

T. A. RISHER.

Rotary Reciprocating-Engines.

No. 147,174.

Patented Feb. 3, 1874.

Fig. 1.

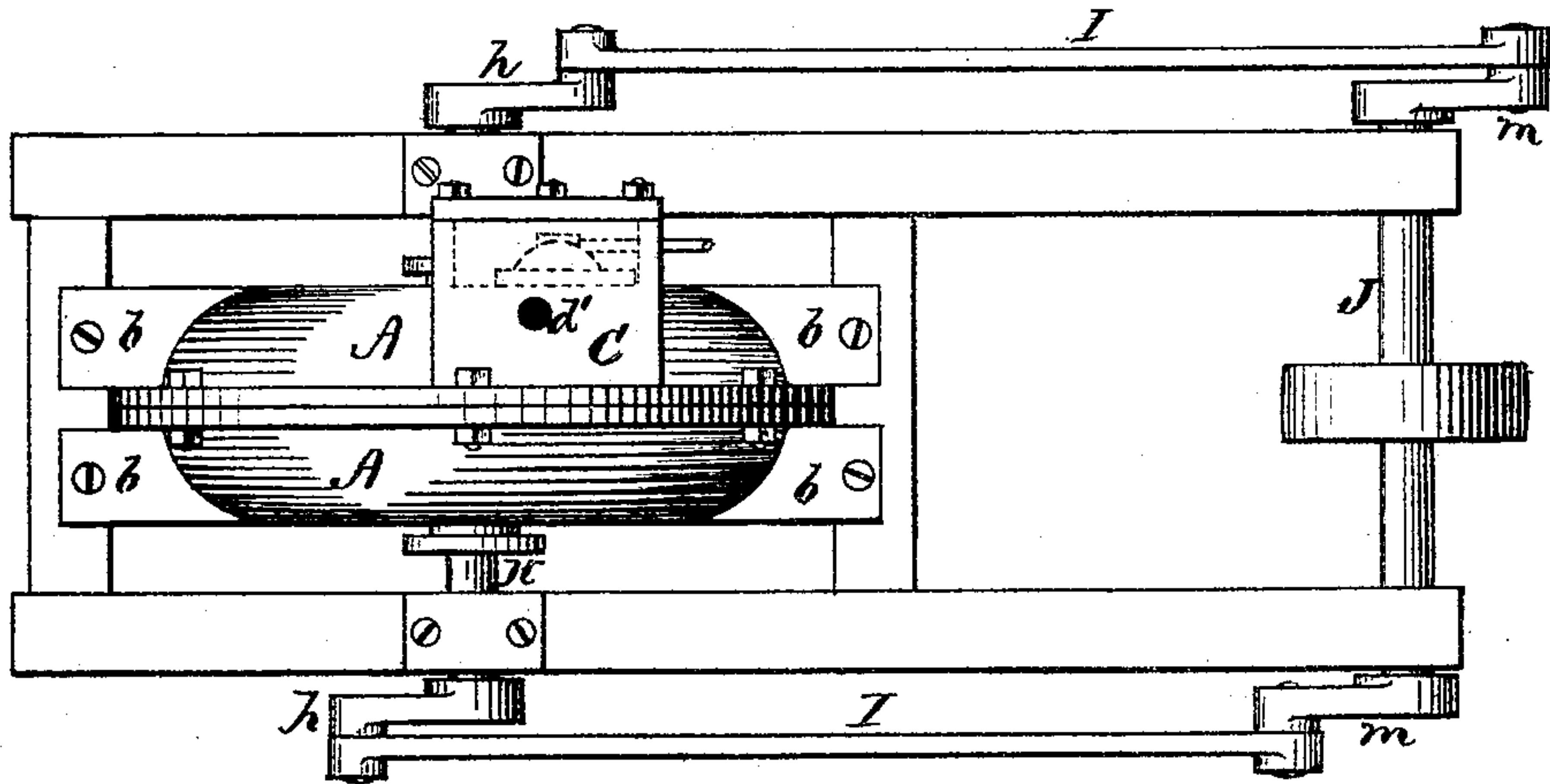


Fig. 2.

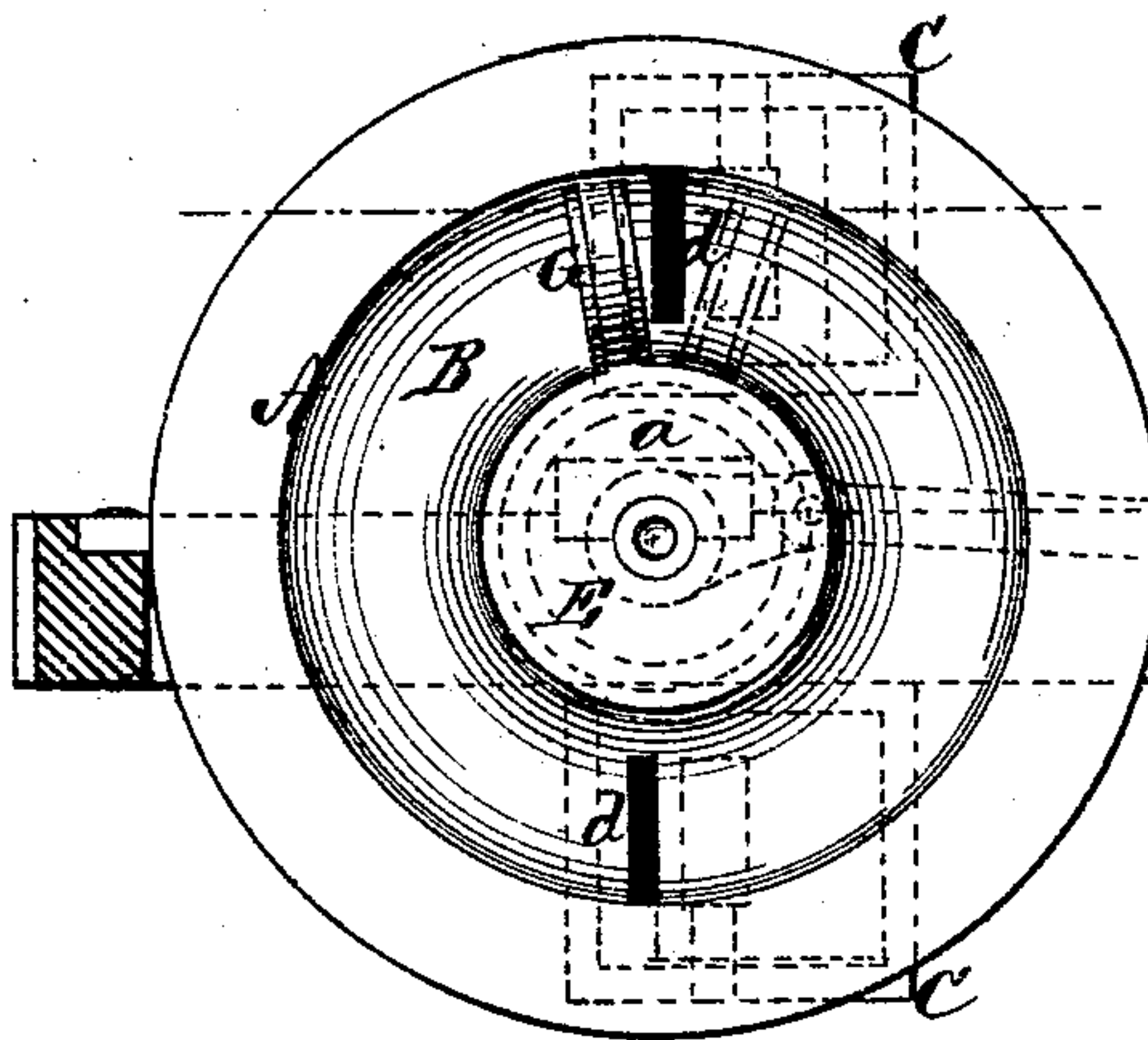


Fig. 4.

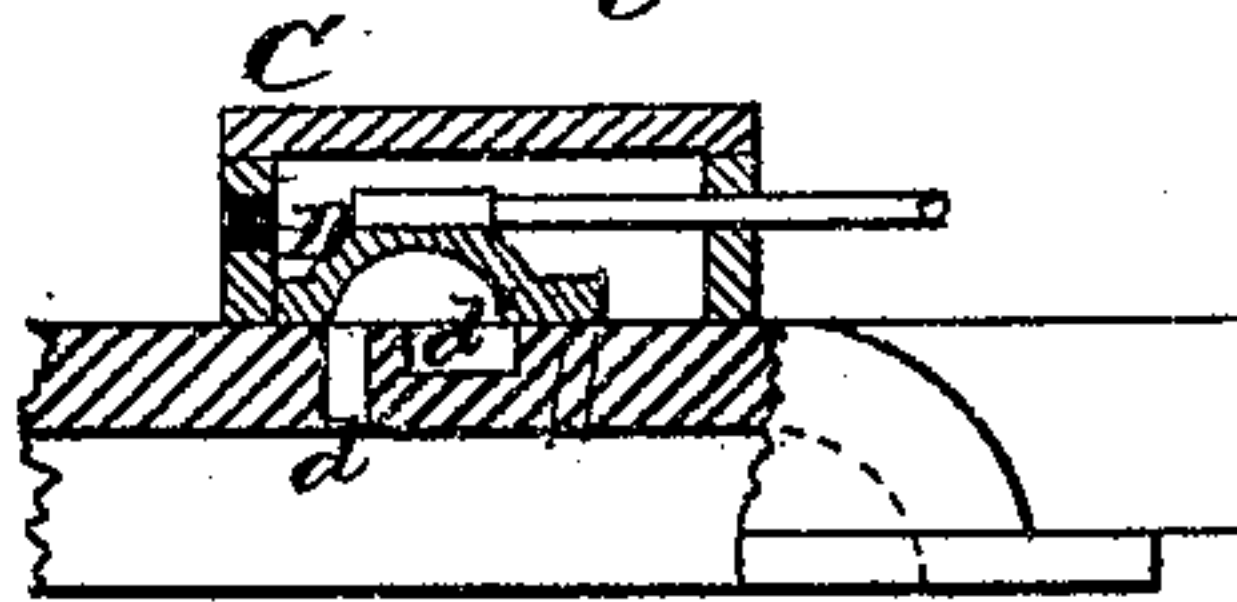
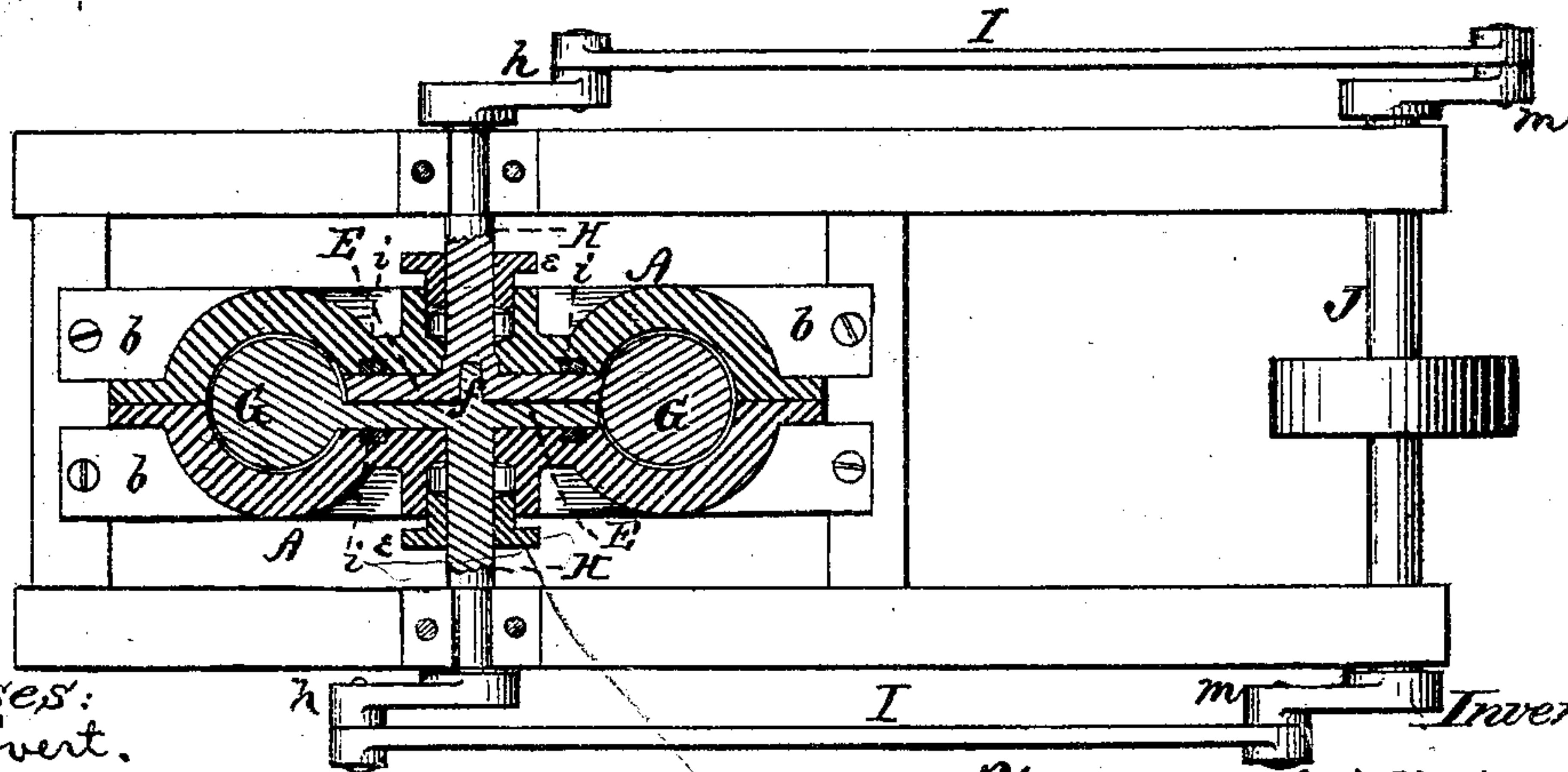


Fig. 3.



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UNITED STATES PATENT OFFICE.

THOMAS A. RISHER, OF KANSAS CITY, MISSOURI.

IMPROVEMENT IN ROTARY RECIPROCATING ENGINES.

Specification forming part of Letters Patent No. 147,174, dated February 3, 1874; application filed January 16, 1874.

To all whom it may concern:

Be it known that I, THOMAS A. RISHER, of Kansas City, in the county of Jackson and in the State of Missouri, have invented certain new and useful Improvements in Steam-Engines; and do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, making a part of this specification.

My invention relates to that class of steam-engines known as "rotary reciprocating engines," in which a stationary cylinder is used, inclosing pistons which are made to partially rotate therein; and it consists of a stationary cylinder provided with an annular steam-channel, circular in cross-section, and two or more movable pistons fitted therein and suitably packed, and two or more steam-chests attached to the cylinder, each provided with a valve and ports, all as more fully hereinafter set forth.

With my construction of engine I use no gear or fly wheels; hence there are no dead-centers. In a single engine I use two steam-chests, one placed at the upper and the other at the lower part of the cylinder, and within the steam-channel I use two movable pistons. In a double engine I use four steam-chests—one at top, one at the bottom, and one on each side of the cylinder—and I use four pistons within the steam-channel, my object being, in either case, to have the steam pass directly from the chests against the pistons, thereby avoiding condensation and loss of the strength of the steam.

In order to enable others skilled in the art to which my invention appertains to make and use the same, I will now proceed to describe its construction and operation, referring to the annexed drawing, in which—

Figure 1 is a plan view of my engine. Fig. 2 is a longitudinal vertical section, and Fig. 3 a horizontal section, of the same. Fig. 4 is a section through one of the steam-chests.

The cylinder of my engine is composed of two circular half-casings, A A, firmly bolted together through circumferential flanges formed around them. In the casing or cylinder thus formed is made a circular steam-passage, B, of cylindrical form, leaving a circular center, *a*, in each half of the casing, with

a suitable space between the two circular centers *a a*. The casing or cylinder A is provided with suitable flanges *b b*, to attach it to a frame-work. In the steam-passage B, in one of the half-casings, are steam-inlet ports *d d*, nearly opposite each other, and leading from separate steam-chests C C. In each of these steam-chests is an ordinary slide-valve, D, operated, in the usual manner, by an eccentric on the main shaft of the engine. The two valves D D are so arranged that, when steam is admitted from one steam-chest into the cylinder, the other exhausts, and vice versa. *d'* is the exhaust-port of the steam-chest. G G represent the two pistons working in the steam-channel B, and made in circular form, to fit snugly in the same, and should also be provided with suitable packing, to make them steam-tight. Each piston G is attached to or formed with a circular disk, E, of the same size as the centers *a a* of the cylinder or casing. Each disk has a shaft, H, formed in or attached to its center, and projecting to one side only. The two shafts H H project in opposite directions through the center of the casing, through stuffing-boxes *e e*, and have their bearings in suitable boxes on the frame, to which the casing is attached. One of the disks E has a projection or journal, *f*, extending into a hole in the center of the other disk, as shown in Fig. 3. In each of the centers *a* of the casing is a circular recess, *i*, for the insertion of packing, to make steam-tight joints between the disks E and the centers, as well as between the disks. On the outer end of each shaft H is attached a crank, *h*, connected by a pitman, I, with a crank, *i*, on the end of the main shaft J. The two cranks *h h*, as well as the two cranks *m m*, are set in opposite directions, as shown in Fig. 3.

Steam being admitted into the steam-passage B through one of the ports *d*, it acts upon both the pistons G G, forcing them around in opposite directions nearly one-half of a revolution, and when this stroke is completed, steam is cut off from that port and admitted through the other port *d*, which throws the pistons back again to their former positions, exhausting the steam previously let in through the exhaust *d'*.

By this construction of the engine, there is

no loss of power of the steam, as is always the case where the steam has to act against a stationary head or abutment; but the steam here acts against two movable pistons turning on a common center, and exerting a powerful leverage. There is practically no dead-centers for the main shaft, and hence a fly-wheel may be entirely dispensed with.

Four pistons may be used, instead of two, by the addition of two steam chests and valves, with their ports, in which case the pistons only make about one-fourth of a revolution at each stroke; and there will be two cranks on each side of the casing, and two pitmen connecting them with two cranks on each end of the main shaft J. The cranks are then set quartering, or at a distance of ninety degrees apart.

I am aware that English Patent No. 2,960 of 1864, among other inventions, represents an engine comprising a stationary cylinder with an angular steam-passage, having two segmental and angular pistons connected to packed rings, and movable within the passage. The cylinder of this engine has an opening above and below, for the inlet of steam; but the steam-chest to be used therewith is not shown or referred to, or the fact whether one or more steam-chests are to be used is left in doubt.

I am also aware that English Patent No. 6,376 of 1833, among other inventions, represents an engine comprising a stationary cylinder with two steam-chests, and two angular pistons connected to shafts passing through the center of the cylinder, and extending from said shafts to the inner periphery of the cyl-

inder. In this latter case, the entire cylinder is open, and acts as the steam-passage. It is well known that a tight steam-joint rarely can be made and retained with an angular cylinder and an angular piston. After the first wear it is hardly possible to practically pack a piston thus shaped; hence this form of cylinder and piston is now rarely, if at all, used. In both of the cases above referred to, the cylinders and pistons are angular, and their construction is of such a nature that to make a double engine would be impossible.

With my invention I experience no loss of steam, as, by the formation of the cylinder and pistons they are perfectly steam-tight, and by using two steam-chests for each pair of pistons, I get the full force and strength of the steam to bear directly against both faces of the pistons as they are alternately forced back and forth.

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

The combination of stationary cylinder A, provided with annular steam-channel B, circular in cross-section, two or more movable pistons, G, packing i, and two or more steam-chests, having ports and valves, substantially as described.

In testimony that I claim the foregoing I have hereunto set my hand this 16th day of January, 1874.

THOMAS A. RISHER.

Witnesses:

A. J. SMITH,
A. N. MARR.