

No. 804,272.

PATENTED NOV. 14, 1905.

W. SCHWARZ.
RESPIRATOR.

APPLICATION FILED MAY 23, 1905.

4 SHEETS—SHEET 1.

fig. 1.

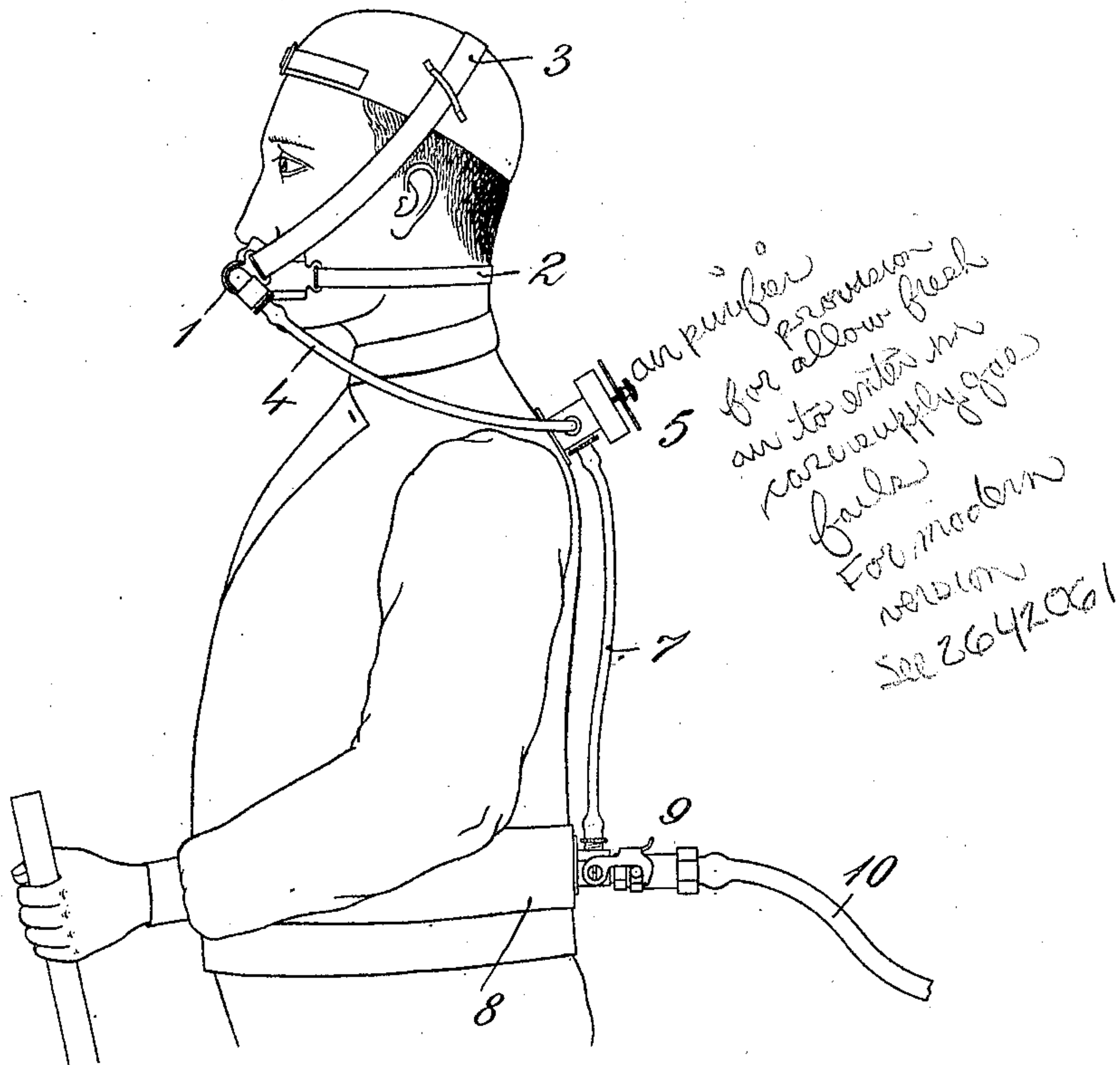
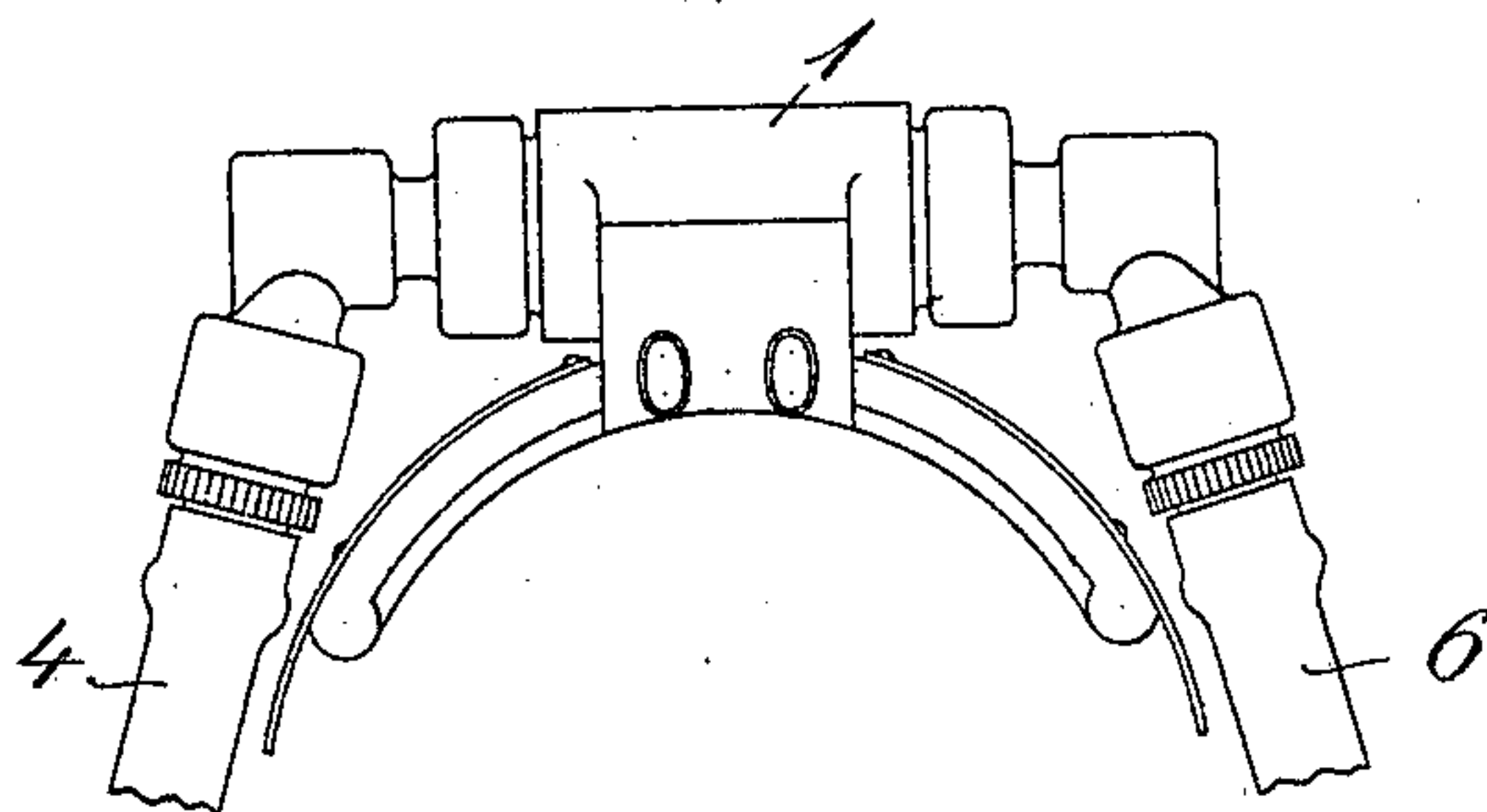


fig. 2.



Witnesses

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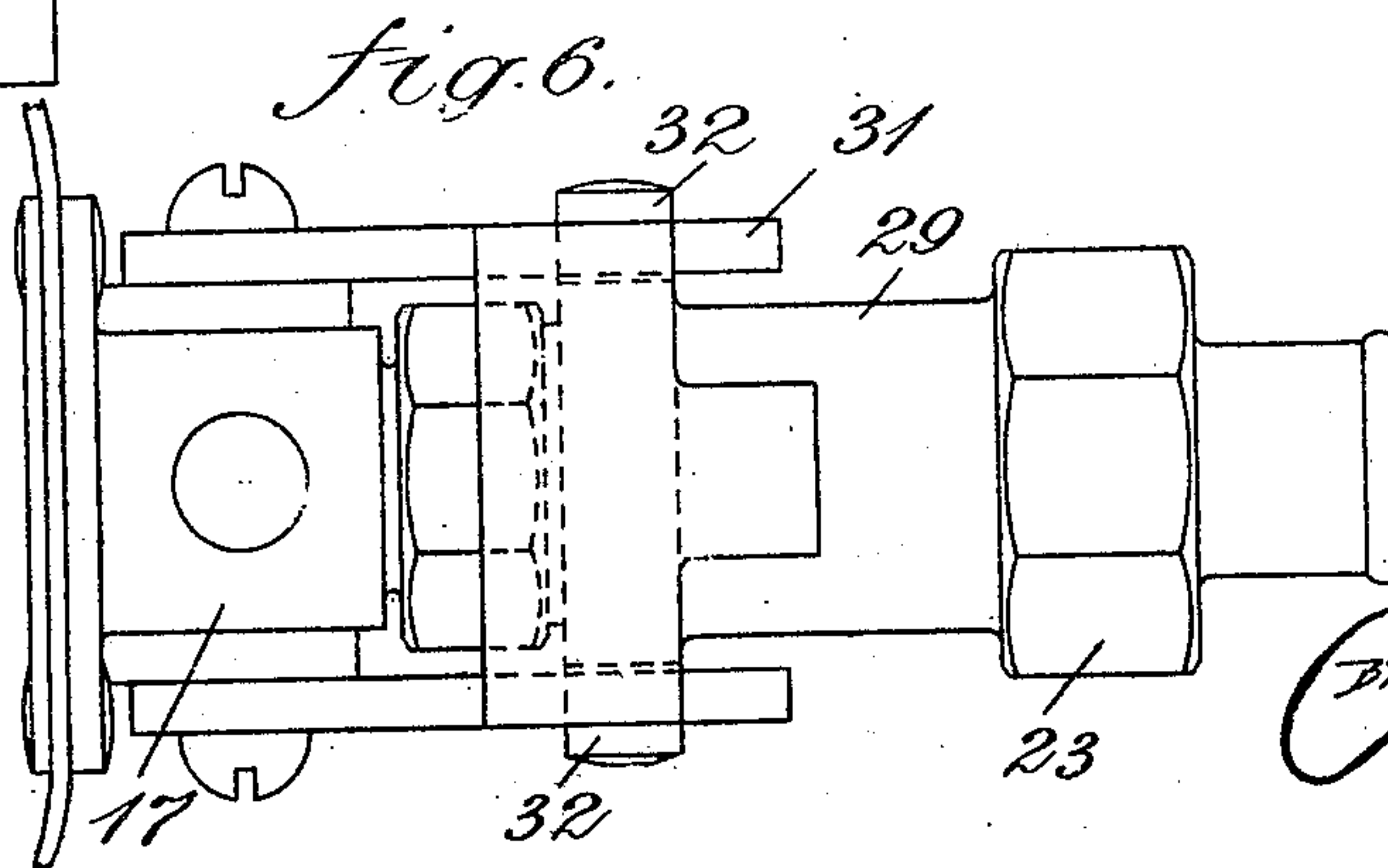
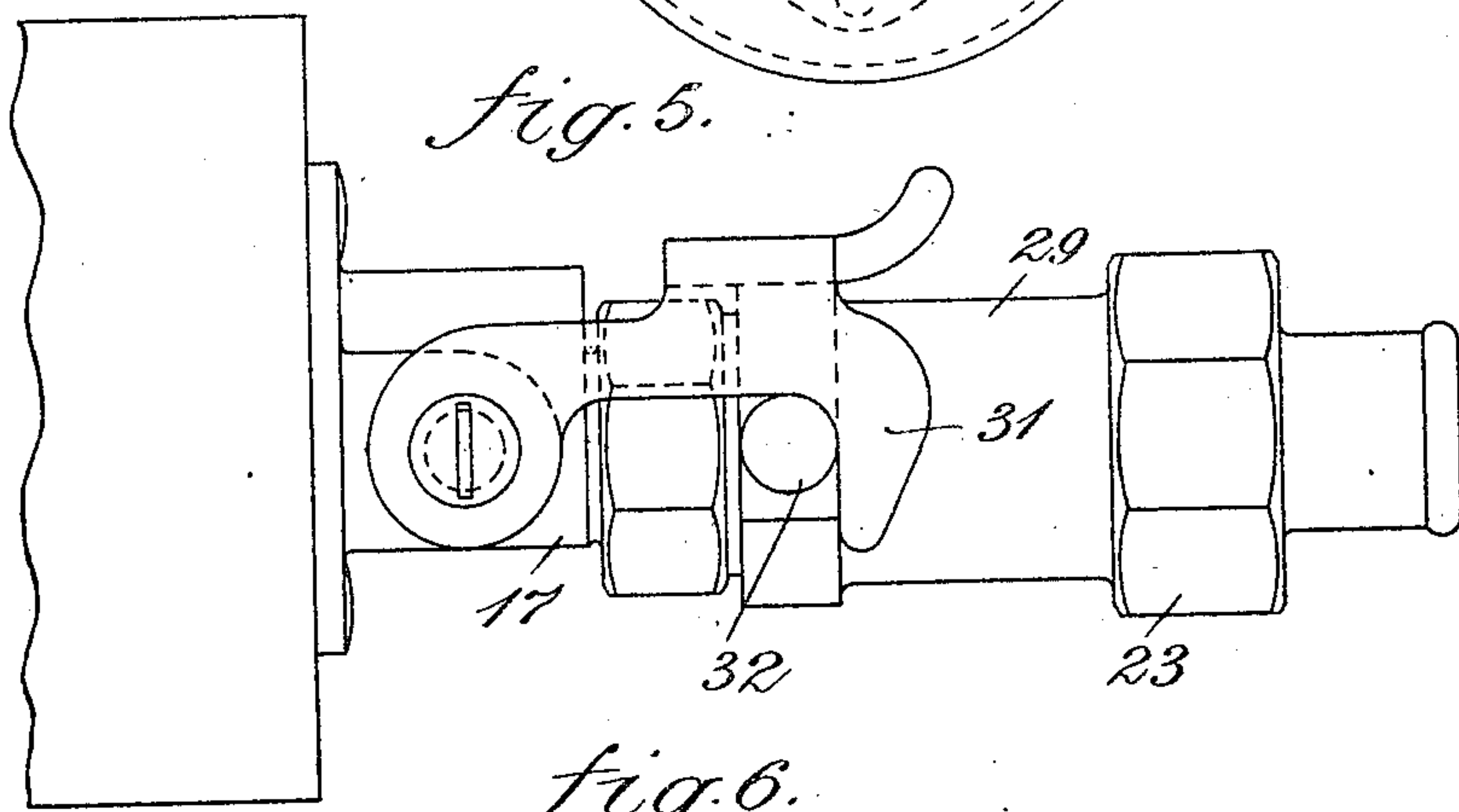
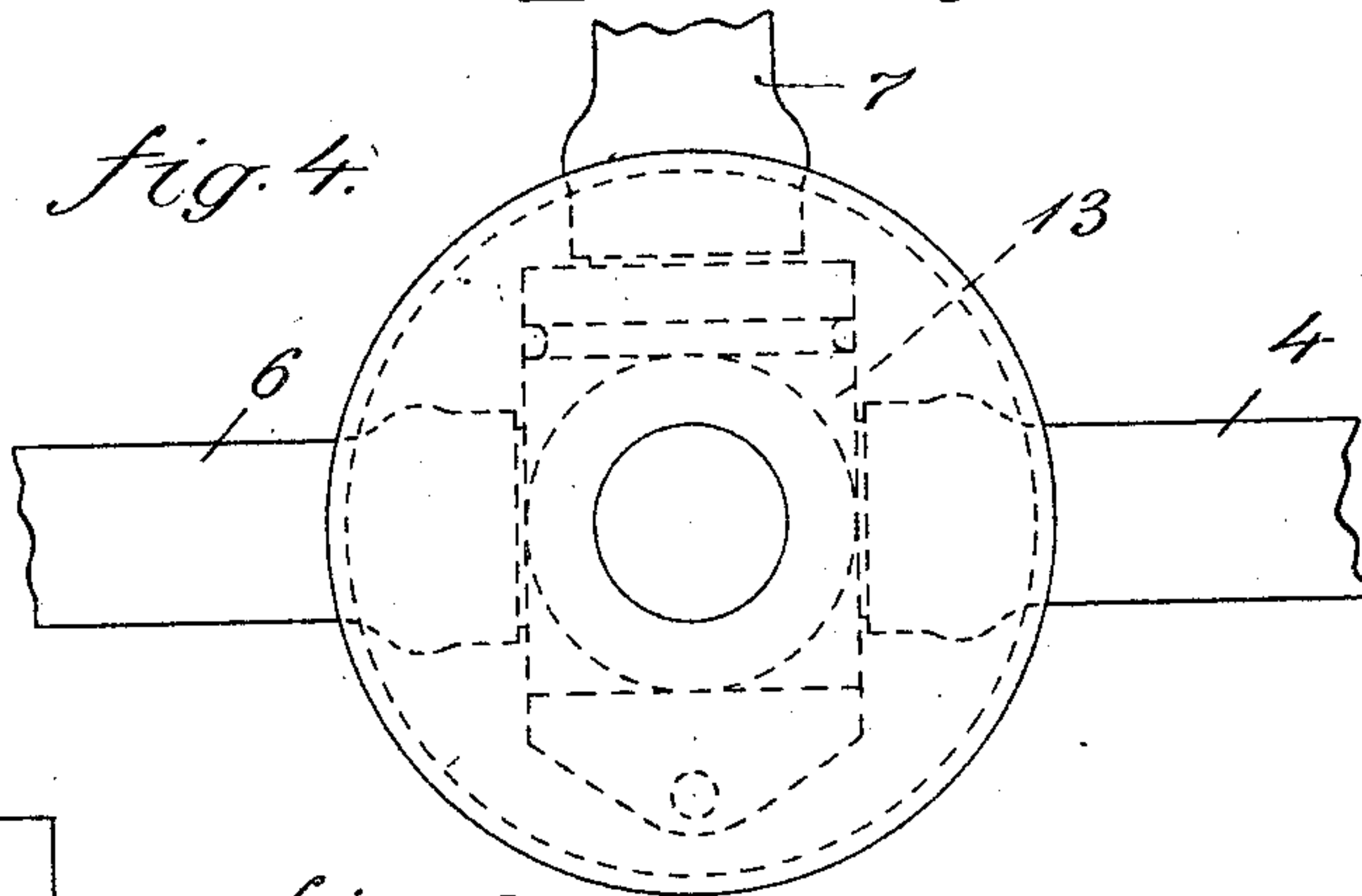
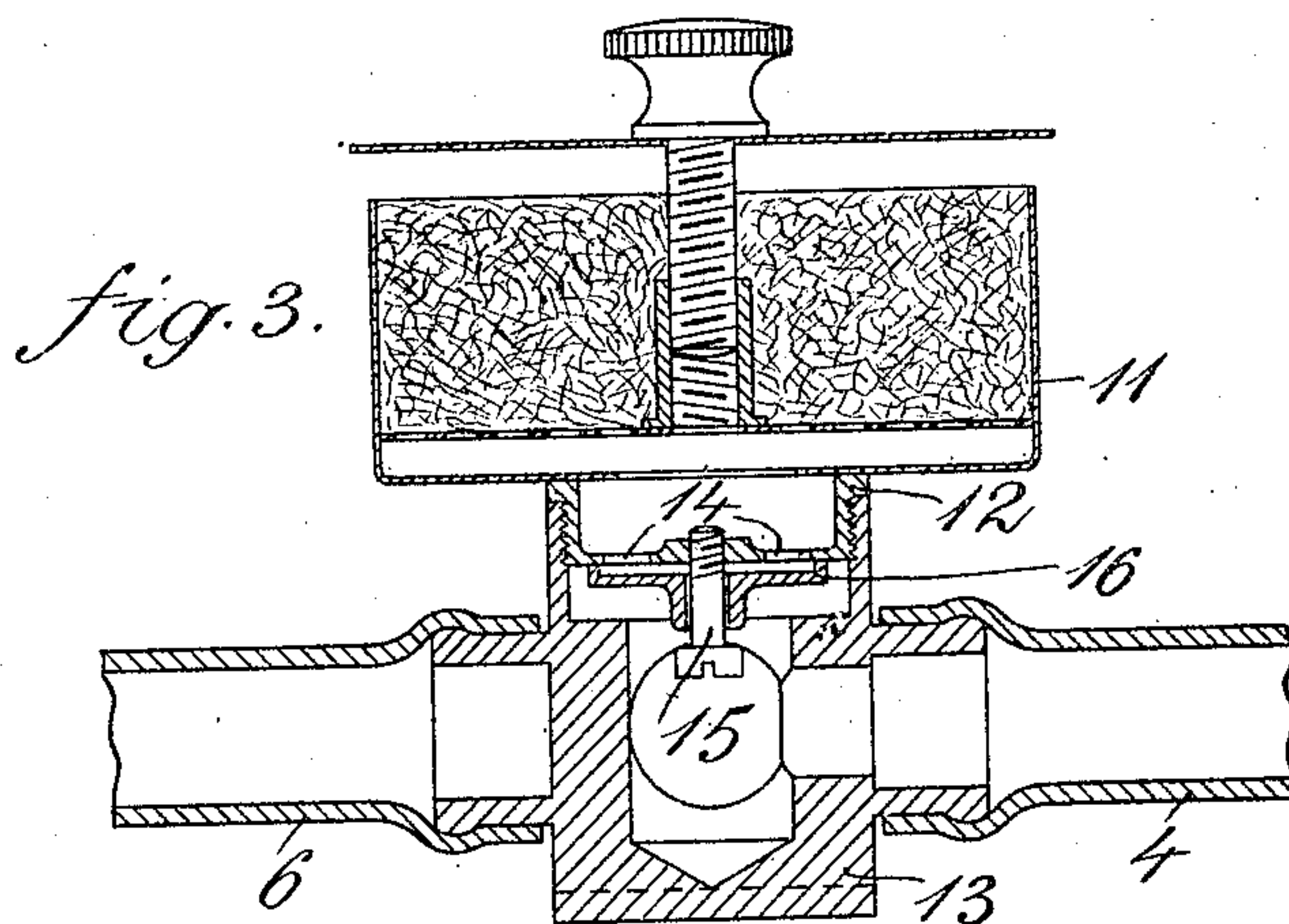
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4 SHEETS—SHEET 2.



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4 SHEETS—SHEET 3.

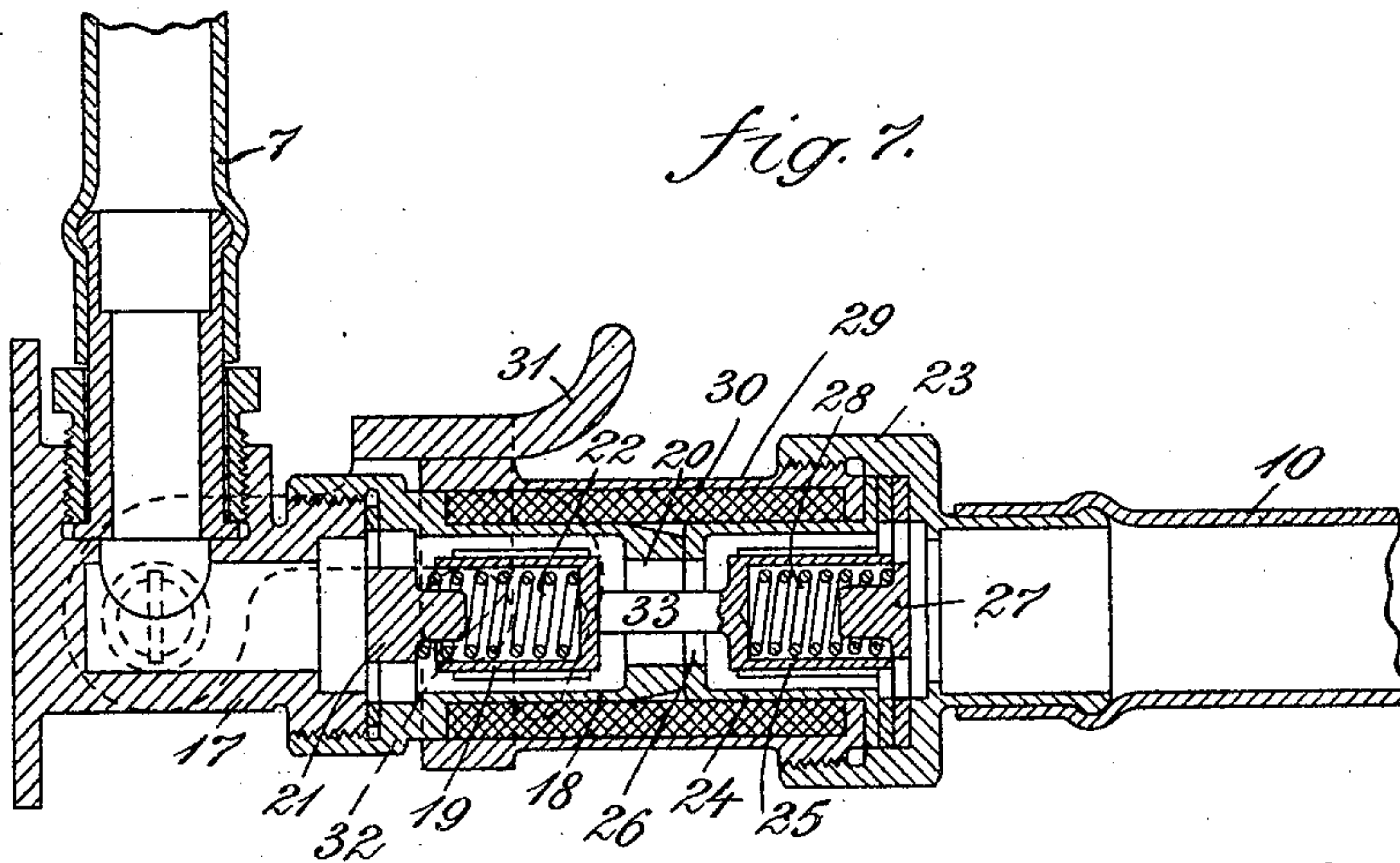


fig. 7.

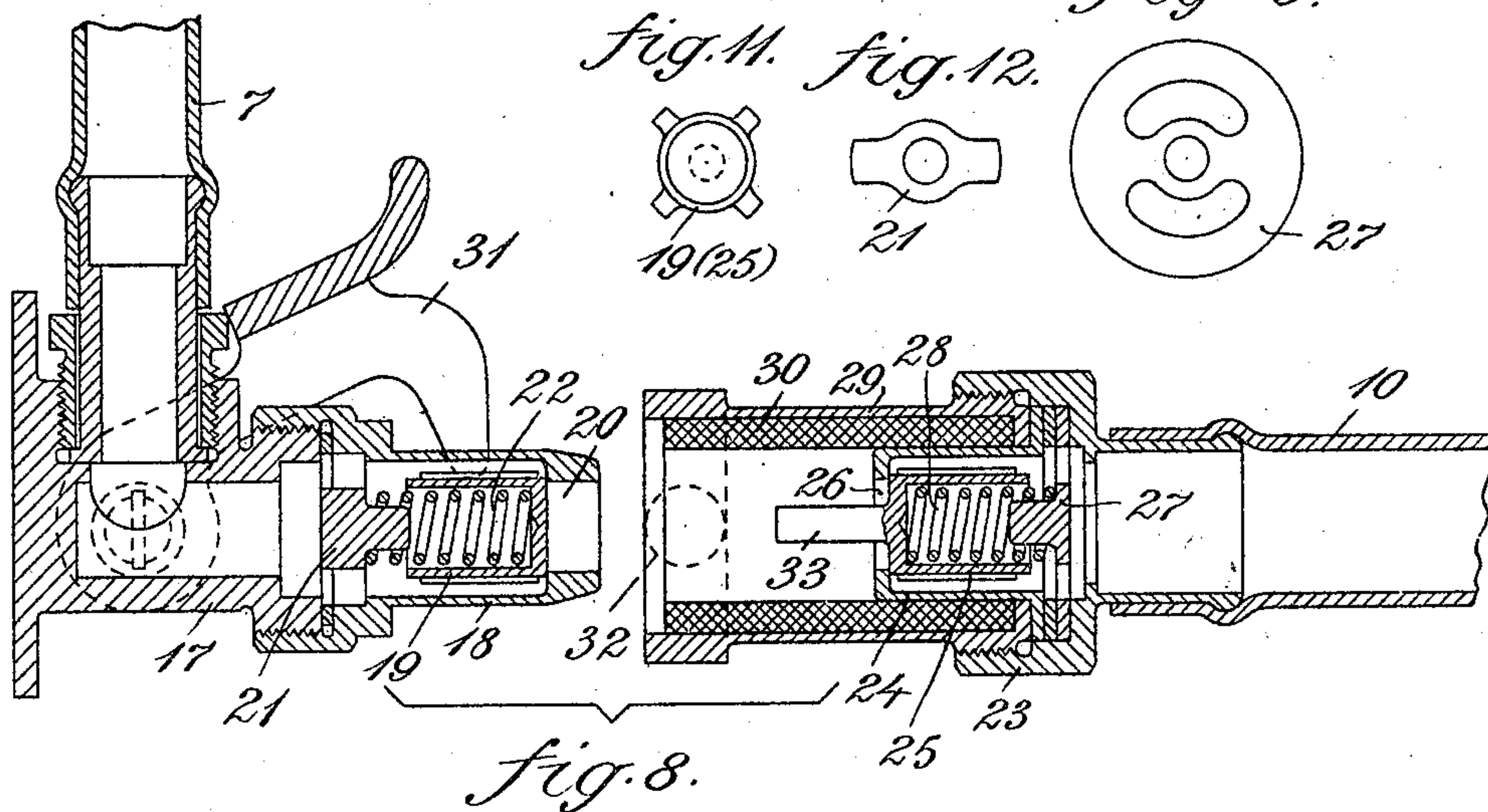


fig. 11. fig. 12.

fig. 13.

fig. 8.

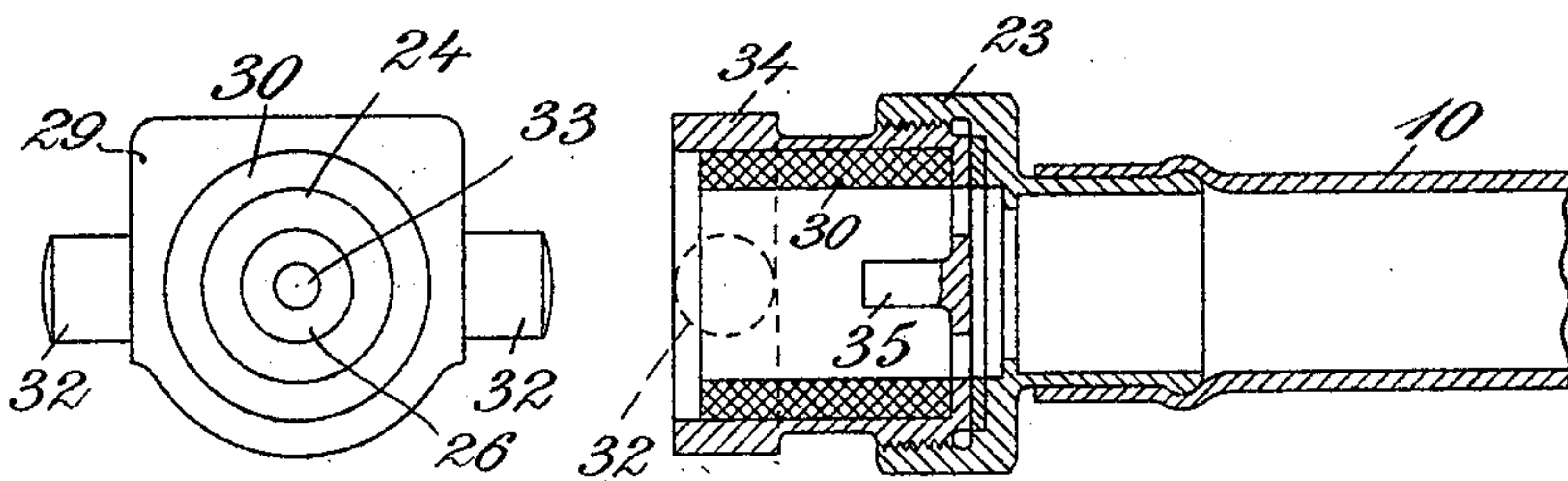


fig. 9.

fig. 10. Inventor
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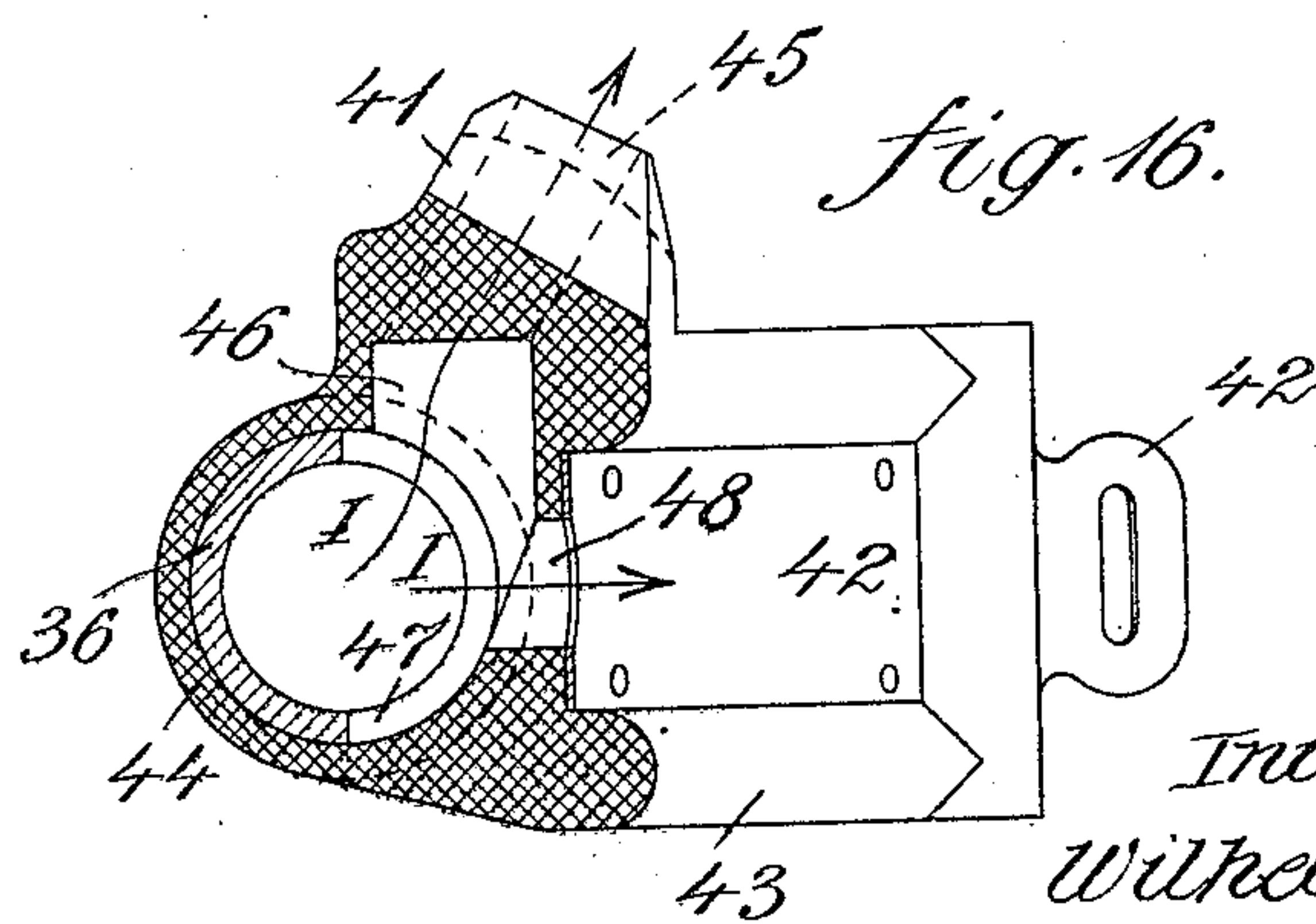
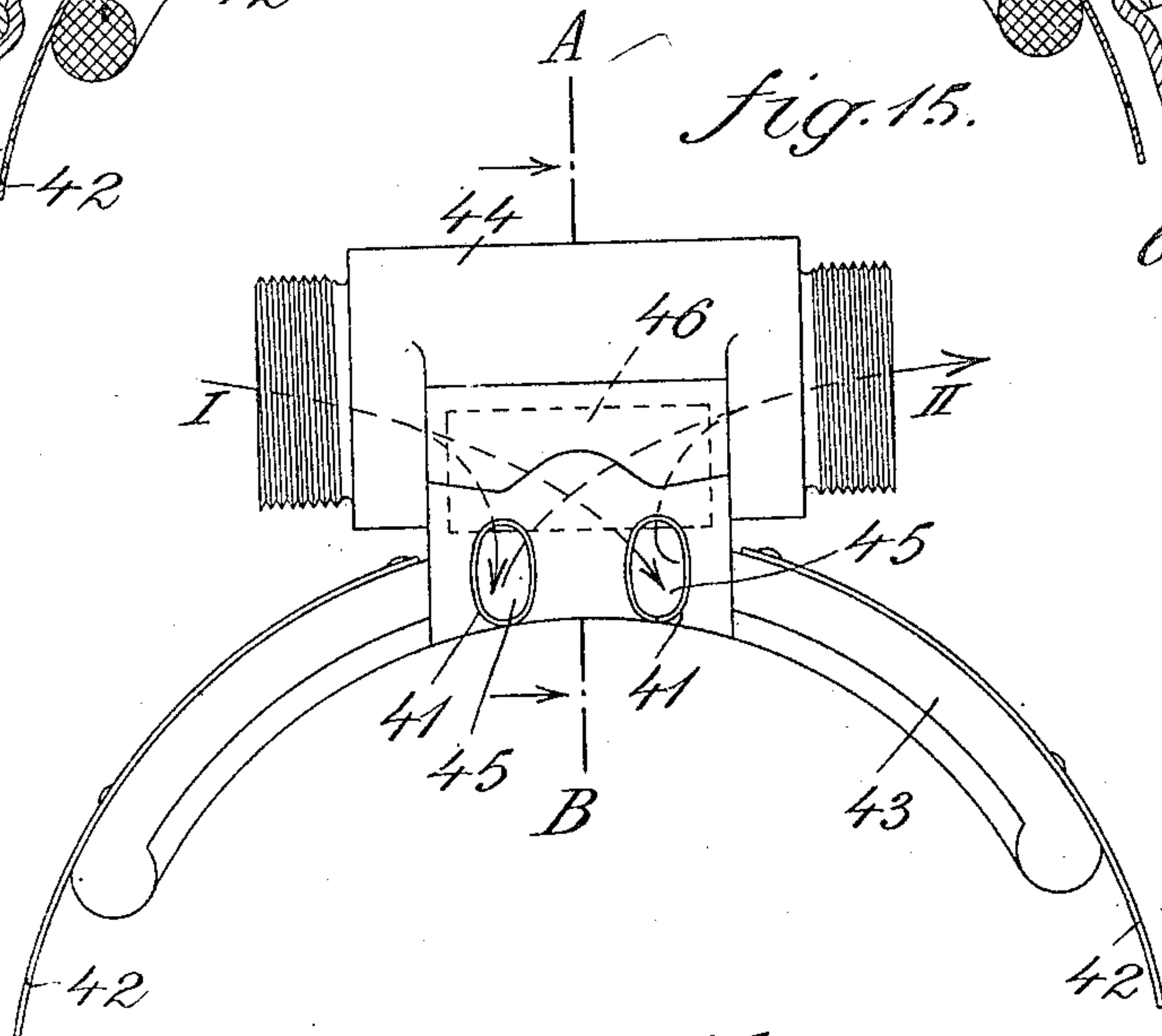
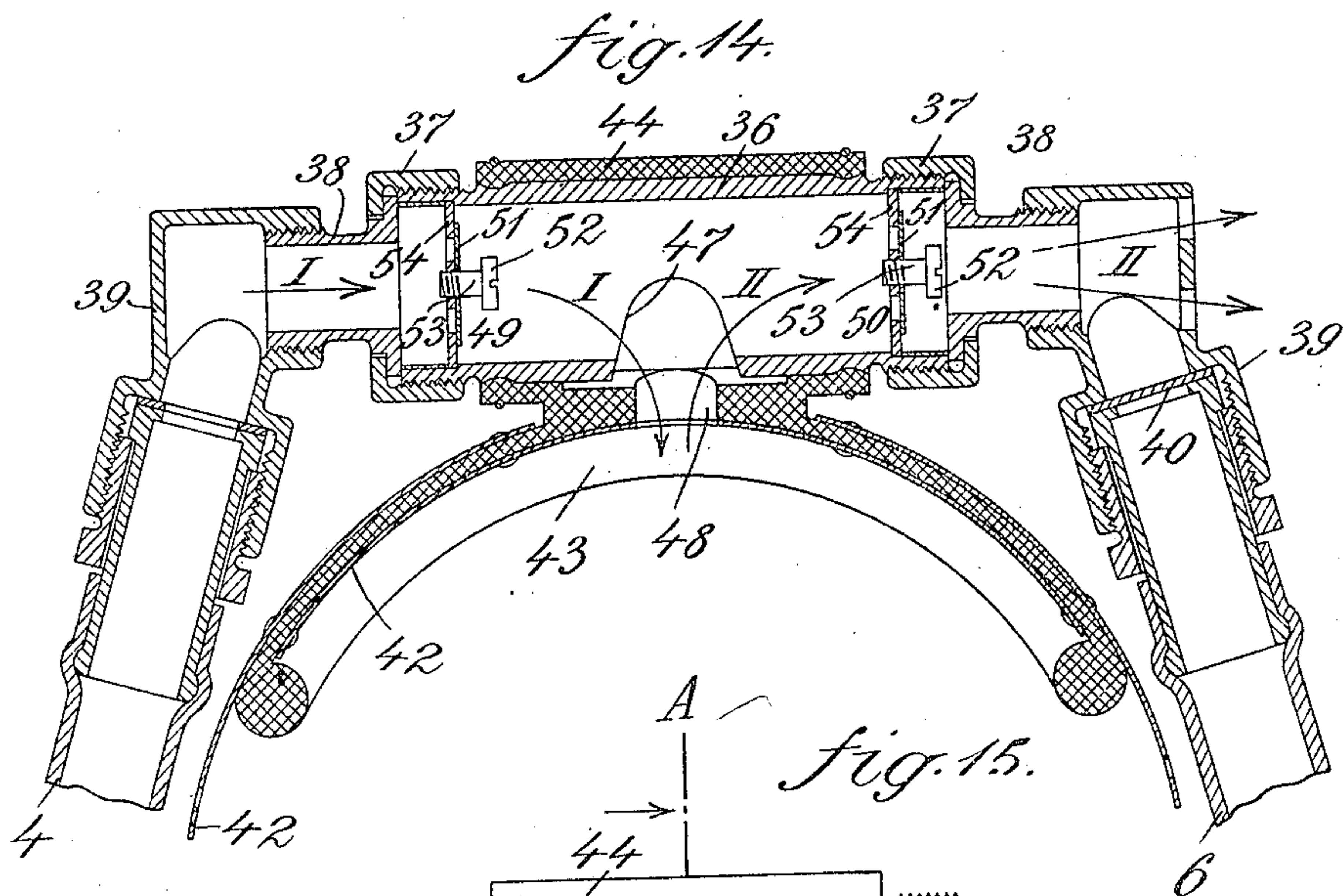
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4 SHEETS—SHEET 4.



Witnesses

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AT 45

UNITED STATES PATENT OFFICE.

WILHELM SCHWARZ, OF PFORZHEIM, GERMANY.

RESPIRATOR.

No. 804,272.

Specification of Letters Patent.

Patented Nov. 14, 1905.

Application filed May 23, 1905. Serial No. 261,888.

To all whom it may concern:

Be it known that I, WILHELM SCHWARZ, engineer, a subject of the Grand Duke of Baden, residing at Zähringer Allee, Pforzheim, Baden, German Empire, have invented new and useful Improvements in Respirators, of which the following is a specification.

My invention relates to an improved respirator to exclude injurious matters—such as dust, smoke, and gas—from the lungs.

The essential feature of the new respirator is that an air-purifier is inserted in the fresh-air-supply pipe in such manner that the wearer of the appliance can breathe either fresh air from without or the air of the surrounding space where he is, purified by the said device.

One form of construction of the apparatus is illustrated in the accompanying drawings, in which—

Figure 1 is a view showing the general arrangement of the apparatus. Fig. 2 is a plan of the actual respiratory device drawn to an enlarged scale. Fig. 3 is a vertical section, and Fig. 4 a plan of the air-purifier. Fig. 5 is an elevation, and Fig. 6 a plan of a pipe-coupling employed for the apparatus. Fig. 7 is a longitudinal section of the coupling holding the two pipes together. Fig. 8 is a like view of the parts uncoupled. Fig. 9 is an end elevation of the one-half of the coupling. Fig. 10 is a longitudinal section of a modification of the coupling-half connected with the fresh-air-supply pipe. Figs. 11, 12, and 13 are detail views, to be hereinafter referred to. Fig. 14 is a longitudinal section through the respiratory device. Fig. 15 is a plan of the india-rubber device which is pushed over the tubular casing of the respiratory appliance. Fig. 16 is a section on the line A B of Fig. 15.

The casing of the respiratory device 1, Fig. 1, is provided with tubular projections or nipples for the nose and mouth or for the nose only or for the mouth only, in which latter case the nostrils must be closed by means of a clip device. This casing may be secured in the desired position in any suitable manner—for example, by means of bands 2, 3. It is provided, as will be hereinafter described, with back-pressure valves in such manner that one valve admits the fresh or the purified air for inspiration, and the other valve lets out the expired air.

To the casing 1 there is connected the flexible pipe 4, leading to the air-purifier 5, Figs. 1, 3, and 4. The latter is connected to the

back of the wearer of the apparatus—for instance, by a second flexible pipe 6, Fig. 2. This pipe 6 cannot be seen in Fig. 1, as it lies in line with the pipe 4, which thus conceals it. In this manner there is no inconvenient pull exerted on the mouth or nose; nor is the field of vision in any way disturbed. From the air-purifier 5 there conducts a further flexible pipe 7, which is connected to the fresh-air-supply pipe 10 by means of a pipe-coupling 9 of peculiar construction carried by the belt 8.

The air-purifier, Figs. 3 and 4, consists of a filter-box 11, having a hollow screw-stem 12, by which it is connected to the casing 13, which presents tubular projections to receive the pipes 4, 6, and 7. The base of the stem 12 is provided with perforations 14 and receives a pin 15, on which slides a disk 16, so that in this manner a valve is constituted. This valve is closed when the wearer of the apparatus inspires fresh air, since the latter, entering under pressure through the main supply-pipe 10 and connecting-pipe 7, forces the disk 16 against the bottom of the stem 12. When, therefore, the apparatus is used as fresh-air respirator, the air-purifier is cut out. If, however, the coupling 9 is broken, whereby the fresh-air supply is interrupted, the disk 16 will sink and the surrounding air, purified by passing through the device 5, will enter the respirator. In order, however, simultaneously with disconnection of the coupling 9 and automatic insertion of the air-purifier 5 to prevent the entrance of impure air from the surrounding space into the pipe 7 and into the air-supply pipe 10, a peculiar form of pipe-coupling 9 is employed.

The coupling member 17 is secured to the belt 8 and has a tubular portion or spigot 18, containing a valve 19, Fig. 11. This valve when the coupling is broken, Fig. 8, closes the bore 20 in consequence of the action of the spring 22, one end of which presses against the disk 21, Fig. 12, while the opposite end presses against the valve. In this manner no noxious air from the surrounding space can enter the pipe 7. The other coupling member 23 has a tubular portion 24, containing a valve 25, which when the coupling is broken closes the hole 26 by reason of the spring 28, inserted between the valve and the disk 27, Fig. 13. By this means the surrounding vitiated air cannot enter the fresh-air-supply pipe either. Into the coupling member 23 there is screwed a tubular piece or socket

29, the rubber lining 30 of which fits over the spigot 18 of the other coupling member 17, so that when the parts 18 29 are fitted together an air-tight joint is effected. In order to guard against unintentional disconnection of the parts 18 29, a double pivotal hook 31 is provided, gripping over studs 32, projecting from the coupling member 23, Figs. 7, 8, 9. In order on making a joint to again open the valves 19 25 automatically, the latter valve 25 is provided with a pin 33, which when the parts 18 29 are brought together butts against the valve 19, so that the valves mutually open each other. In this manner a free passage is afforded for the fresh air.

Should it not be necessary to provide for prevention of the entrance of noxious air into the fresh-air-supply pipe 10 the coupling-piece of the latter may be constructed as shown in Fig. 10. The valve 25 is here dispensed with, and there is provided a short socket-piece 34, the rear end of which is perforated and furnished with a projecting pin 35.

As will be understood from the above, the wearer of the apparatus can inspire either fresh air from without or air from the surrounding space, purified by means of the device 5. The former will be the case when he is standing at his place of work, the second when he has to leave this station for a short time. It is then only necessary for him to turn back the hook-piece 31 and draw the pipe 10 out of the coupling.

The casing of the respiratory device, as shown in Figs. 14 to 16, consists of a tubular member 36, to the ends of which screw-nipples 38 are secured by means of nuts 37. These nipples receive the knee-pieces 39 for connecting the pipes 4 and 6, of which the former, 4, conducts to the fresh-air-supply pipe, while the other, 6, closed by the disk 40, in conjunction with the pipe 4, serves to hold in place on the back of the wearer the air-purifier 5, which is connected with the fresh-air-supply pipe. The nipples 41 41 for the nose and the piece 43, which fits over the mouth and is stiffened by metal strips 42, Figs. 14 to 16, are carried by a sleeve 44 of rubber or the like, which fits over the metallic casing 36. If desired, the parts 41 43 may form a single piece with the sleeve 44. To clean the apparatus, it is only necessary to draw the rubber member 41 43 44 off the casing 36, whereby ready access can be had to all the parts.

The apertures 45 of the nipples 41 conduct to an opening 46 in the rubber sleeve 44, and to this opening 46 there corresponds an opening 47 in the wall of the casing 36. Into the opening 46 there also conducts an aperture 48 of the mouth-connecting piece 43, so that the fresh air entering through the back-pressure valve 49 can be inspired in the direction of the arrow I, and the expired exhausted air can flow out in the direction of the arrow II through the back-pressure valve 50.

The back-pressure valves 49 50, Fig. 14, are of the so-called "fly-up" type. The disk 51 of each valve rides on a screw 52, the thread of which does not reach to the head, so that between the thread and the head a smooth guide-stem 53 is presented for the sleeve to slide on. The sleeve can thus readily be forced back from the apertures of the perforated disk 54. This is of much importance for the proper operation of the respiratory device, as breathing is thus greatly facilitated as compared with other apparatuses in which the screws for the valve-disks are screwed up tight.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A respirator, comprising a respiratory device fitting the face of the wearer of the apparatus, and perforated to admit of his breathing, and having valve-controlled air inlet and outlet passages; an air-purifier having air inlet and outlet passages; a back-pressure valve controlling the latter passage; a pipe connecting the said purifier-outlet with the air-inlet of the respiratory device; and a valve-controlled pipe adapted to connect the said purifier-outlet with a fresh-air-supply pipe; whereby on the fresh-air supply being shut off, the said back-pressure valve opens automatically and allows air from the surrounding space to pass through the purifier to the respiratory device; substantially as described.

2. A respirator, comprising a respiratory device fitting the face of the wearer of the apparatus, and having a centrally-located aperture through which the wearer can breathe, and a valve-controlled air-inlet at the one end and a valve-controlled air-outlet at the other end; means for holding the said device to the wearer's head; an air-purifier located at the wearer's back and having air inlet and outlet passages; a back-pressure valve controlling the latter passage; a pipe located at one side of the said purifier and connecting its outlet with the air-inlet of the respiratory device; means at the opposite side of the purifier securing the latter to the opposite end of the respiratory device; and a valve-controlled pipe adapted to connect the said purifier-outlet with a fresh-air-supply pipe; substantially as described.

3. A respirator, comprising a respiratory device consisting of a perforated tubular casing having valve-controlled air inlet and outlet passages, and a member sliding over the said casing and presenting perforations through which the wearer of the apparatus can breathe, communicating with the interior of the casing; an air-purifier having an air-inlet and a valve-controlled air-outlet; a pipe connecting the said purifier-outlet with the air-inlet of the respiratory device; and a valve-controlled pipe adapted to connect the said purifier-outlet with a fresh-air-supply pipe; substantially as described.

4. A respirator, comprising a respiratory device consisting of a perforated tubular casing having valve-controlled air inlet and outlet passages, and a member sliding over the said casing and presenting nipples adapted to fit the nostrils and a suitably-shaped member adapted to fit the mouth of the wearer of the apparatus, said nipples and mouthpiece communicating with the interior of the casing; an air-purifier having an air-inlet and a valve-controlled air-outlet; a pipe connecting the said purifier-outlet with the air-inlet of the respiratory device; and a valve-controlled pipe adapted to connect the said purifier-outlet with a fresh-air-supply pipe; substantially as described.

5. A respirator, comprising a respiratory device fitting the face of the wearer of the apparatus and perforated to admit of his breathing, and having air inlet and outlet passages, and back-pressure valves controlling the said passages and having disks lifting entirely from their seats; an air-purifier having an air-inlet and a valve-controlled air-outlet; a pipe connecting the said purifier-outlet with the air-inlet of the respiratory device; and a valve-controlled pipe adapted to connect the said purifier-outlet with a fresh-air-supply pipe; substantially as described.

6. A respirator, comprising a respiratory device fitting the face of the wearer of the apparatus and perforated to admit of his breathing, and having valve-controlled air inlet and outlet passages; an air-purifier having air inlet and outlet passages; a back-pressure valve controlling the latter passage; a pipe connecting the said purifier-outlet with the air-inlet of the respiratory device; a fresh-air-supply pipe; a pipe for connecting the said purifier-

outlet with the latter; and means for coupling the two said latter pipes, consisting of a spigot member on the one pipe, and a spring-actuated valve sliding therein and controlling its aperture, and a socket member on the other pipe and a spring-actuated valve sliding therein and presenting a projection and closing the passage of the socket, whereby on the spigot being inserted into the socket the valves abut and mutually open each other; substantially as described.

7. A respirator, comprising a respiratory device fitting the face of the wearer of the apparatus and perforated to admit of his breathing, and valve-controlled air inlet and outlet passages; an air-purifier having air inlet and outlet passages; a back-pressure valve controlling the latter passage; a pipe connecting the said purifier-outlet with the air-inlet of the respiratory device; a fresh-air-supply pipe; a pipe for connecting the said purifier-outlet with the latter; and means for coupling the two said latter pipes, consisting of a spigot member on the connecting-pipe and a spring-actuated valve sliding therein and controlling its aperture, and a socket member on the fresh-air-supply pipe and a member presenting a projection located therein, whereby on the spigot being inserted into the socket the valve and the projection abut and effect opening of the valve; substantially as described.

In witness whereof I have hereunto signed my name this 6th day of May, 1905, in the presence of two subscribing witnesses.

W. SCHWARZ.

Witnesses:

ALBERT BAER,

ERNST ENTENMAN.