

No. 645,893.

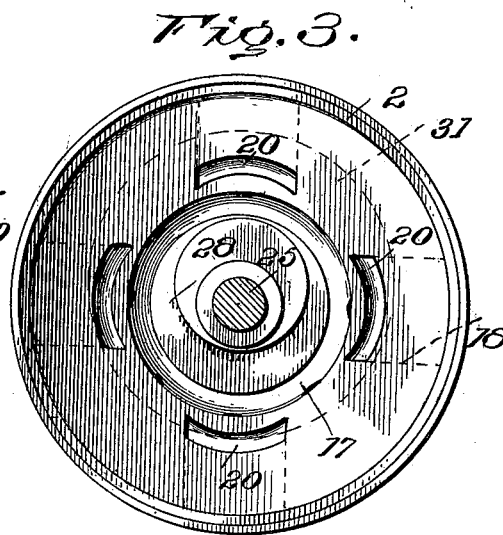
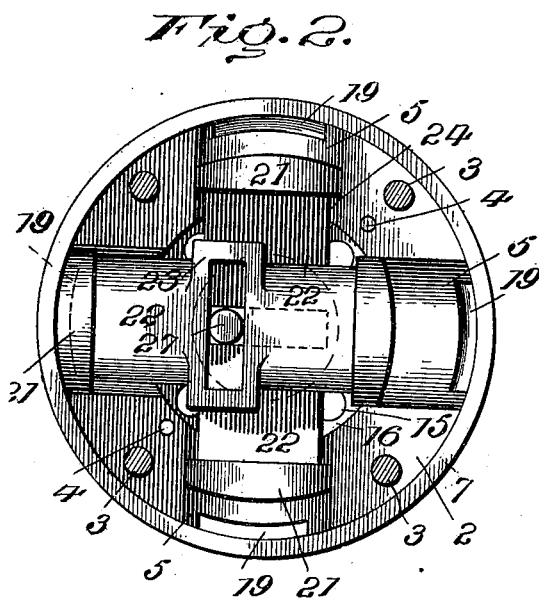
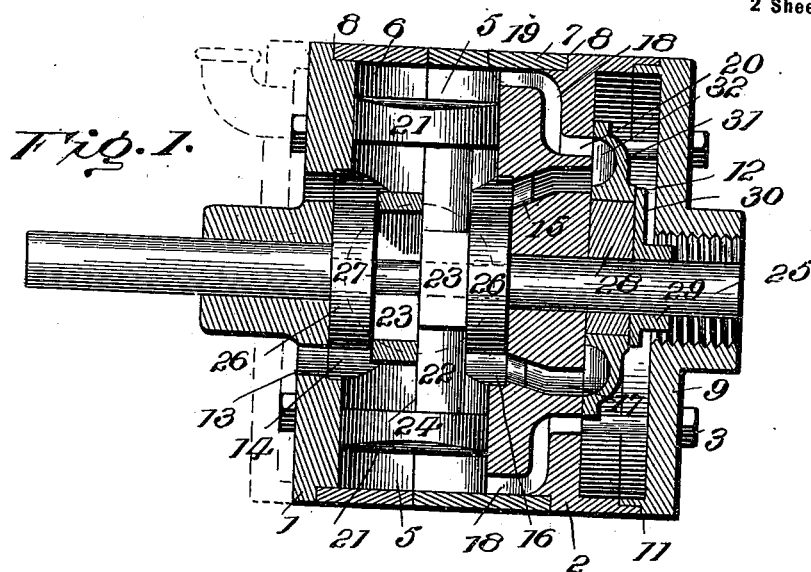
C. S. DEAN.
STEAM ENGINE.

Patented Mar. 20, 1900.

(No Model.)

(Application filed May 5, 1899.)

2 Sheets—Sheet 1.



Witnesses

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Fig. 4.

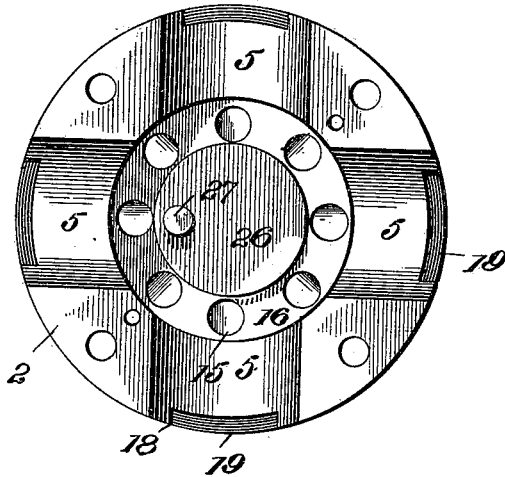


Fig. 5.

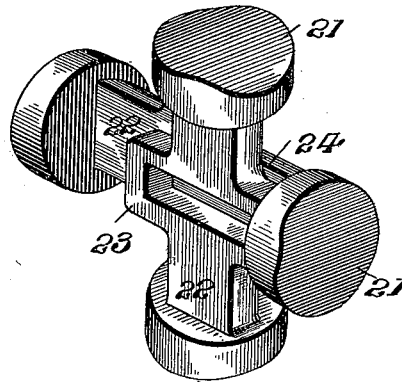
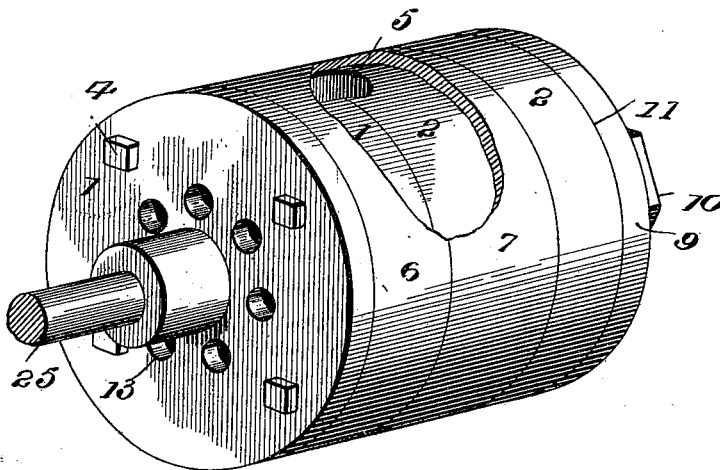


Fig. 6.



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UNITED STATES PATENT OFFICE.

CYRUS S. DEAN, OF FORT ERIE, CANADA, ASSIGNOR OF ONE-HALF TO
CHARLES O. RANO, OF BUFFALO, NEW YORK.

STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 645,893, dated March 20, 1900.

Application filed May 5, 1899. Serial No. 715,734. (No model.)

To all whom it may concern:

Be it known that I, CYRUS S. DEAN, a subject of the Queen of Great Britain, residing at Fort Erie, county of Welland, Province of Ontario, Dominion of Canada, have invented certain new and useful Improvements in Steam-Engines; 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.

My invention relates to steam-engines of the multiple-cylinder type.

The object of the present invention is the provision of an improved steam-engine of simple and compact construction particularly adaptable for introduction into steam-boiler flues or tubes to operate scrapers or cleaners for removing the scale, soot, or any other substance that should be removed.

A further object is to provide a steam-engine having a divided shell or casing of novel construction, whereby fewer and simpler operating parts are required and their assembling and separation can be more easily and rapidly had.

Other objects are the provision of a valve and pistons of improved construction and other co-operating devices, whereby a greater efficiency is obtained than has heretofore been possible.

Having the foregoing objects in view, the invention consists of an engine comprising certain improved elements, novel features, and combinations of parts, set forth in detail hereinafter and recited in the appended claims.

In the accompanying drawings, Figure 1 is a longitudinal section, certain parts being in full lines; Fig. 2, a face view of the steam-supply head, showing the pistons in position; Fig. 3, a view of the opposite face of the steam-supply head with the cap removed and the valve shown by dotted lines; Fig. 4, a face view of the steam-supply head, showing the ports; Fig. 5, a detail view of the pistons; and Fig. 6, a perspective detail of the machine, with parts broken away.

The engine body or casing consists of two circular parts or heads 1 and 2, secured together by bolts 3 and dowels 4 and having semi-cylindrical radial chambers 5, which when together form the four cylinders in which the

pistons play. There are two annular shells 6 and 7, which are seated in the grooved portions 8 of the heads, so as to be flush with the exterior surfaces of the latter, and these shells close the outer ends of the steam-cylinders and constitute heads for all of them. The abutting edges of the shells are preferably aligned with the abutting edges of the heads, and the joint is made tight by the clamping action of the bolts 3. There is a cap 9, having a steam-pipe coupling 10 and having a lap-joint connection with head 2 at the point 11, said cap being held in position by the bolts 3. Between the cap and the head is the steam-chest 12. The exterior of the engine being smooth and cylindrical, it can be made almost as large as the flue or tube and yet pass easily through the same when operating the scraper or cleaner. The head 1 is provided with a circularly-arranged series of exhaust-ports 13, leading from an annular space 14, which communicates with all the steam-cylinders. In the head 2 is the circular series of inclined exhaust-ports 15, which open into an annular groove 16 at their inner ends, and at their outer ends they open into the annular port 17. The head 2 is provided with the steam-supply ports 18, one for each steam-cylinder, which open into the outer ends of the cylinders at 19 and open into the steam-chest at 20 at points adjacent the annular groove 17.

The pistons are composed of cylindrical heads 21, stems 22, and links 23, all cast in a single piece. The stems and links are perfectly flat along one side from the point where they join one head to the point where they join the other, as shown at 24, and this flattened portion constitutes the longitudinal axis of the piston. The flat portions of the stems of the two double pistons employed slide against each other during their reciprocations. The formation of the pistons, stems, and links in one integral piece is of great importance, inasmuch as the vibration and wear are considerable because of the rapid reciprocations, and if the links were split and connected by bolts or other fastenings, as in ordinary constructions, such fastenings would soon jar and wear loose with disastrous results. In order that I may employ completely-integral pistons as specified, I have

found it necessary to have the engine body or casing constructed in separable parts, for otherwise the two double pistons employed could not be assembled in the engine, as their heads would prevent them from being crossed one over the other. The divided construction of heads and shells heretofore described I have found a particularly desirable and advantageous one to fulfil the requirements.

A rotary shaft 25 made in two sections is employed, one section being journaled in head 1 and the other section in head 2. On the inner end of each shaft-section is a crank or wrist-wheel 26, and these wheels are connected by a wrist-pin 27, which is secured to one of them, and after passing through the links 23 is received in a suitable aperture in the other wrist-wheel. An eccentric 28, secured to the shaft, is held in position by a nut 29, having a flange 30. The valve shown at 31 is of saucer shape, being provided with an annular concavity 32, which is adapted to cause the exhausting of the steam through the ports 15, said valve being thrown by the eccentric. The flange 30 holds the valve seated during its movements.

In Fig. 1 I have shown by dotted lines a different form of cap or head, which can be employed when the engine is used for other purposes than operating a tube or flue scraper, where it is desirable that the exhaust be through a single pipe rather than through a series of holes.

The operation is as follows: The steam entering the steam-chest passes into the port not covered by the valve and acts on the piston-head in the cylinder with which that port communicates, forcing the piston inwardly. This causes a movement of the wrist-pin, which in turn shifts the other pair of pistons, so as to uncover the port closed by one of them. As the shaft turns the valve moves with it, and the next induction or supply port is gradually uncovered, so that at the same time the first-named piston is receiving the steam while advanced well on its stroke one of the pistons of the other set is being also acted on by the steam. When the first piston has reached the end of its stroke, the supply-port to its cylinder is covered by the valve and the steam cut-off, and the position of the valve allows the dead steam to exhaust. After the second piston has advanced well on its stroke the movement of the valve causes the port leading to the piston of the set first named to open, and said set of pistons is driven back toward its initial position. The steam then begins to exhaust from the cylinder of the piston of the second set. These operations continue one after another as long as steam is supplied, thus causing an even and rapid rotation of the shafts, the steam being supplied to the different steam-cylinders one after another in

rotation and exhausted in the same fashion. The scraper for cleaning the boiler flue or tube is connected to the projecting shaft-section, and by reason of the compactness, shape, and operation flues or tubes can be cleaned very rapidly and easily by using the present engine as the motive power.

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

1. In a steam-engine, a body or casing composed of separable sections having halves of steam-cylinders in their adjacent faces which form complete steam-cylinders having open outer ends when the sections are together, means for holding said sections together, and a shell on the casing which covers the open outer ends of all the cylinders and constitutes a head for them.

2. In a steam-engine, the combination with a body or casing composed of separable sections having halves of steam-cylinders in their adjacent faces which form complete steam-cylinders having open outer ends when the sections are together, of a shell composed of separable sections fitted on the sections of the casing end to end and closing the outer open ends of the steam-cylinders, and means for holding the body-sections and the shell-sections together.

3. In a steam-engine, the combination with a body or casing formed of separable sections of cylindrical shape which have the halves of steam-cylinders in their adjacent faces whereby complete steam-cylinders are formed when they are fitted together, said steam-cylinders having open outer ends and the respective body-sections having peripheral grooves, of a shell composed of separable cylindrical sections lying in the peripheral grooves in end-to-end disposition and closing the outer ends of the steam-cylinders, and means for holding the body-sections together, whereby the shell-sections are held in position.

4. In a steam-engine, a body composed of separable sections each having a plurality of sets of diametrically-disposed semicylinders in their adjacent faces which form steam-cylinders when the sections are connected together, a head covering the outer ends of said cylinders, independent double pistons in the respective sets of steam-cylinders, each of said double pistons consisting of piston-heads and a connecting-stem formed in a single integral piece, said double pistons having their stems adapted to play one across the other between the piston-heads, and a rotary shaft operatively connected to the stems.

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

CYRUS S. DEAN.

Witnesses:

J. E. PRICE,
F. E. NEWTON.