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PATENTED MAR. 6, 1906.

C. C. DAVIS.
ROTARY BLOWER.
APPLICATION FILED MAY 2, 1905.

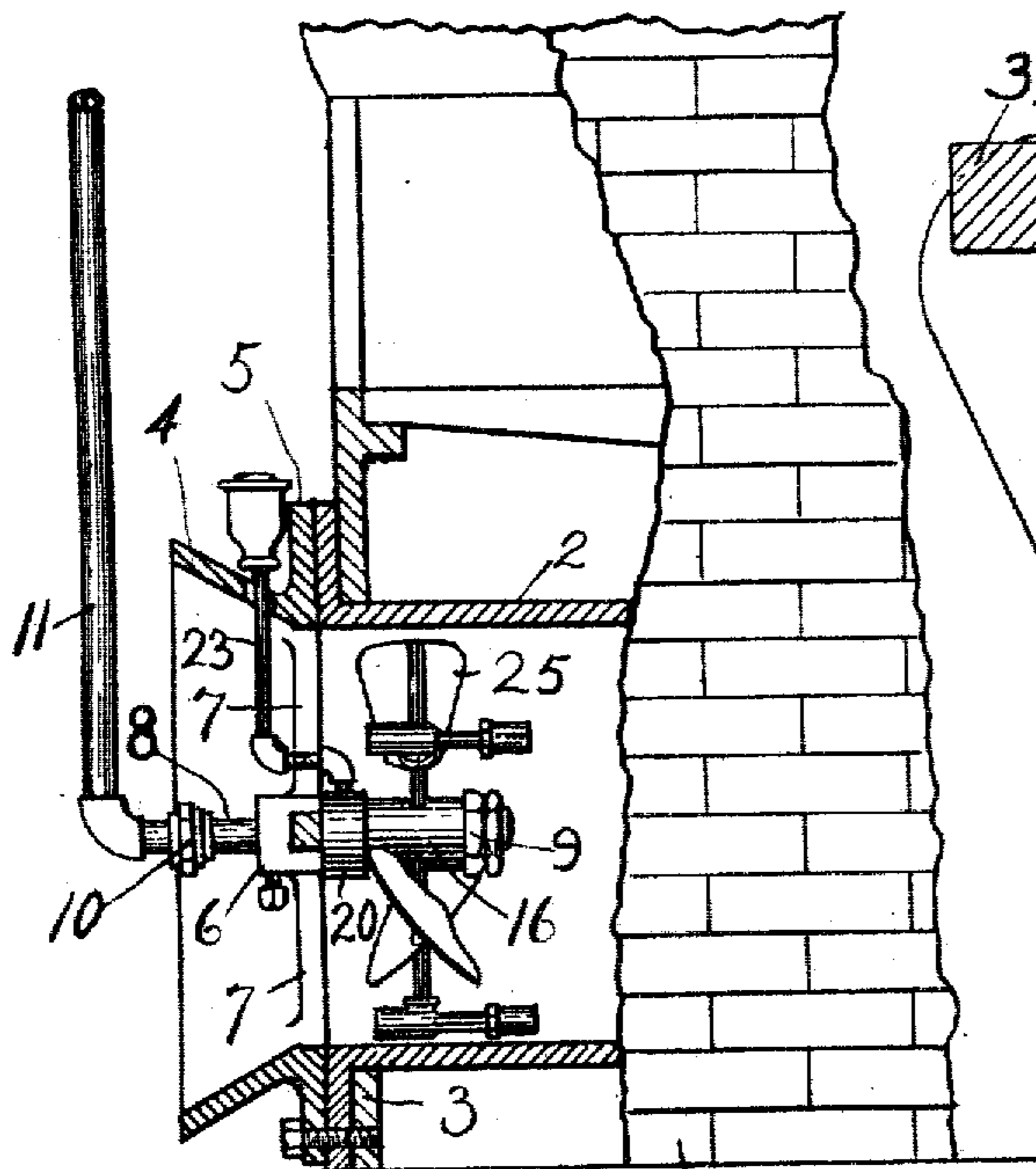


Fig. 1.

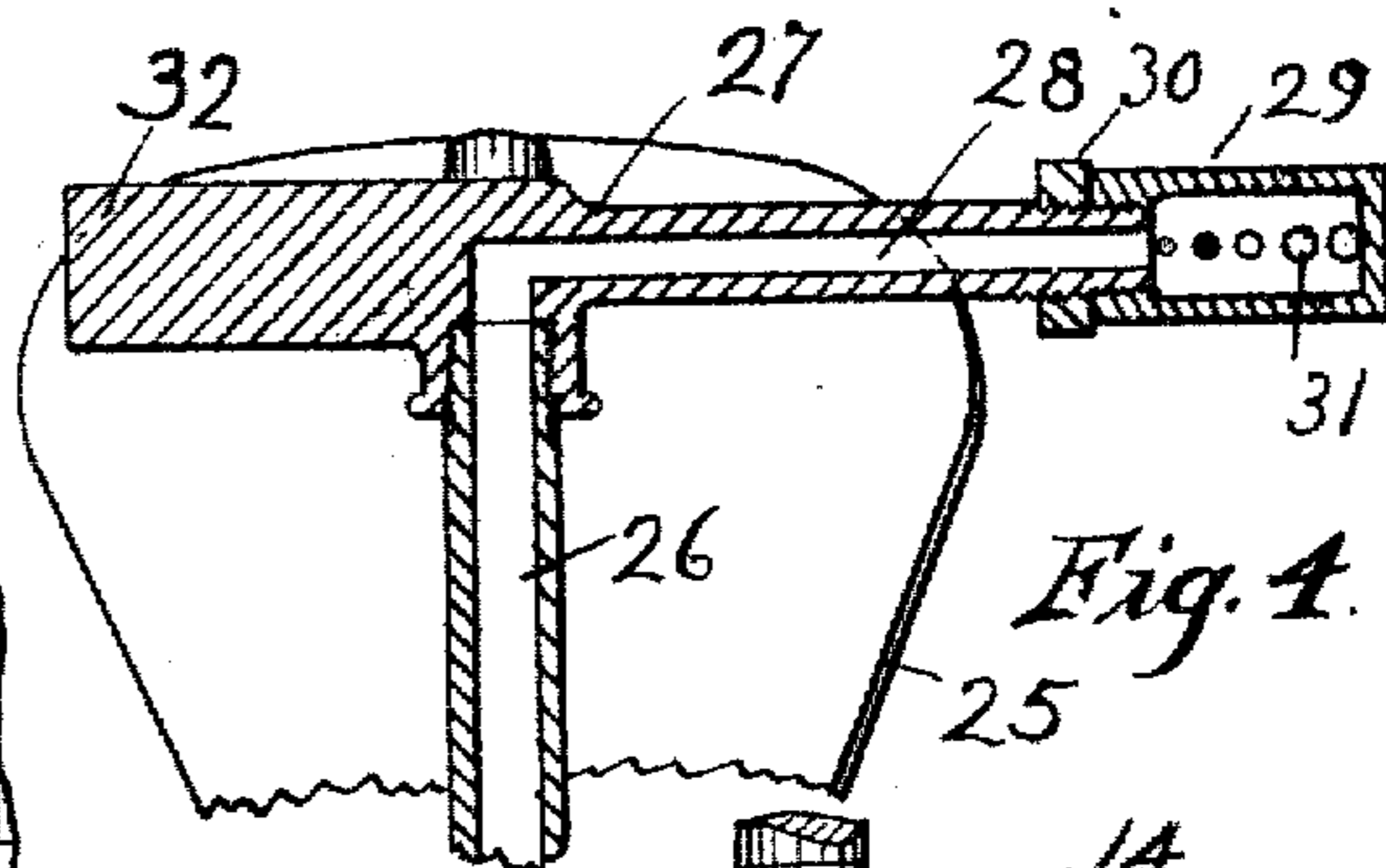


Fig. 4.

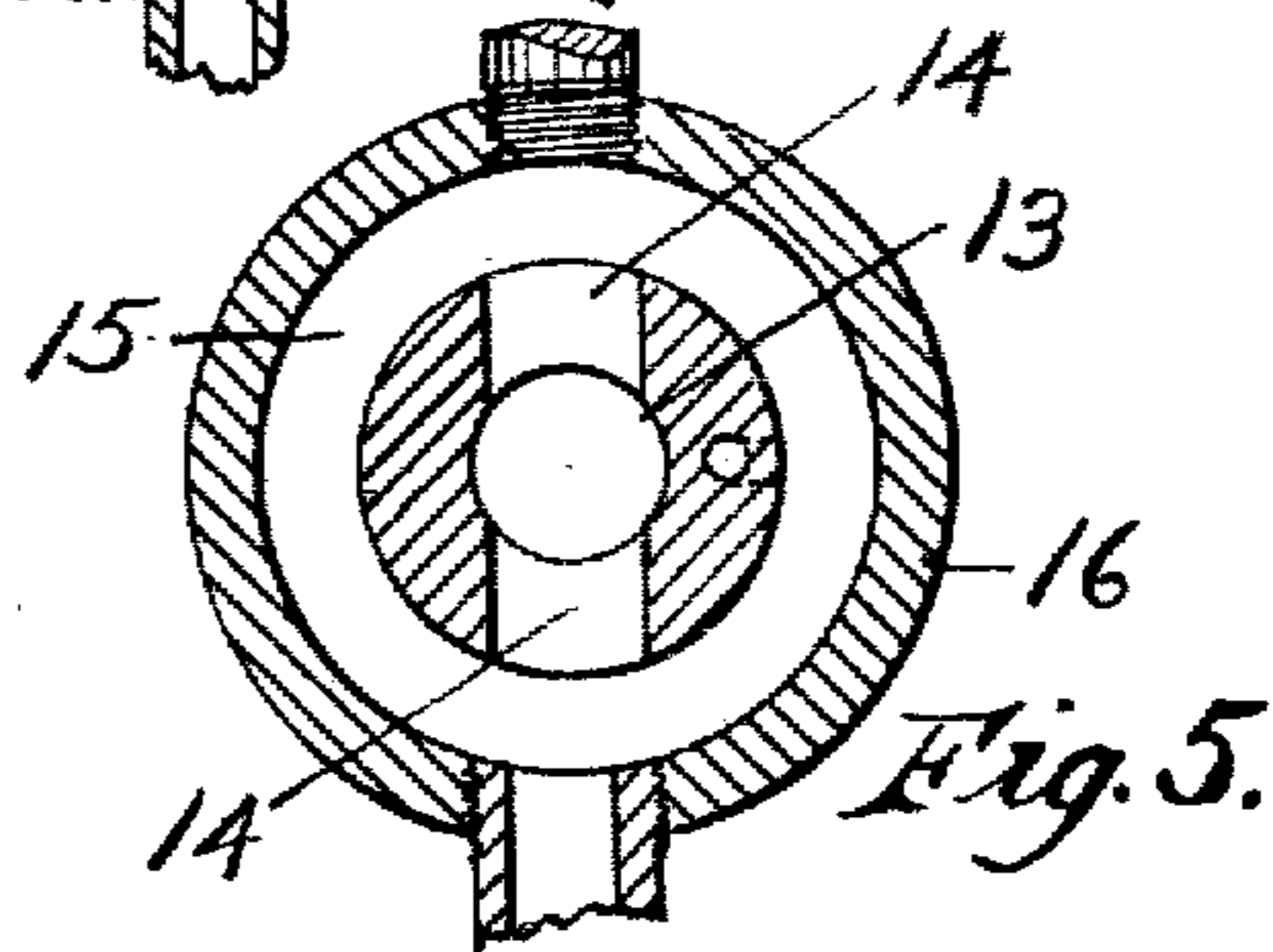


Fig. 5.

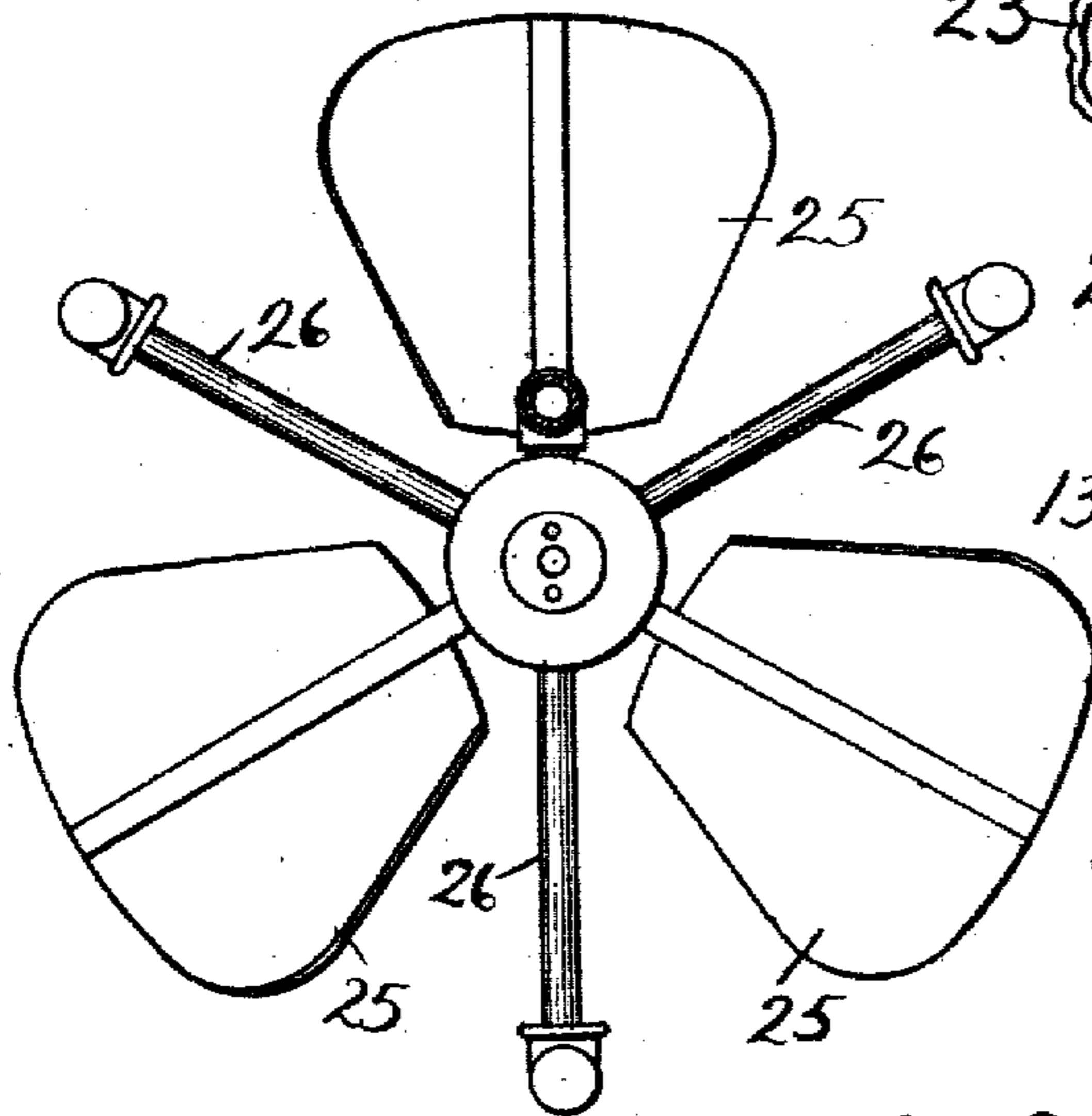


Fig. 2.

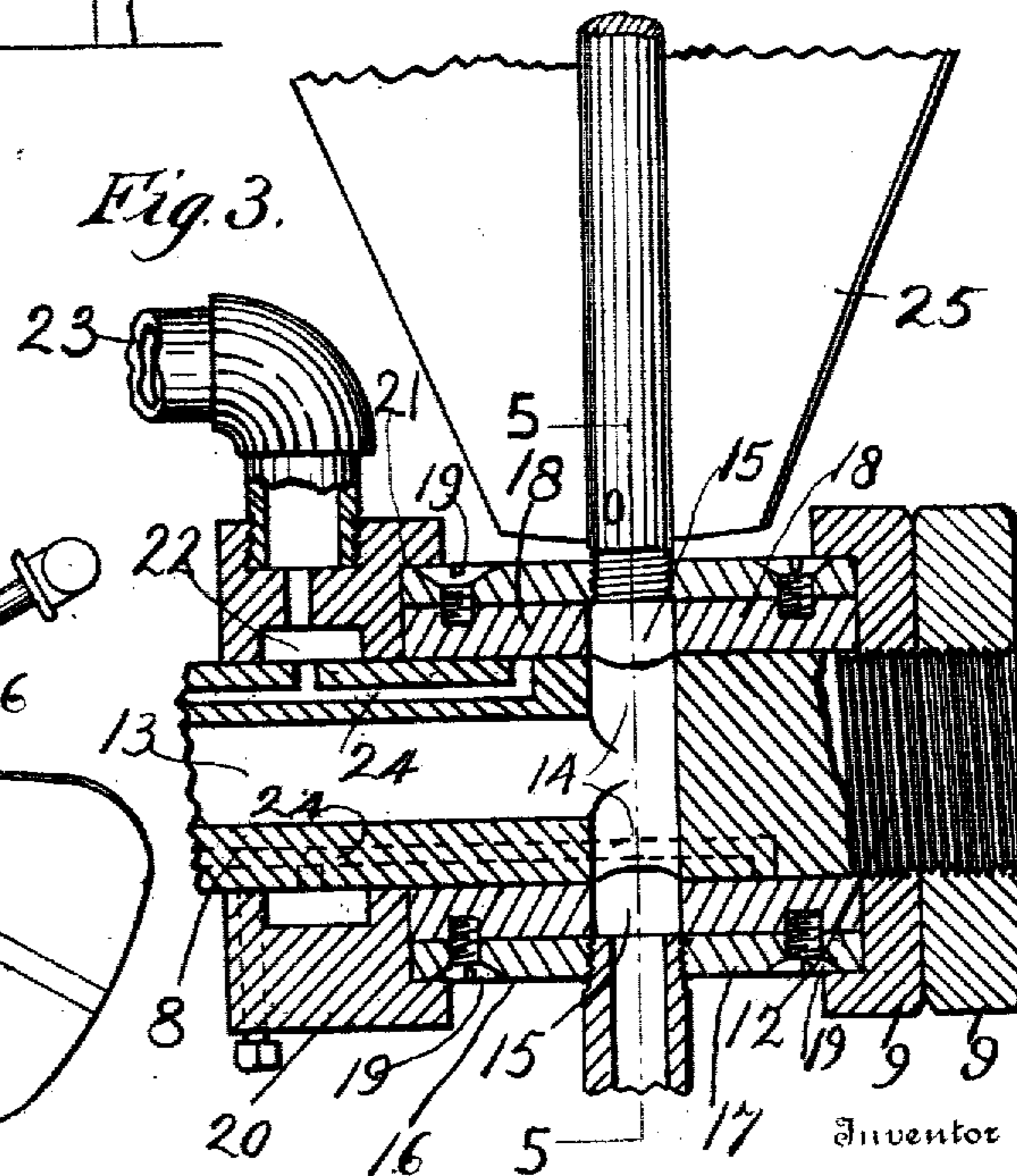


Fig. 3.

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ROTARY BLOWER.

No. 814,190.

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To all whom it may concern:

Be it known that I, CLARENCE C. DAVIS, a citizen of the United States, residing at the city of Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Rotary Blowers, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to improvements in steam-actuated blowers for producing a forced draft in boilers, and has for its object the production of a blower constructed on the principle of a rotary fan to which motion is imparted by the action of steam discharged against the air from radial pipes connected to the rotary hub.

In the ordinary steam-actuated fan-blower the steam is discharged from the arms supporting the fan-blades and when thus discharged has had a tendency to strike against the adjacent fan-blade, and by the reaction thus caused the efficiency of the blower is greatly reduced. In my improved device the steam is received through the hollow shaft of the device and led through radially-disposed pipes that extend outward from the center hub, said pipes being substantially the length of the fan-blades. Extending forward from the outer end of each of these pipes is a perforated head that discharges the steam against the air free and clear of the fan-blades and approximately at right angles to the axis on which the same turns. By carrying the steam out so far from the center a great leverage is obtained, and by discharging the same clear of the fan there is no reaction on the adjacent blades, and a tremendous velocity to the fan is thus obtained, rendering the device highly efficient.

Another feature of the invention is that by discharging the steam forward of the fan all the moisture of the steam is mixed with the current of air to thus increase the efficiency of the blower.

The invention is fully set forth in this specification and more particularly pointed out in the appended claims.

In the accompanying drawings, Figure 1 illustrates a portion of a boiler, partly in section, with my draft apparatus attached thereto. Fig. 2 is a front elevation of the device, showing the fan-blades and the alternate radial steam-supplying arms. Fig. 3 is an enlarged sectional view of the hub and the tubular steam-supplying shaft. Fig. 4 shows a detail view of the construction of one of the heads from which the steam is discharged and the tube supplying the same, also showing one of the fan-blades beyond, illustrating the relation of the head to said blade. Fig. 5 is a sectional view on line 5 5 of Fig. 3, showing the annular steam-chamber from which steam is supplied to the radial arms.

Referring to the drawings, at 1 is the boiler, which is shown as having the brickwork partly broken away, and at 2 is the casing, in which the fan is rotatably mounted. This casing may be constructed of any material and in any suitable form. I have shown the same made in two parts, so as to render the working parts of the blower more accessible. The casing-body 2 has a flange 3, that may be bolted to the boiler. The flaring mouth-section 4 may be made in another section, with its flange 5 bolted to the flange 3 of the casing. In this construction the bearing 6 would be suspended in the center by a series of arms 7 7.

At 8 is the hollow shaft, that is held stationary in the bearing 6. This shaft is threaded at its inner end 12 to receive the two check-nuts 9 9 and on its outer end to receive the union 10, by which union said shaft is connected to the steam-supply pipe 11. This shaft is hollow at 13 for a portion of its length and has two outlet-ports at 14 14 to admit the steam into the annular chamber 15 in the rotatable hub 16. This hub is held to freely revolve on the shaft 8, and it may be constructed in any suitable manner. It is shown as being made of an outer ring or shell 17 with two short bushing-rings or collars 18 18, held in place within said shell by the screws 19 19, leaving a space between them to form the steam-chamber 15.

At 20 is a collar that is attached to the shaft 8 by a set-screw or other convenient means. Said collar is counterbored to receive the end of the rotatable hub 16 and serves primarily as a friction-washer against which the said hub may rotate. This collar also has an annular chamber 22 to serve as an oil-reservoir that is supplied through the feed-pipe 23. The oil is carried from said reservoir to the bearing of the rotatable hub 16 through the oil-ducts 24 24.

The fan-blades 25 25 may be constructed

of any suitable material and supported from the hub 16 in any suitable manner. They may be mounted on tubular arms that serve as the steam passage-ways, or the supporting-rods may be solid, as shown in the drawings.

An essential feature of my invention is the manner in which I discharge the steam forward of the fan-blades and free and clear of the same. This is done through the pipes 26 26, which extend out radially from the hub 16. On the end of each of these radial pipes is secured a head 27, set at right angles to the same. The hollow portion 28 in this head 15 extends forward clear of the fan-blades 25 and is threaded on its end. An adjustable cap 29 is screwed onto this threaded portion against a regulating check-nut 30. This cap is provided with one or more holes 31, through 20 which the steam is discharged. The opposite end of this head has a weighted extension 32 to serve as a counterbalance for the extending tubular end and cap. This counterbalance is found in practice to be quite necessary in order to equalize the strain of the cen- 25 trifugal force on the extending end and cap.

The tubular portion 28 may be extended a little farther than is shown in the drawings and have its end plugged, and then by drilling 30 discharge-openings 31 into the side of this tube the necessity of using cap 29 may be done away with.

The construction and operation of my improved device may be more fully described 35 as follows: The tube or shell 2 may be attached to the ash-pit door, set on either side of the same in the front of the boiler, or inserted through the wall at the side and held in place by any suitable means. By con- 40 structing the shell in two parts it may be readily separated, thereby rendering the working parts very accessible. The steam-pipe 11 may be led from the boiler to the center shaft in any suitable manner and suitable 45 shut-off valves employed to control the flow of steam to the device. The central tubular shaft 8 is held stationary in the bearing 6, and the hub 16 is held to rotate between the friction-washer 20 and the nuts 9 9. These nuts 50 may be nicely adjusted to take up any lateral motion of the hub on the shaft. A plurality of fan-blades 25 are supported from this hub in any suitable manner, and steam-passages in the form of pipes 26 are preferably 55 arranged to extend from the hub and alternate with the fan-blades to conduct the steam to the discharge-outlets 31, which outlets are arranged to direct the steam at right angles to the axis of rotation and preferably 60 discharge the same forward of the fan-blades. The steam under pressure thus discharged rotates the fan-blades with a tremendous velocity, carrying a large quantity of air in which the steam is mingled and forces the same 65 with a great pressure through the tightly-

packed fuel on the grate, materially increasing the combustion of the same, and consequently the efficiency of the boiler. By discharging the steam from outlets located so far from the center of rotation a great lever- 70 age is obtained to do the work with the use of but a very small quantity of steam.

In the construction above described I obtain a very powerful draft with but little expenditure of power, and the cost of operating 75 is reduced to the minimum.

The device is very efficient, as well as simple and practical in construction.

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

1. A rotary blower comprising a rotatable hub, means for supplying said hub with steam, a plurality of blades supported from said hub, and a plurality of steam-conduc- 85 tors supported by said hub the outer end of each of said conductors being provided with an extension projecting laterally beyond the plane of the edges of said blades, whereby the steam is discharged at a point clear of the 90 fan-blades.

2. A rotary blower comprising a rotatable hub, means for supplying steam thereto, a plurality of fan-blades supported from said hub, and a plurality of steam-conductors 95 alternating with and independent of the fan-blades and also supported by said hub, each of said conductors being provided with a discharge end projecting laterally beyond the plane of the edges of said blades, whereby 100 the steam is discharged at a point clear of the fan-blades.

3. A rotary blower comprising a rotatable hub, means for supplying steam thereto, a plurality of fan-blades supported from said 105 hub, and a plurality of radially-arranged steam-conductors connected to said hub and alternating with said fan-blades, said conductors being each provided with a right-angular discharge end projecting laterally be- 110 yond the plane of the edges of said blades, whereby the steam is discharged at a point clear of the fan-blades.

4. A rotary blower comprising a rotatable hub, means for supplying steam thereto, a 115 plurality of fan-blades supported from said hub, and a plurality of steam-conductors alternating with said fan-blades, said conductors being of approximately the same length as said blades and each provided with 120 an extension projecting laterally beyond the plane of the edges of said blades, whereby the steam is discharged at a point clear of the fan-blades.

5. A rotary blower comprising a rotatable 125 hub, means for supplying steam thereto, a plurality of fan-blades supported from said hub, and a plurality of steam-conductors extending outwardly from said hub, the outer free ends of said conductors being weighted 130

and provided with extensions projecting laterally beyond the plane of the edges of said blades.

6. A rotary blower comprising a rotatable
5 hub, means for supplying steam thereto, a plurality of fan-blades supported from said hub, a plurality of steam-conductors also carried by said hub and alternating with said fan-blades, the outer free ends of said con-
10 ductors being each provided with a lateral

extension, and an adjustable cap secured to the free end of each extension and provided with holes or perforations.

In testimony whereof I affix my signature in presence of two witnesses.

CLARENCE C. DAVIS.

Witnesses:

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