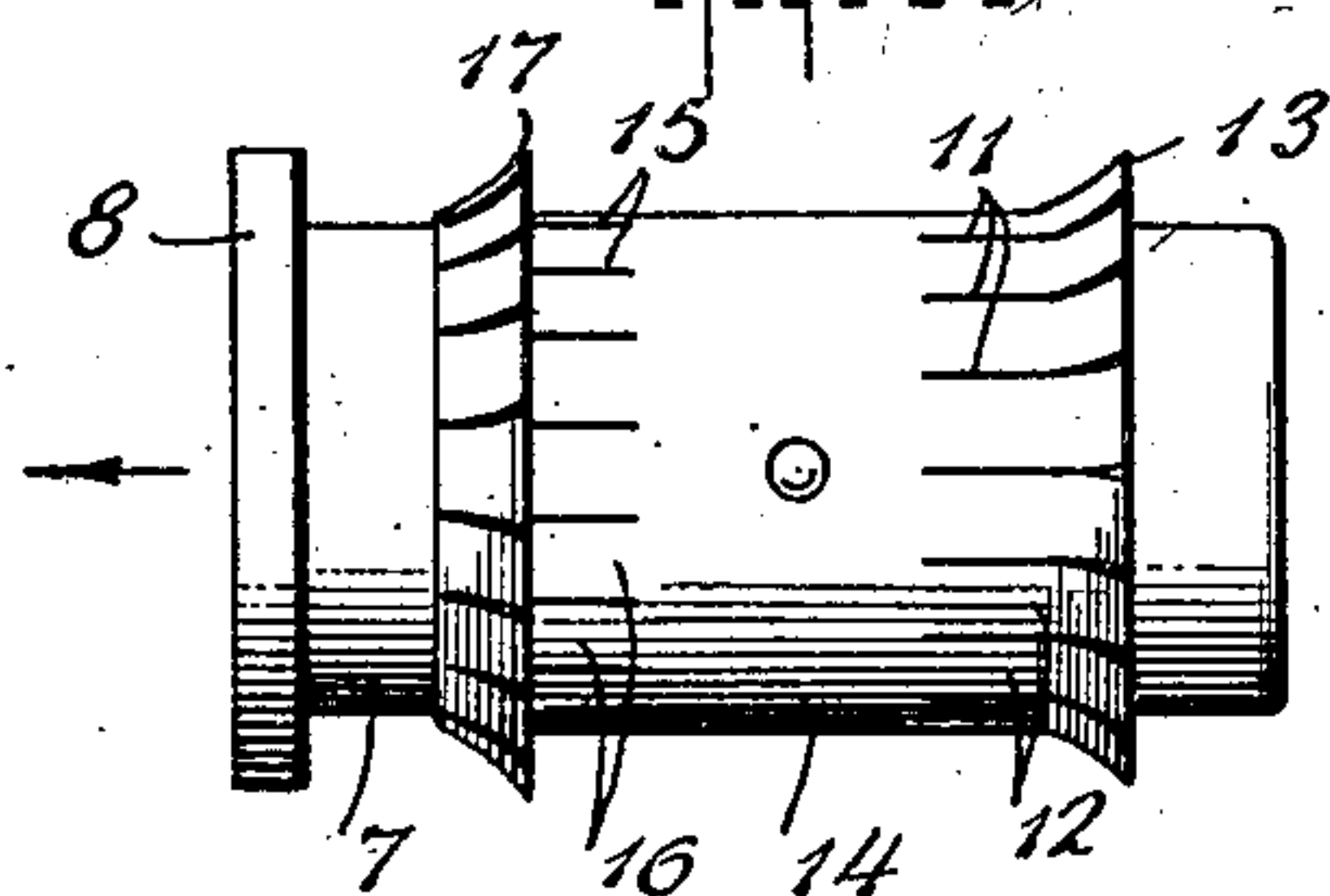


Fig. 6.

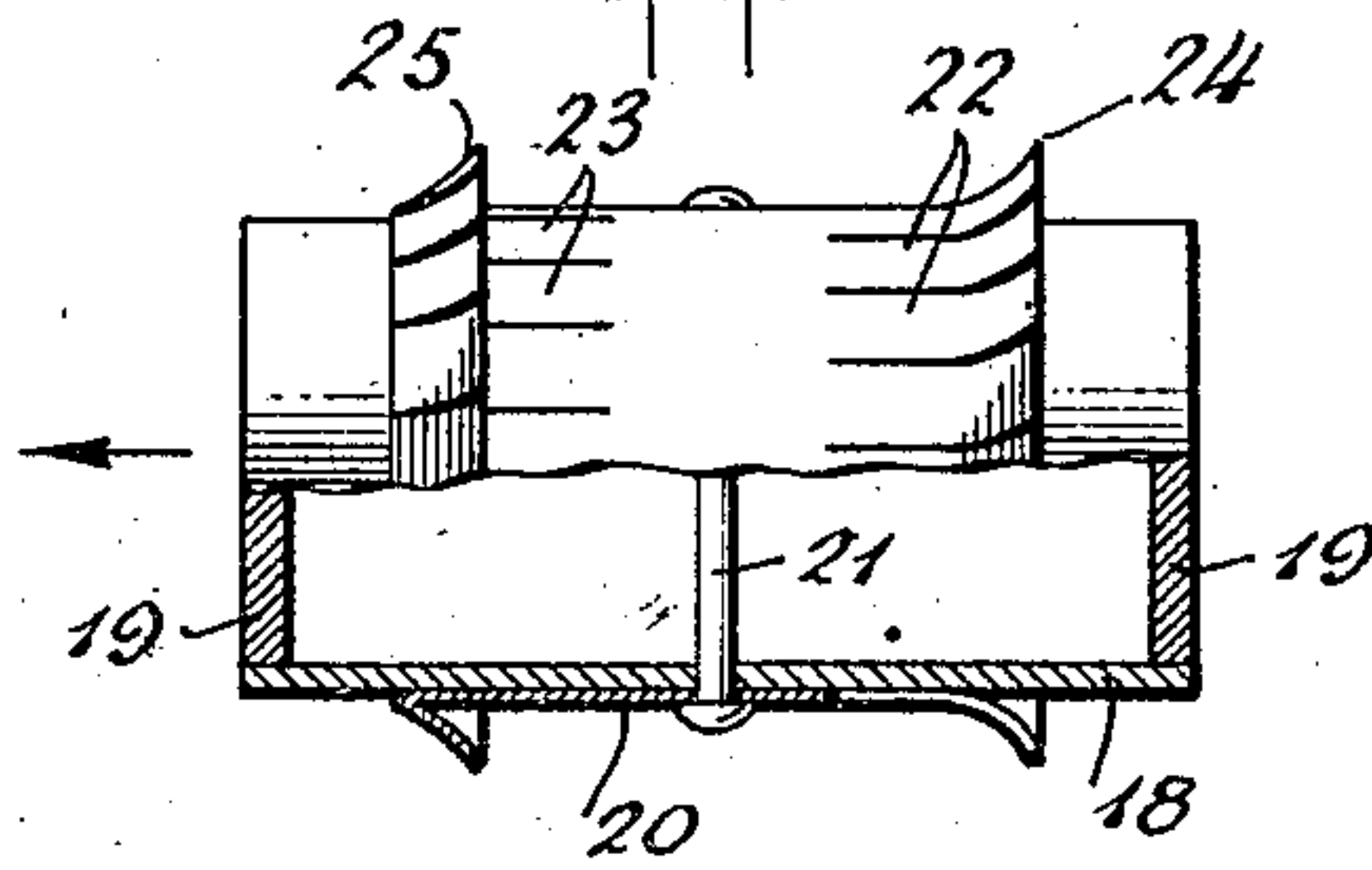
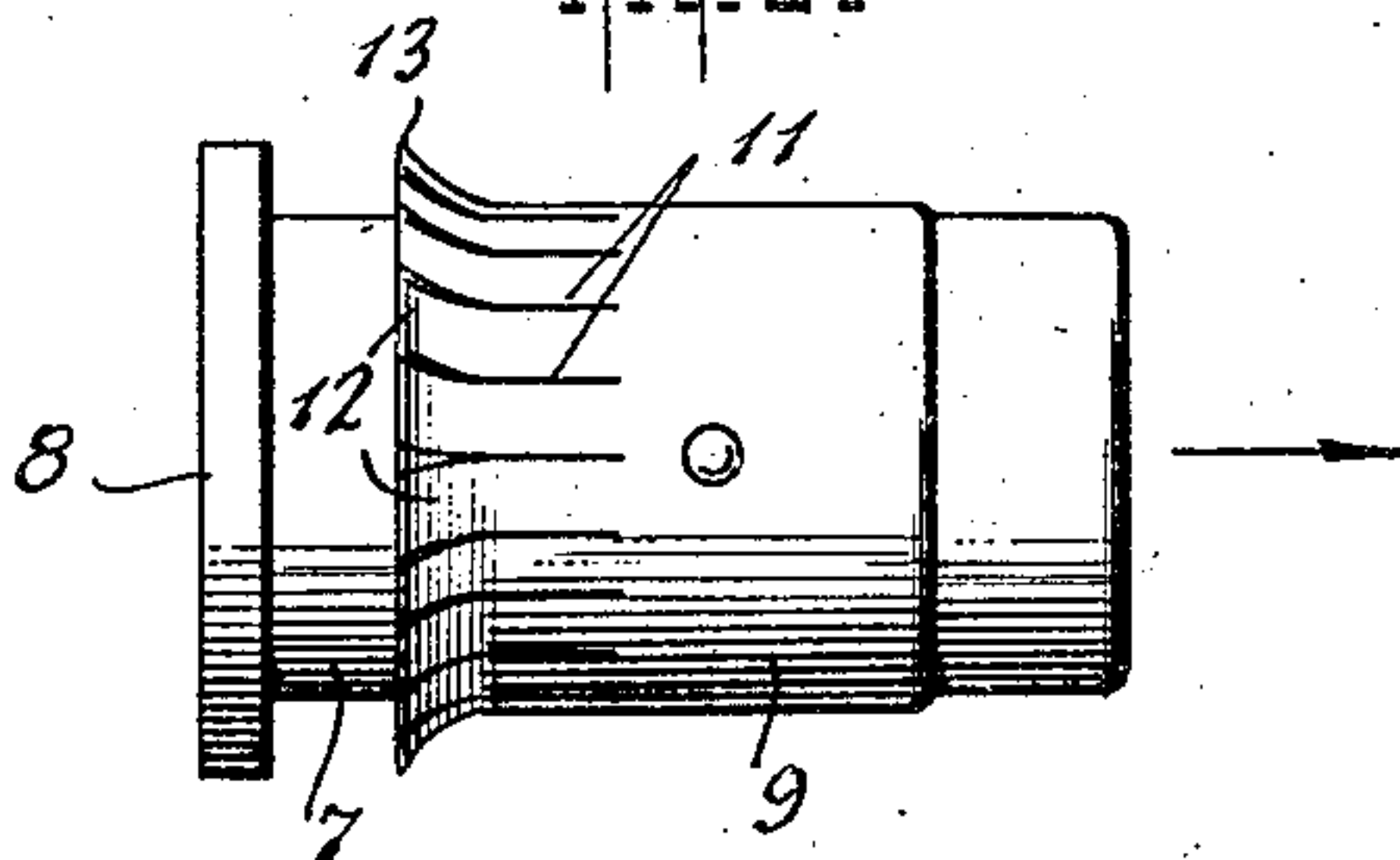


Fig. 5.



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## UNITED STATES PATENT OFFICE.

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## PLUG FOR CLEANING TUBES.

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This invention relates to improvements in cleaning devices, and has particular reference to a plug for cleaning condenser tubes and the like.

5 An object of the invention is to provide an improved plug of simple, practical and inexpensive construction which will effectively remove from a condenser tube all accumulations of slime, mud and other substances  
10 which are a detriment to the efficiency of the tube.

Another object resides in fixedly mounting upon the body of the plug a scraping element in the form of a sleeve, the effective  
15 scraping edge of which will be practically continuous and will at all times yieldably engage the interior surface of the tube with sufficient pressure to thoroughly remove all sediment from said surface.

20 The above and other objects will appear more clearly from the following detail description, when taken in connection with the accompanying drawing, which illustrates preferred embodiments of the inventive idea.

25 In the drawing—

Figure 1 is a side elevation of one form of the plug showing its application to a tube and the arrow indicating the direction of travel of the plug through the tube;

30 Figure 2 is an end elevation of the plug shown in Figure 1;

Figure 3 is a longitudinal section on the line 3—3 of Figure 2;

35 Figure 4 is a side elevation of another form of the invention showing a slightly different modification of the scraper;

Figure 5 is a side elevation of another form with the position of the scraper element reversed with respect to the illustration in Figure 1; and

40 Figure 6 is a side elevation, partly broken away and shown in section, of still another form of the invention.

The plug of the present invention is designed to be inserted within the bore of a  
45 condenser tube or the like and is forced through the tube, preferably by means of an apparatus for delivering a charge of compressed air, steam or water, which acts to propel the plug through the tube and in so  
50 doing remove any sediment therein and discharge it from the tube at the other end thereof.

In the form of the invention shown in  
55 Figures 1 to 3, the plug consists of an elongated body 7, preferably made of solid rub-

ber of strong texture, said body being circular in cross section and of less diameter than the tube through which it is to be projected. At only one end of the body the  
60 same has formed integrally therewith a head or flange 8, also of rubber, the diameter of which is slightly larger than the tube in order that said head will fit tightly within the tube to impart to it an expanding pressure which will cause the head to tightly  
65 fit the tube for the twofold purpose of acting as a piston against which pressure is exerted when forcing the plug through the tube and as a cleaning element which will assist in  
70 removing sediment from the tube.

In order to assist the flange 8 in thoroughly removing all accumulations within the tube the body 7 is further provided with a metallic scraping member 9. This  
75 member is in the form of a sleeve which is positioned upon the body by inserting the end thereof opposite the flange 8 through the sleeve and positioning the latter at a point medially of the ends of the body. The  
80 sleeve is secured in position by means of a rivet or other fastening device 10 extending diametrically through the sleeve and body. The end of the sleeve 9 remote from the flange 8 is provided with a plurality of  
85 longitudinally extending slits 11 dividing said end into a number of scraping blades 12, the free extremities of which are flared outwardly to form in effect a circumferential scraping edge 13, the diameter of which is  
90 slightly greater than the interior bore of a tube to be cleaned. The sleeve 9 is preferably made of steel or other metal having the required resiliency so that when the plug is inserted into the tube the free extremities  
95 of the blades will be forced inwardly by contact of the scraping edge 13 with the interior of the tube. Thus by reason of the inherent resiliency of the metal it will be obvious that considerable pressure will be  
100 exerted against the interior surface of the tube by the free extremities of the blades forming the scraping edge 13 and this pressure will be augmented by the fact that when the blades are compressed at the time of the  
105 insertion of the plug into the tube the portions of said blades adjacent their inner ends will compress the resilient body 7 thus causing said body to also have a tendency to force the blades outwardly. As the plug is  
110 projected through the tube the scraping edge 13 will effectively remove any accumulation



which may have adhered to the tube after the passage of the flange 8 and it will be obvious that the combined action of said flange and scraping edge will, therefore, be effective in removing all sediment from said tube.

In the form of the invention shown in Figure 4, the body 7 is of precisely the same construction as that shown in Figure 1. However, the scraper 14 differs from the element 9 in that the end of the sleeve adjacent the flange 8 of the body is also provided with a plurality of longitudinal slits 15 forming a plurality of blades 16, the outer extremities of which are bent backward upon themselves and outwardly flared to form a second scraping edge 17 which is of the same diameter as the edge 13. The slits 15 are disposed in staggered relation to the slits 11 so that the free edge of any one of the blades 16 which constitutes a portion of the scraping edge 17 will be in overlapping relation to the small space between two adjacent blades 12. By thus arranging the blades 16 with respect to the blades 12 it will be obvious that all possibility of the device failing to remove any of the sediment in the tube will be avoided for any accumulation which may possibly pass between any two blades 16 will be scraped by a portion of the scraping edge 13.

In Figure 5 the construction of the body 7 and the scraper 9 is exactly the same as that shown in Figure 1, but in mounting the scraper upon the body the position thereof is reversed so that the scraping edge 13 will be located adjacent the flange 8. When so constructed the end of the body which has no flange thereon is first inserted into the tube so that the scraping edge 13 will contact the tube before the flange 8 enters the same and the plug will then be projected through the tube in the direction of the arrow shown in Figure 5.

In the form of the invention shown in Figure 6, the body 18 is of cylindrical construction and can be made of some other material than rubber, such as metal for instance, and the ends of said body are closed

by disks or heads 19, the body in the present instance being made without a flange at either end. The scraper 20 is also in the form of a sleeve secured to the body by a rivet 21 and constructed the same as the scraper 14 with blades 22 and 23 at opposite ends, the free extremities of which are flared to form scraping edges 24 and 25, respectively, and the blades at one end being arranged in staggered relation with respect to the blades at the other end. In this form of the invention the edges 24 and 25 are solely relied upon to remove the sediment from the tube.

What is claimed is:

1. A plug for cleaning condenser tubes and the like, including a body composed entirely of rubber and having a flange at one end thereof, and a scraper including a sleeve fitted over said body and having one end split longitudinally to form a plurality of blades, the free extremities of which are flared outwardly and which combine to form a circumferential scraping edge.

2. A plug for cleaning condenser tubes and the like, including a body having a flange at one end, and a scraper including a sleeve fitted over the other end of the body and fixed thereto intermediate its ends, said sleeve being split longitudinally at both ends thereof to form a plurality of blades with the blades at one end arranged in staggered relation to those at the other end, the free extremities of the blades at both ends being flared to form circumferential scraping edges.

3. A plug for cleaning condenser tubes and the like, including a cylindrical body, and a scraper mounted upon said body and including a sleeve split at each end thereof to form a plurality of scraping blades with the blades at one end arranged in staggered relation to those at the other end, and the free extremities of said blades being flared outwardly to form circumferential scraping edges at both ends of said sleeve.

In testimony whereof I have affixed my signature.

EDWARD WALKER.