No. 658,014. Patented Sept. 18, 1900.

M. JÖNSSON.

STEAM MOTOR.

(Application filed Apr. 5, 1899.)

(No Model.) 3 Sheets—Sheet 1.

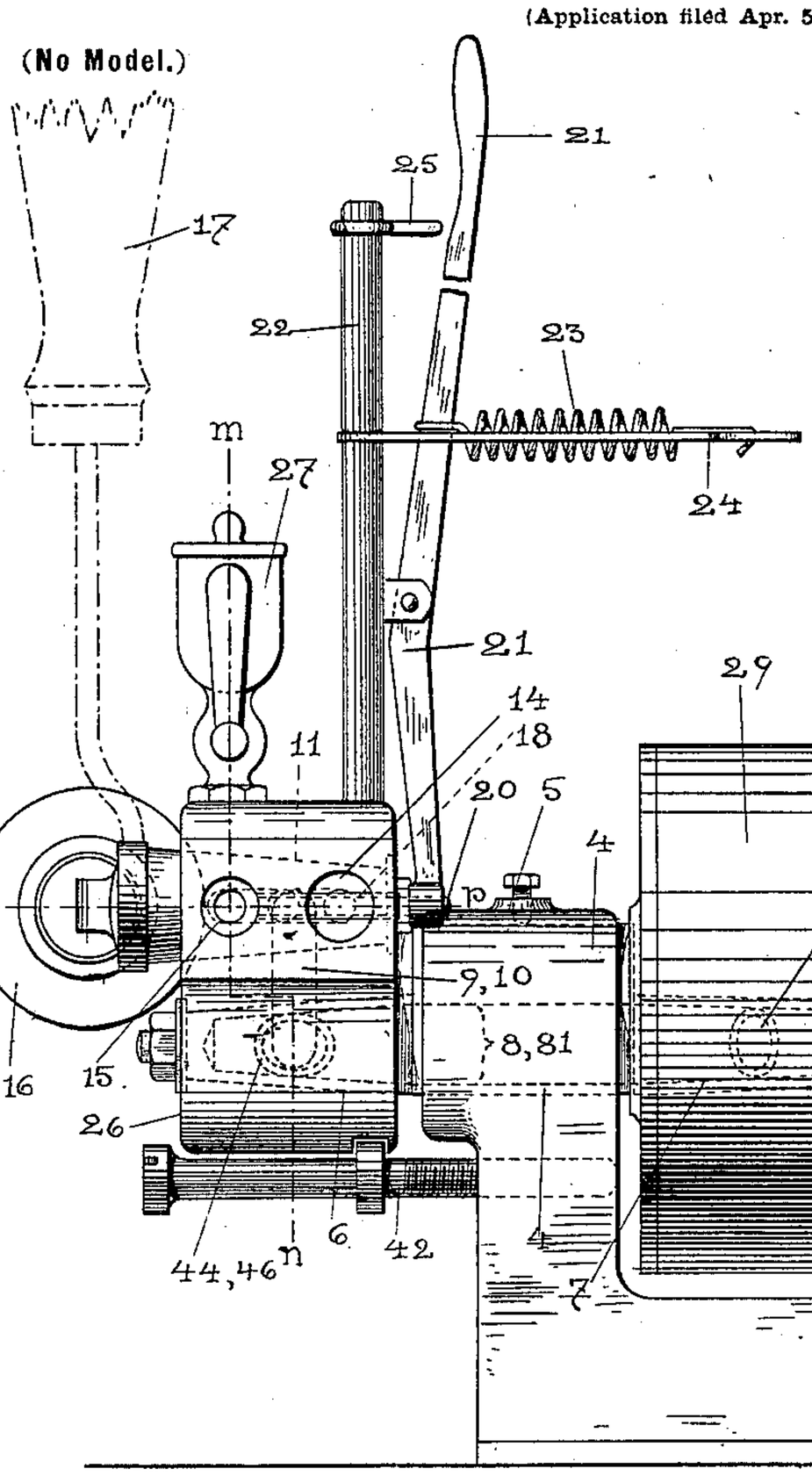


Fig. 1.

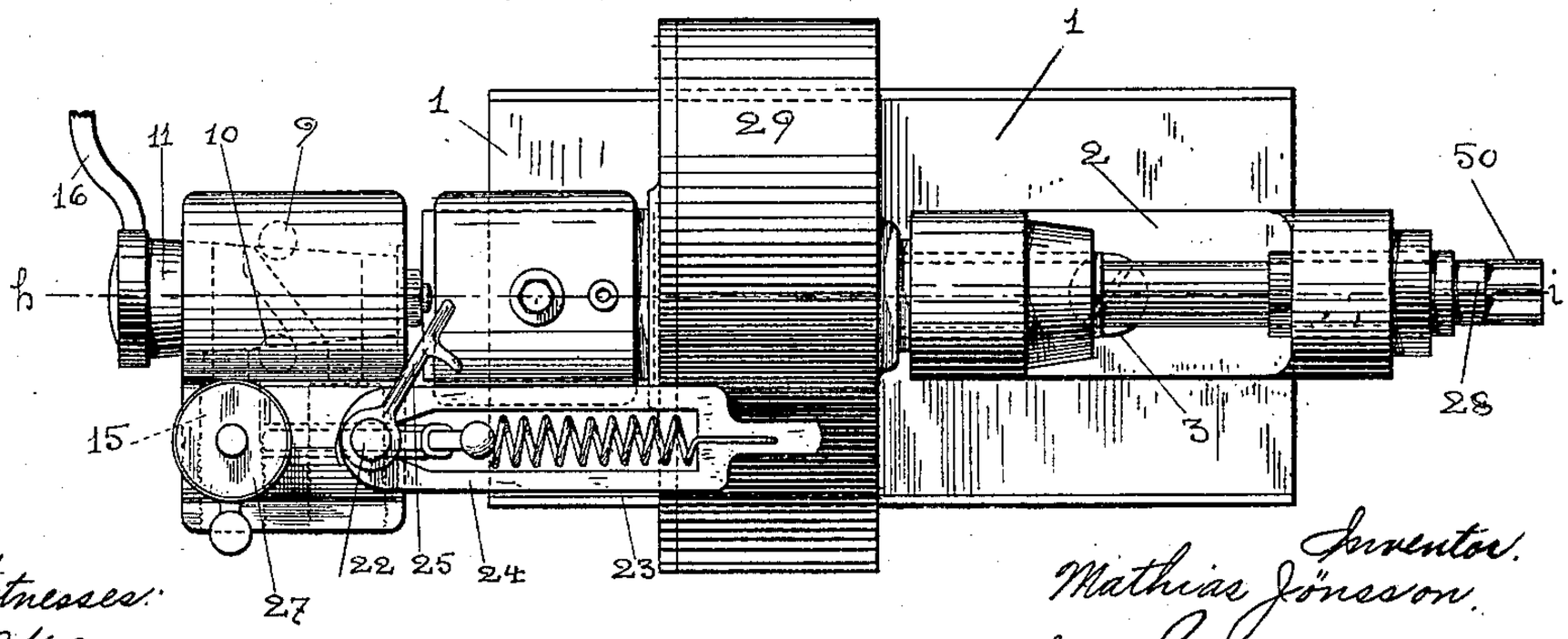


Fig. 2.

Witnesses:
C. H. Lee
B. K. Sommers

Inventor.
Mathias Jönsson.
by Munn & Co
Attys.

No. 658,014. Patented Sept. 18, 1900.

M. JÖNSSON.

STEAM MOTOR.

(Application filed Apr. 5, 1899.)

(No Model.) 3 Sheets—Sheet 2.

Fig: 3.

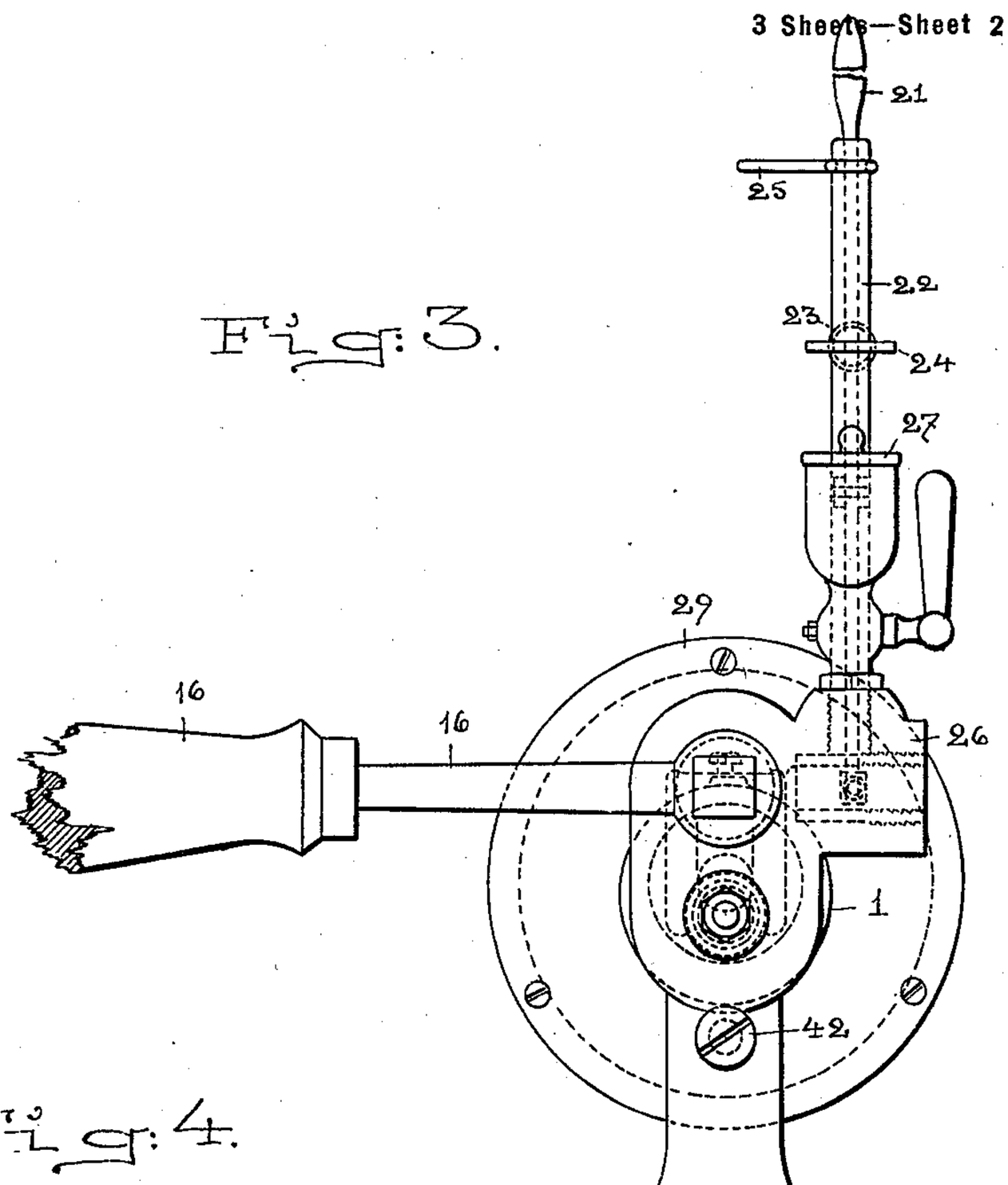
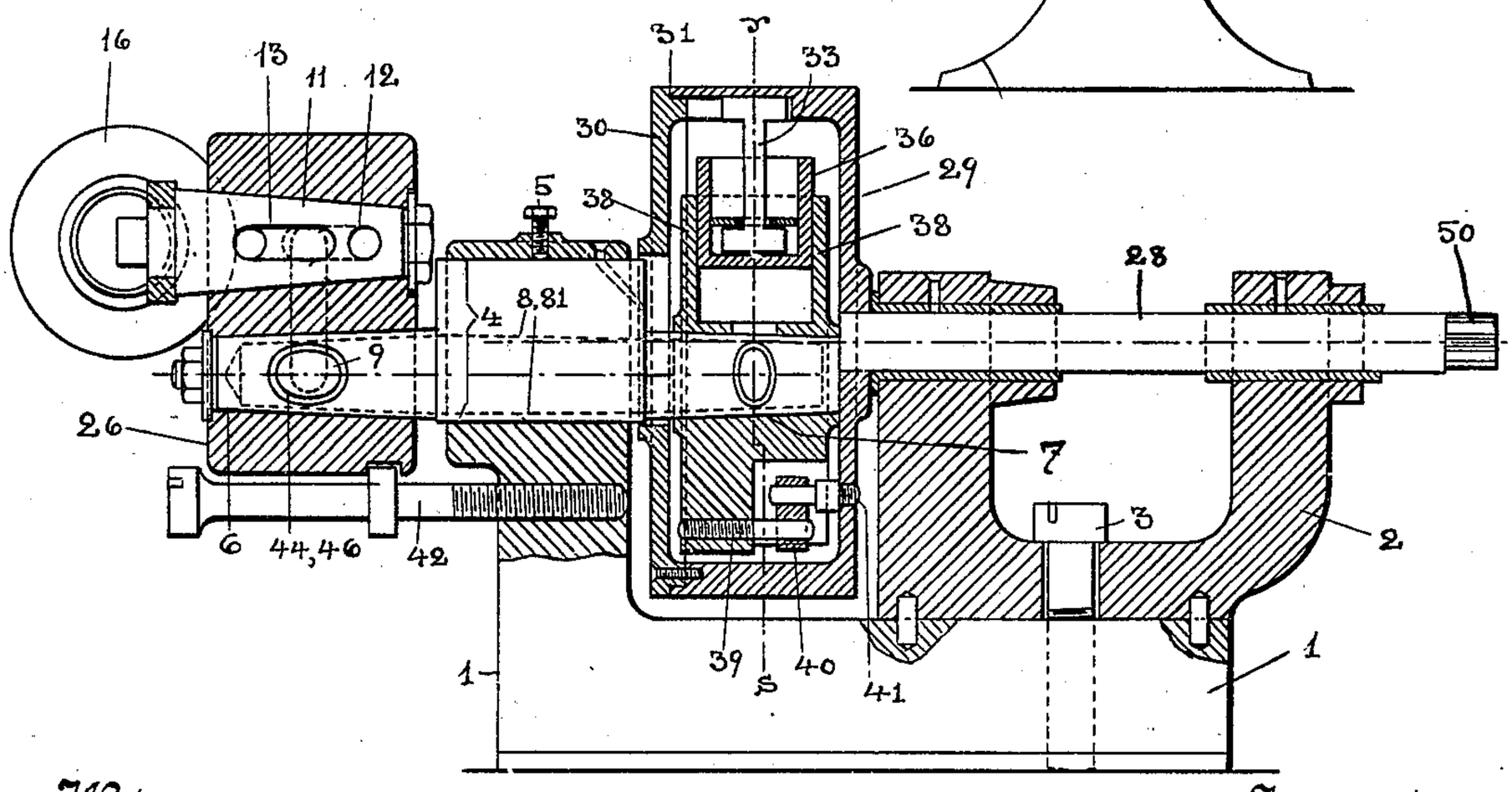


Fig: 4.



Witnesses:
Fritz Landegren
Carl Otto Sahlberg

Inventor:
Mathias Jönsson.

No. 658,014. Patented Sept. 18, 1900.

M. JÖNSSON.

STEAM MOTOR.

(Application filed Apr. 5, 1899.)

(No Model.) 3 Sheets—Sheet 3.

Fig: 5.

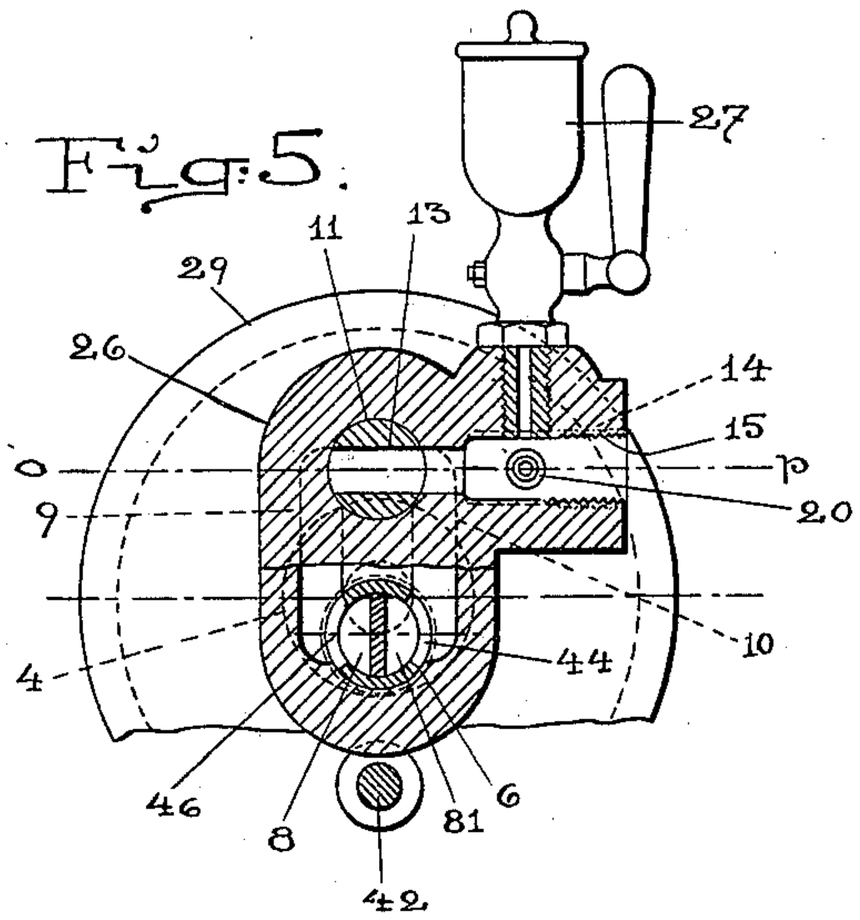


Fig: 6.

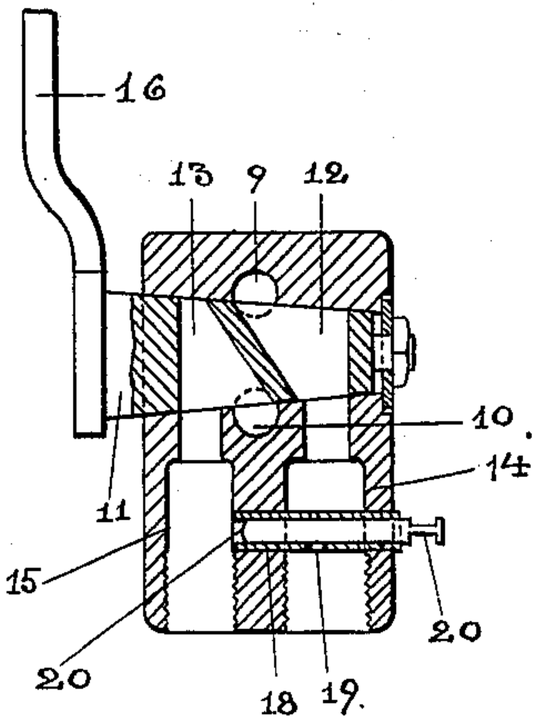
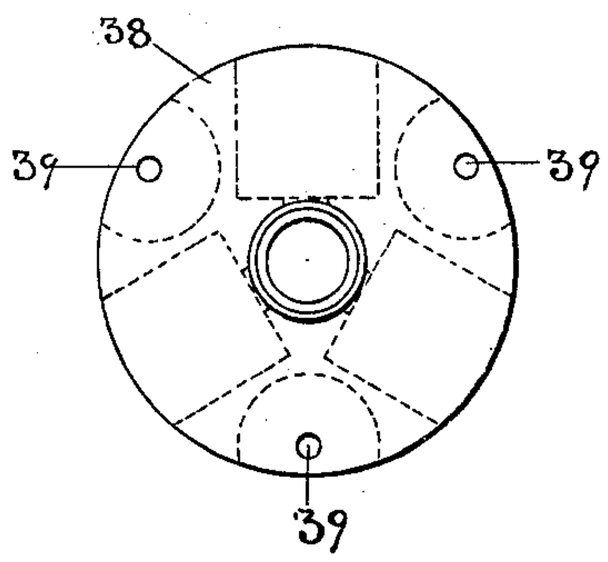


Fig: 7.

Fig: 8.

Fig: 9.



Witnesses:
Fritz Landegren
Carl Otto Sahlberg

Inventor:
Mathias Jönsson.

UNITED STATES PATENT OFFICE.

MATHIAS JÖNSSON, OF WISBY, SWEDEN.

STEAM-MOTOR.

SPECIFICATION forming part of Letters Patent No. 658,014, dated September 18, 1900.

Application filed April 5, 1899. Serial No. 711,860. (No model.)

To all whom it may concern:

Be it known that I, MATHIAS JÖNSSON, a subject of the King of Sweden and Norway, residing at Wisby, Sweden, have invented certain new and useful Improvements in Steam-Motors; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

My invention has relation to steam-engines, and particularly to that type known as the "revolving-cylinder" engine.

One of the objects of my invention lies in the provision of means whereby the direction of rotation of the revolving cylinder can be changed at will.

In the type of engines referred to the opposite ends of the rods of the pistons working in the cylinders of the revolving cylinder have heretofore been pivoted to pins connected with or secured to the pistons and the wheel driven by the revolving cylinder, respectively, which necessarily entails considerable expense, complicates the construction, and increases the wearing-surfaces.

A further object of my invention is to materially simplify these connections and reduce the cost of construction and the wearing-surfaces.

My invention consists in the combination, with a revolving-cylinder engine, of means for changing the direction of rotation of said cylinder at will.

My invention further consists in the means for connecting the piston-rods to their pistons and to the wheel driven thereby.

My invention further consists in the provision of a safety-valve adapted to operate automatically and to be operated by hand, and, lastly, the invention consists in details of construction and combinations of coöperative parts.

That my invention may be fully understood I will describe the same in detail, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation, Fig. 2 a top plan view, Fig. 3 an end elevation, and Fig. 4 a longitudinal vertical section taken on line *h i* of Fig. 2, of a revolving-cylinder steam-engine embodying my improvements. Figs. 5 and 6 are sections taken on lines *m n* and *o p*, respectively, of Fig. 1. Figs. 7 and 8 are sections taken on line *r s* of Fig. 4, showing the cylinders in different positions; and Fig. 9 is an end view of the revolving cylinder.

To a suitable base 1, from one end of which rises a bearing-standard 1^a, is bolted the U-shaped frame 2, in the vertical legs of which the power-shaft 28 has its bearings, said shaft carrying at its outer end a power-transmitting gear 50.

In a bearing in standard 1^a on frame 1 is seated and held against rotation by means of a set bolt or bolts 5 the central enlarged cylindrical portion 4 of an eccentric-shaft S, having outwardly-tapering journals 6 and 7 extending from opposite ends of said central portion on a line parallel with but eccentric to the longitudinal axis of said central portion and parallel with but eccentric to the axis of rotation of the aforesaid power-shaft 28. The shaft S has a cylindrical bore or passage extending from the outer end of one of its journals to the like end of the other, said journal ends being closed and said passage being divided into two passages 8 and 81 by a vertical partition. (See Figs. 7 and 8.) At a suitable point near the outer end of the journals 6 7 are formed ports diametrically opposite each other and leading from the aforesaid passages 8 and 81, the two ports at the end of journal 6 being indicated by the numerals 44 and 46, respectively, and the corresponding ports near the outer end of journal 7 by the numerals 45 and 47, respectively. (See Figs. 5, 7, and 8.)

On the journal 7 of shaft S is mounted a valve-chest 26, having a bore of a taper to fit the taper of said journal 7, and in said valve-chest are formed two passages 9 and 10, leading, respectively, to the ports 44 and 46 in journal 6 of shaft S and communicating through said ports with the passages 8 and 81, respectively, in said shaft. The valve-chest has in its upper part a tapering transverse bore intersecting the passages 9 and 10, Figs. 5 and 6, and in communication with a live-steam-supply duct 15 and an exhaust-duct 14, formed in said valve-chest at right angles to

the aforesaid tapering bore or seat, in which is seated a reversing plug-valve 11, provided with a handle 16 and having a passage divided by on oblique partition into two passages 13 and 14, (see Fig. 6,) so that by properly positioning said valve the live-steam-supply passage 15 can be placed in communication with one or the other of the two passages 9 and 10 for purposes hereinafter explained, or the supply of live steam to the engine can be entirely cut off.

On the valve-chest 26 is secured an oil-cup 27, that feeds oil to the live-steam passage 15, such oil being entrained by the steam and distributed to the working parts of the engine. A tube 18, Fig. 6, seated in openings in the walls of the valve-chest 26 and intersecting the exhaust-passage 14, communicates with the live steam passage 15, said tube having one or more ports 19 opening into the exhaust-passage 14. A plug or cylindrical valve 20 works in said tube and normally closes the port or ports 19, and to said valve is connected a hand-lever 21, Figs. 1 and 2, fulcrumed to lugs on a standard 22, rising from the valve-chest 26. The standard 22 carries a longitudinally-slotted bracket 24, shiftable along said standard, through the slot of which bracket the upper arm of the two-armed hand-lever 21 passes, and to said lever-arm is secured one end of a spring 23, which lies in the slot of said bracket and has its other end secured to the outer end of such bracket. It is obvious that the stress of the spring 23 tends to hold the plug-valve in a normal position, covering the port or ports 19 in the valve-tube 18. It is furthermore obvious that by shifting the bracket 24 on the standard either upward or downward the stress of the spring 23—hence the load on the valve 20—is correspondingly increased according to the work of the engine.

At the upper end of the standard 22 is pivoted a latch or catch 25, whereby lever 21 may when pushed against the standard 22 be locked thereto, in which position the valve 20 is in a position to uncover the port 19 in tube 18. It will be seen that this valve performs the function of safety and blow-off valve, it being obvious that when the pressure in the engine exceeds a normal pressure determined by the stress of the spring 23 the valve 20 will be forced outward to uncover the port or ports 19 in tube 18, thus allowing steam to blow off into the exhaust-passage 14, or this may be done through the medium of the hand-lever, when required.

On the journal 7 of the shaft S is mounted the revolving cylinder, consisting of a disk 38, in which are formed three power-cylinders equidistant from one another and with their axes radial to the axis of rotation of the cylinder, as usual and as clearly shown in Figs. 4, 7, 8, and 9. Between each two cylinders a substantially-semicircular recess is formed in the outer face of the cylinder, Figs. 7 and 8, and on a line radial to the axis of rotation of said cylinder and bisecting the said recesses the cylinder is provided near its periphery with an internally-screw-threaded hole, into which is screwed a pin 39, linked by means of a link 40 to the wrist-pin 41, secured to and projecting from the inner face of the drive-wheel 29, keyed to or otherwise rigidly mounted on the motor-shaft 28. The power-cylinders of the revolving cylinder are, as usual, open at their outer ends and adapted to communicate through a port in their bottom or inner head with the ports 45 and 47, leading to the passages 8 and 81, respectively, in the journal 7 of shaft S, on which said revolving cylinder 38 is revolubly mounted, as stated above. In each of said power-cylinders works a piston. (Indicated, respectively, by the numerals 35, 36, and 37.) These pistons are likewise hollow cylinders, open at their outer ends, as usual, their rods being connected therewith and with the wheel driven thereby, as hereinafter described.

As hereinbefore stated, the drive-wheel 29 is rigidly secured to the power-shaft 28 and connected, as described, with the cylinder 38, said drive-wheel being constructed in the form of a drum having its head 30 secured thereto fluid-tight, and within said drum is mounted the revolving cylinder 38, as clearly shown in Fig. 4.

I have hereinbefore referred to the disadvantages inherent to the usual mode of connecting the piston-rods with their respective pistons and with the wheel driven thereby. These disadvantages I obviate by providing the piston-rods with a cross-head at each end, and, as shown in Figs. 4, 7, and 8, I form in the inner periphery of the drive-wheel 29 transverse groove-bearings 29^a, extending from one wheel-head nearly to the other, so that the cross-heads at the outer ends of the piston-rods 32, 33, and 34 can be slipped into or out of said grooves from one end of the wheel when the head 30 is removed. Within the pistons 35, 36, and 37 and near the inner closed ends or heads thereof I removably secure in any desired manner a partition 34^a, apertured for the passage of the piston-rod, the inner cross-head of which lies under said partition, the aperture therein being of sufficient area to allow the piston-rod to assume the required angular position relatively to the axis of the piston during the rotation of the cylinder 38.

In Fig. 7 the revoluble cylinder 38 is shown in a position in which the steam-port in power-cylinder containing piston 35 is in communication with the passage 81 of shaft S through the port 45 in the journal part 7 of said shaft. When the lever 16 of valve 11 is in the position shown in Figs. 1, 3, and 6, live steam will flow through duct 15 in valve-casing 26, passage 13 in plug-valve 11, passage 10 in said valve-casing, port 44 in journal portion 6 of shaft S, passage 81 therein, and out of port 45 into the power-cylinder containing piston 35, which latter is driven out by the steam,

thereby revolving drive-wheel 29, and as said wheel is linked to the revolving cylinder 38 the latter will revolve with said wheel. In this manner steam is admitted to each piston-cylinder successively, and as said cylinders revolve their ports are successively brought into communication through the port 47 in journal portion 7 of the shaft S with the passage 8 therein and through the port 46 at the opposite end of said passage—namely, in journal portion 6 of shaft S—with the passage 9 in valve-casing 26, the passage 12 in plug-valve 11, and the exhaust-duct 14.

I have hereinbefore stated that so far as I am aware no means have before my invention been provided for reversing the rotation of the revolving cylinder, which of course materially limits the scope of usefulness of the engine. It is obvious that by reversing the plug-valve 11—namely, by turning the same one hundred and eighty degrees—the handle 16 being then in a position diametrically opposite to that shown in Figs. 3 and 6, live steam will pass from duct 15 through plug-passage 13, passage 9, port 46 in journal portion 6 of shaft S, passage 8 therein, port 47 in journal portion 7 of said shaft, thence to the power-cylinders of the revolving cylinder successively, the steam being exhausted through port 45 in said journal portion 7, passage 81, port 44, passage 10, plug-valve passage 12, and exhaust-duct 14. When, on the contrary, the plug-valve lever 16 is brought to the vertical position shown in dotted lines in Fig. 1, the plug-valve 11 will be turned to completely cut off the communication between ducts 14 15 and passages 9 and 10.

Of course it will be understood that the bearings in valve-casing 26 and revolving cylinder 38 for the journals 6 and 7 of eccentric-shaft S, as well as said journals, are trued to fit fluid-tight, and with a view to taking up wear of journal 7 the valve-casing 26, which may be keyed or otherwise secured to journal 6, so as to have longitudinal motion thereon, can be adjusted in that direction when the set bolt or bolts 5 are unscrewed to release the enlarged portion 4 of said shaft. This adjustment is effected by means of one or more screw-bolts 42, working in threaded bearings in standard 1^a of the engine-frame and are provided with collars 42^a, that project into notches or recesses in the bottom or base of the valve-casing 26. In small engines one such screw-bolt 42 will suffice, as shown in Figs. 1, 3, 4, and 5.

The oil supplied from cup 27 is, as will be readily understood, carried by the live steam through passage 8 or 81, according to the direction of rotation of the revolving cylinder 38, and thence to journal 7 and piston-cylinders, such oil as may escape at the joints collecting in drum or wheel 33 to lubricate the outer cross-heads on the piston-rods and their bearings in said drum, as well as the wrist-pins 41 and pins or studs 39 and links 40, thus dispensing altogether with special lubricating-ducts, while the construction of the eccentric-shaft S insures a practically-noiseless and smooth running of the engine.

The motor-shaft 28 may be lubricated from special oil-cups in any usual manner or from the oil-cup 27 by well-known means, said shaft being preferably mounted to revolve in bushes, as shown and for well-known reasons.

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

1. In a revolving-cylinder steam-engine, a stationary longitudinally-adjustable eccentric-shaft having two tapering journals, the revolving cylinder, and a valve-casing provided with bearings fitting said journals, said shaft and valve-casing having steam-passages adapted to supply live steam to and exhaust steam from the power-cylinders of the revolving cylinder, and means for adjusting the shaft longitudinally through the medium of said valve-casing, for the purpose set forth.

2. In a revolving-cylinder steam-engine, a stationary hollow shaft eccentric to a revolving cylinder at one end of said shaft, both ends of said shaft tapered, and a steam-chest adjustable on that end opposite the cylinder, a series of power-cylinders revoluble on the end of the stationary shaft, single-acting pistons therein, said pistons connected by piston-rod to said cylinder and the latter to a power-transmitting shaft, substantially as described.

3. In a revolving-cylinder steam-engine, a stationary eccentric-shaft, a revolving cylinder, and a valve-casing mounted on said shaft, the latter and valve-casing provided with two steam-passages arranged to supply live steam to and exhaust steam from the power-cylinder, a blow-off passage in communication with the live and exhaust steam passages, and a loaded valve controlling said communications, for the purpose set forth.

4. In a revolving-cylinder steam-engine, a stationary eccentric-shaft, a revolving cylinder and a valve-casing mounted on said shaft, the latter and valve-casing provided with two steam-passages arranged to supply live steam to and exhaust steam from the power-cylinder, a blow-off passage in communication with the live-steam and exhaust passages, a loaded valve controlling said communications, and means for varying the load on said valve, for the purpose set forth.

5. In a revolving-cylinder steam-engine, a stationary eccentric-shaft, a revolving cylinder and a valve-casing mounted on said shaft, the latter and valve-casing provided with two steam-passages arranged to supply live steam to and exhaust steam from the power-cylinder, a blow-off passage in communication with the live-steam and exhaust passages, a loaded valve controlling said communications, and means for positioning the valve by hand to establish communication between the blow-off passage and said live

and exhaust steam passages, for the purpose set forth.

6. In a revolving-cylinder steam-engine, a stationary eccentric-shaft, a revolving cylinder and a valve-casing mounted on said shaft, the latter and valve-casing provided with two steam-passages arranged to supply live steam to and exhaust steam from the power-cylinder, a blow-off passage in communication with the live-steam and exhaust passages, a loaded valve controlling said communications, means for positioning the valve by hand to establish communication between the blow-off passage and live and exhaust steam passages, and means for locking said valve in its said position, for the purpose set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

MATHIAS JÖNSSON.

Witnesses:
CARL OTTO SAHLBERG,
FRITZ LANDEGREN.