

Feb. 17, 1953

R. R. BERG  
SANDBLASTING DEVICE

2,628,456

Filed Jan. 15, 1952

2 SHEETS—SHEET 1

Fig. 1.

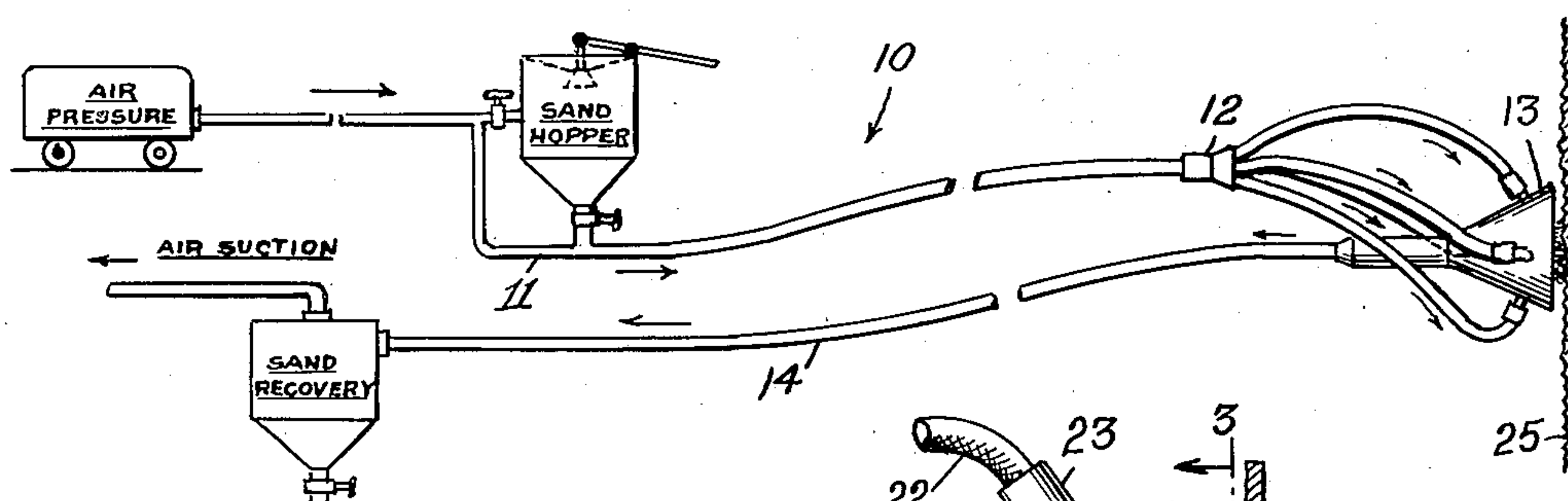


Fig. 2.

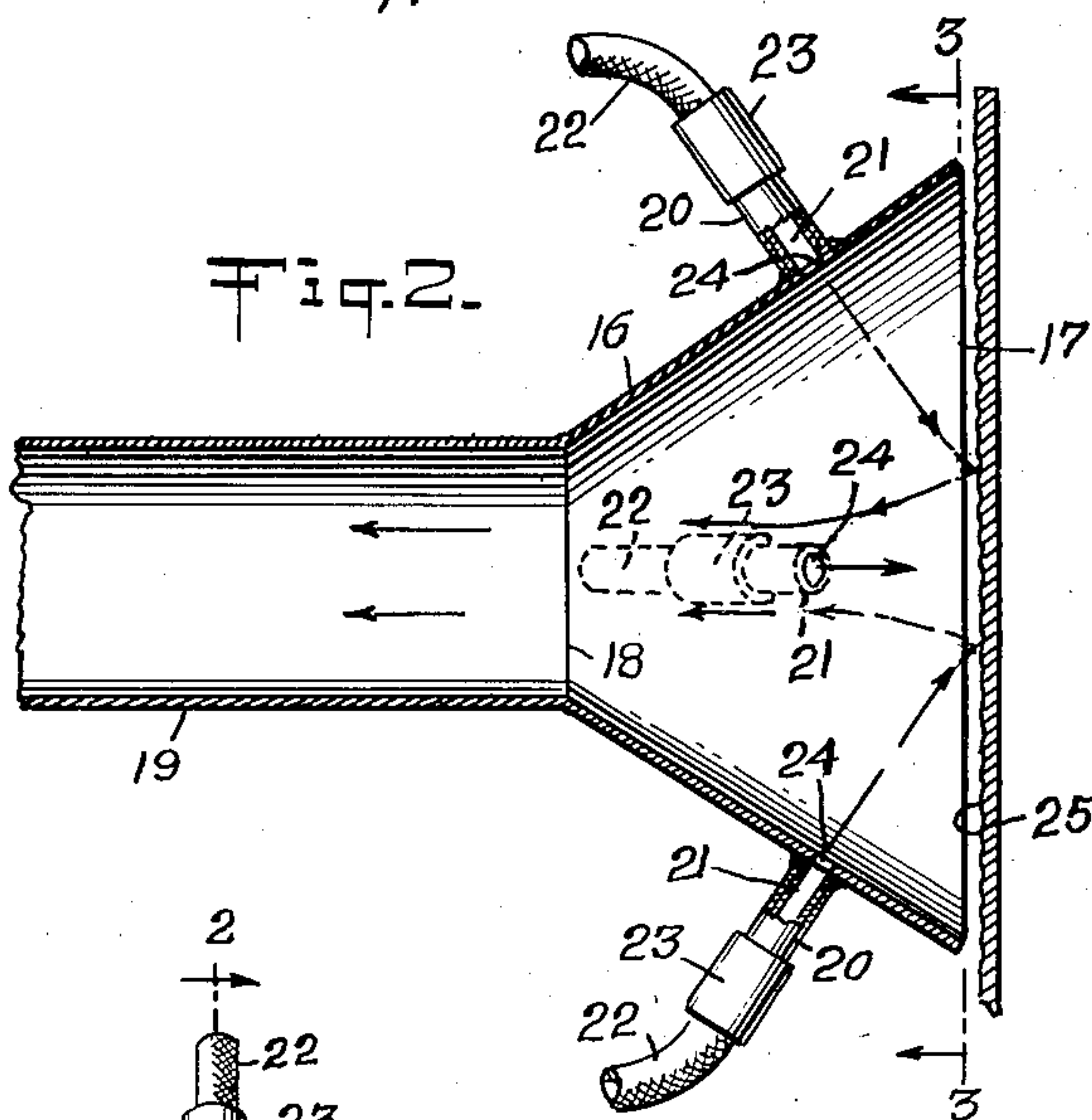
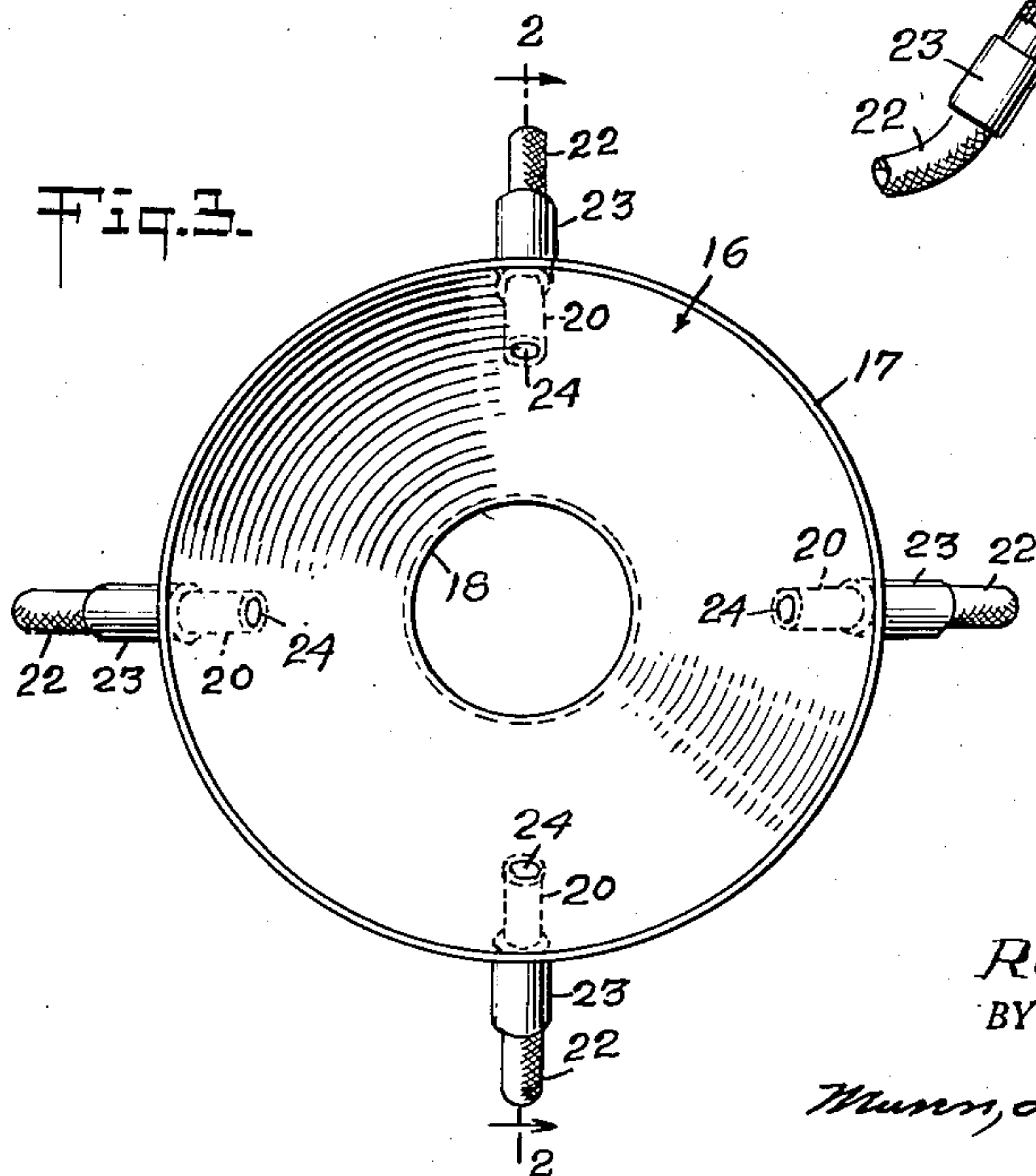


Fig. 3.



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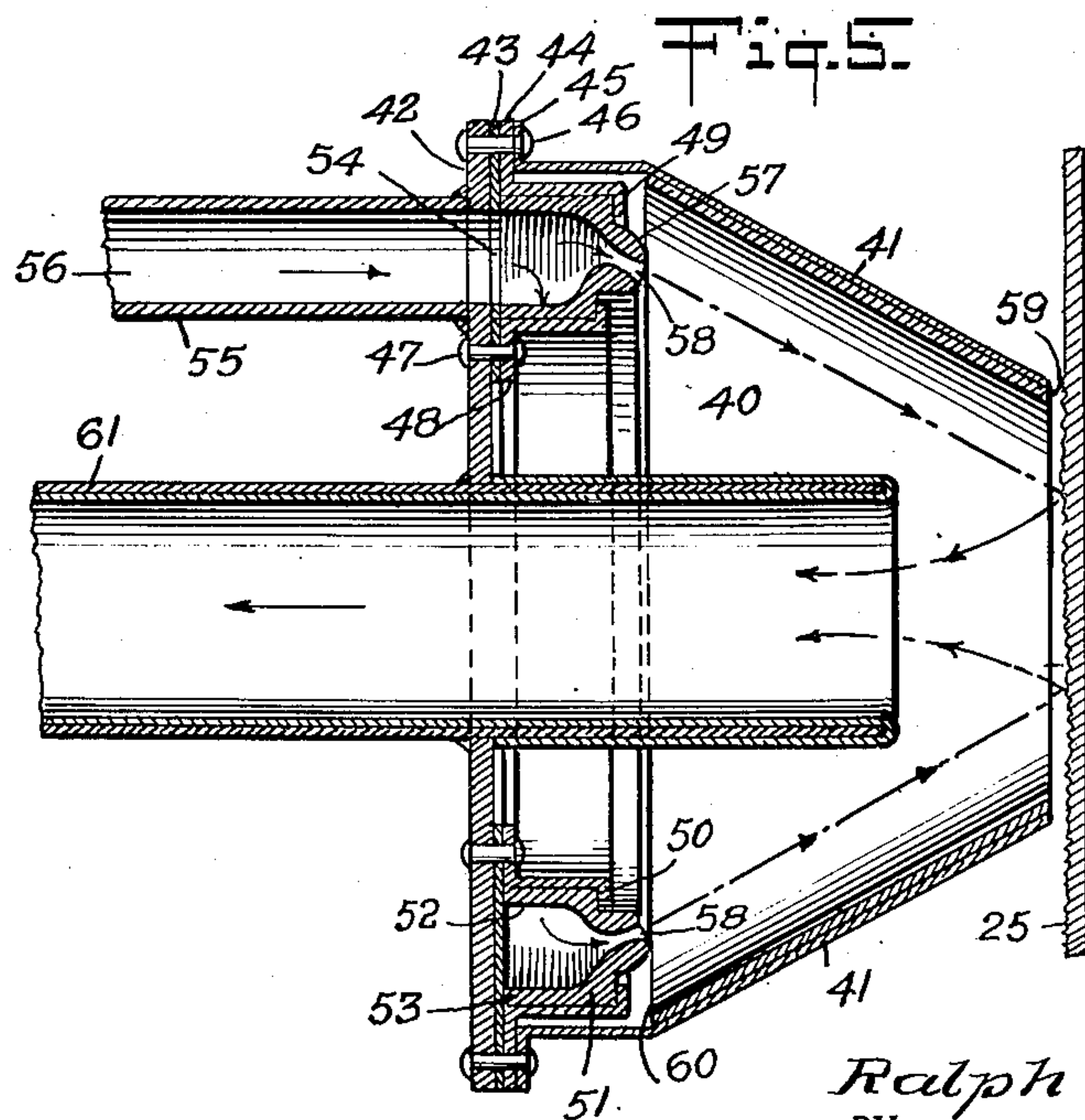
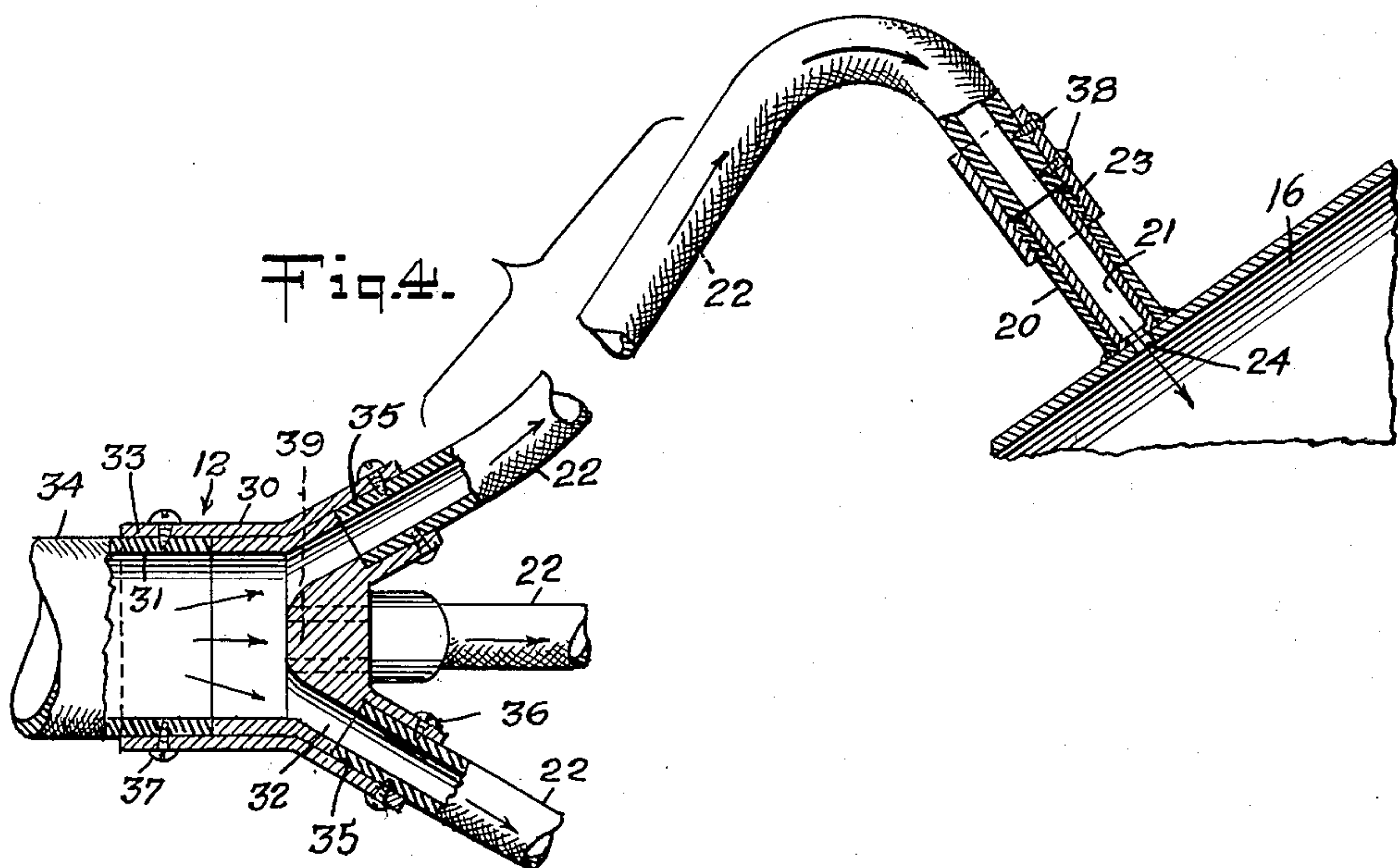
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2 SHEETS—SHEET 2



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## UNITED STATES PATENT OFFICE

2,628,456

## SANDBLASTING DEVICE

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9 Claims. (Cl. 51—8)

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This invention relates to improvements in abrading equipment and, more particularly, to an improved sandblasting device.

Among the objects of my invention are to provide sandblasting equipment having means for recovery of the sand or other abrasive material used in the abrading process.

Another object of this invention is provide sandblasting equipment comprising in a single unit a blasting gun and abrasive recovery means.

Other objects of this invention are to eliminate the inconveniences and dangers commonly experienced with the presently known sandblasting equipment. Among these inconveniences experienced are the necessity to employ personnel to clean up used sand from areas where such equipment is used, the inability to carry on other work such as maintenance and repair in the vicinity while blasting equipment is being used, the high dust concentration in the vicinity of such equipment which impairs the operator's vision and efficiency, and the necessity to fully protect exposed machinery and other equipment from the deleterious effects of abrasives before blasting can be performed. Among the dangers present in the use of the commonly known blasting equipment are the danger of silicosis from breathing dust laden air and the danger of falls from sliding on discarded sand present on staging, decks and other surfaces.

Further objects of this invention are to lower the cost of sandblasting by eliminating the waste due to the discarding of sand which is used only once in a blasting operation. Thus expensive charges for transportation, warehousing and handling are considerably reduced.

These and other objects and advantages will become apparent from the following description and the accompanying drawings in which:

Figure 1 is a schematic view of the sandblasting equipment;

Figure 2 is a sectional view in partial elevation of the gun forming a part of my invention;

Figure 3 is a view taken on line 3—3 of Figure 2, and looking in the direction of the arrows;

Figure 4 is an elevational view partly in section showing a portion of the gun shown in Figure 3 and a means for distributing abrasive material to the gun; and

Figure 5 is a sectional view of a modified form of gun.

Similar reference characters in the several figures indicate similar parts.

As heretofore indicated the commonly used blasting equipment has many objectionable fea-

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tures. I have overcome these objections by developing a means of recovering abrasive material immediately adjacent the point of application of such material to surfaces being abraded.

This is accomplished by employing a gun comprising a hood having discharge ports which are disposed so as to direct streams of abrasive toward surfaces to be cleaned in a convergent manner, and an abrasive exhausting means for removing the used abrasive from the hood. The hood is so constructed that the abrasive material will be trapped therein instead of being allowed to fall where it may. The abrasive is thus recovered instead of being wasted or permitted to become a nuisance.

Other abrading devices having recovery means have been devised. However, such devices have undesirable bulkiness and weight and are particularly difficult to use where large vertical surfaces are to be cleaned. Furthermore, so far as is known, no device is available which utilizes the high rebound energy or the abrasive materials employed in accomplishing recovery of such materials.

Referring now to the drawings in particular, 10 generally indicates the apparatus which comprises an air pressure supply, a sand hopper, suitable tubing and valving 11 for mixing the sand with the air, a distributing means 12, a gun 13, a recovery line 14, a recovery tank and a source of vacuum which is not shown.

Figures 2 and 3 show one form of gun which I have invented. The gun comprises a hollow hood 16 of a generally defined frusto-conical shape. The hood is open at both its base 17 and its opposite or apex end 18. Attached to the narrower end 18 is a recovery tube 19. Four nozzles 20 are mounted in equally spaced relation on the perimeter of the hood. The nozzles shown comprise tubes having generally cylindrical passageways 21. Hoses 22 may be readily attached to the nozzles by coupling means 23. Openings 24 are provided in hood 16 in alignment with passageways 21.

As shown, the nozzles and openings 24 are so disposed that abrasive material will be directed toward a point on the central axis of the hood which lies beyond the base. The nozzles are mounted approximately normal to the outer hood surface. Of course the nozzles may be mounted at a different angle with respect to the hood, and the abrasive material need not be directed toward a point on the central axis. Also it is clear that the hood may be of a shape different from that shown. However the hood is so formed,



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and the nozzles are so mounted, that the sand or other material strikes the surface to be abraded or treated, such as surface 25, at an angle such that efficient abrasive action is obtained, and so that the material will rebound in a manner which will not interfere with the incoming particles so as to lower their average kinetic energy to any great extent. The path of the particles is shown by the arrows in Figure 2. The distance of the nozzle from the surface to be abraded when the gun is positioned as shown in Figure 2 can be chosen so as to give the best performance under given conditions.

It has been found that the best performance is obtained when the nozzles direct the sand at an angle to the surface to be abraded which is in the range of from 25 to 75 degrees.

Figure 4 shows the distributing means 12 in detail. The distributing means comprises a body or chamber 30 having a central inlet passageway 31 which is connected to four outlet passageways 32. The outlet passageways 32 are equally spaced from each other and diverge equally outwardly from the central passageway 31. The body 30 is cored out at 33 to receive inlet conduit 34 and has four similar flanged openings 35 to receive hoses 22. The hoses 22 and conduit 34 may be held in place by screws 36 and 37, respectively, which are similar to screws 38 on coupling 23. Of course any convenient coupling means may be employed. A dome shaped streamlined divider 39 is provided within body 30 for directing abrasive material into outlets 32.

In the modified form of gun illustrated in Figure 5, the hood 40, which is of a shape similar to hood 16 but which is reversely positioned with respect to hood 16, has bracket elements 41 secured thereto in any convenient manner. The bracket elements are equally spaced around the hood, and of course a supporting bracket means which is continuous around the hood may be provided instead. Flanged back plate 42, spacer and sealing means 43 and chamber hold down clip 44 are secured to flanges 45 of brackets 41 by rivets 46. Back plate 42 and spacer 43 are annular in shape. The spacer is also secured to the back plate by rivets 47 as is hold down clip 48.

The two hold down clips 44 and 48 are of annular configuration and each have flanges such as 49 and 50 which cooperate with ledges formed on an annular chamber 51 so as to maintain the legs 52 and 53 of the chamber firmly against sealing means 43.

An opening 54 extends through plate 42 and spacer 43 into the chamber. Supply tube 55 is attached to plate 42 so as to align passageway 56 with opening 54. Of course the supply tube as well as opening 54 may be placed anywhere around the annulus inscribed by chamber 51.

Equally spaced projections 57 having Venturi orifices 58 extend outwardly from the chamber. The nozzles are so arranged that abrasive material will be directed to a point on the central axis of the conically shaped hood beyond the base thereof. Edge 60 would normally be considered the base but is not so called in this modification.

Return tube 61 is centrally mounted in plate 42 by any convenient means such as by welding. The tube may be of any suitable construction. Tube 61 extends inwardly of the hood to a point where the rebounding abrasive is likely to be directed thereinto.

The orifices are so directed that sand will not strike the outer surfaces of pipe 61. The Venturi construction in the nozzle results in in-

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creased speed of the particles of sand. The nozzle outlets in both modifications are much smaller than are required in guns having a single central outlet. Consequently the streams of abrasive are more readily directed toward a desired location or point.

From the foregoing description it will be clear that I have developed sand blasting equipment which overcomes many of the disadvantages of older equipment of a similar nature. With my device recovery of abrasive material is assisted by the directional rebounding of abrasive and fluid medium from surfaces being treated. The directional rebounding is so effective that recovery of a substantial part of the abrasive is possible without the use of a vacuum if desired. A short return line pitched downward into the collecting hopper can be employed if no vacuum return is utilized. Blasting may be performed without hood or other equipment totally obscuring the area being treated. Actual contact with the surface by the equipment is not necessary, an advantage when blasting very rough surfaces, welded seams, corners, rivets or other surface irregularities.

It is possible to utilize the herein disclosed features for wood treating where it is desired to clean out soft portions of wood to create grain effect or otherwise to treat wood. The features may also be utilized in paint spraying wherein the vacuum would recover obnoxious fumes. Also in cleaning tanks of sludge, inflammable or otherwise dangerous fumes will be removed by my device.

While I have shown and described a preferred form of my invention, it will be understood that variations in details of form may be made without departure from the invention as defined in the appended claims.

I claim:

1. An abrasive gun comprising a hollow frusto-conical shaped hood having means forming a central opening at the apex thereof, said hood being open at its base, means forming spaced openings extending through the body of said hood, nozzles mounted in said hood each having an outlet opening aligned with one of the spaced openings extending through said hood, said nozzles being mounted so as to direct abrasive supplied thereto toward the central axis of said hood in a direction generally toward the hood base, and means for removing the material through the apex opening of the hood.

2. An abrasive gun comprising a hollow hood having two open ends, nozzles mounted on said hood having outlet openings for directing abrasive material supplied thereto, openings in said hood aligned with said nozzle openings, said openings and nozzles being so arranged that said nozzles direct abrasive material toward the center axis of said hood and in a direction generally toward one of said ends, and means to remove the abrasive material in a direction generally opposite to that from which it is supplied by said nozzles.

3. An abrasive device comprising a frusto-conical hood having inner and outer open ends, nozzles mounted on said hood, said nozzles having outlets for discharging abrasive material supplied thereto toward said outer open end, said nozzles being so mounted that abrasive material supplied thereto is directed toward the central axis of said hood, and suction means for returning said abrasive material through said inner open end.



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4. An abrasive gun comprising a frusto-conical shaped hollow hood open at both its ends, means mounting abrasive discharging nozzles on said hood, said nozzles being so mounted and formed that abrasive material supplied thereto is directed toward the central axis of said hood at one end thereof and suction means for removing said abrasive material through the other of said ends of the hood.

5. An abrasion gun comprising a frusto-conical shaped hollow hood open at both its ends, means mounting abrasive discharging nozzles on said hood, said nozzles being so mounted and formed that abrasive material supplied thereto is directed toward the central axis of said hood at one end thereof, said hood having means forming an outlet for said abrasive material at the other end thereof, and means for removing abrasive material from said hood through said outlet.

6. An abrasion gun comprising a frusto-conical shaped hollow hood having open ends, one of said ends being adapted to be positioned adjacent a surface to be abraded, nozzles mounted on said hood, said nozzles being so mounted and formed that abrasive material supplied thereto is directed toward a position on the central axis of said hood beyond the said one of said ends and abrasive removing means providing a vacuum at the other of said ends of the hood.

7. In abrading equipment a gun comprising a frusto-conical hollow hood having a central axis and an open end adapted to be positioned adjacent material to be abraded, nozzles mounted on the periphery of said hood having outlets disposed so as to direct abrasive material supplied thereto to a position on the central axis of said hood, means for distributing abrasive material to said nozzles comprising means forming a chamber, means connecting said chamber to each of said nozzles and means for supplying abrasive material to said chamber.

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8. In abrading equipment a gun comprising a frusto-conical hollow hood having a central axis and an open end adapted to be positioned adjacent material to be abraded, nozzles mounted on the periphery of said hood having outlets disposed so as to direct abrasive material supplied thereto to a position on the central axis of said hood, means for distributing abrasive material to said nozzles comprising means forming a chamber, means connecting said chamber to each of said nozzles and means for supplying abrasive material to said chamber, said hood having means forming an outlet for abrading material, means for removing said material from said hood through said outlet.

9. An abrasion gun comprising a frusto-conical shaped hood having open ends, means mounted on the hood forming a distributing chamber, nozzles formed on said chamber and connected thereto, said nozzles being so formed and disposed that the abrasive material supplied to the chamber is directed toward the central axis of said hood beyond one end thereof, and means mounted on said hood centrally of said chamber for removing the abrasive material through the other end of the hood.

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