

N. RATCHFORD & C. HARPER.
STEAM ENGINE.

Patented July 22, 1890.

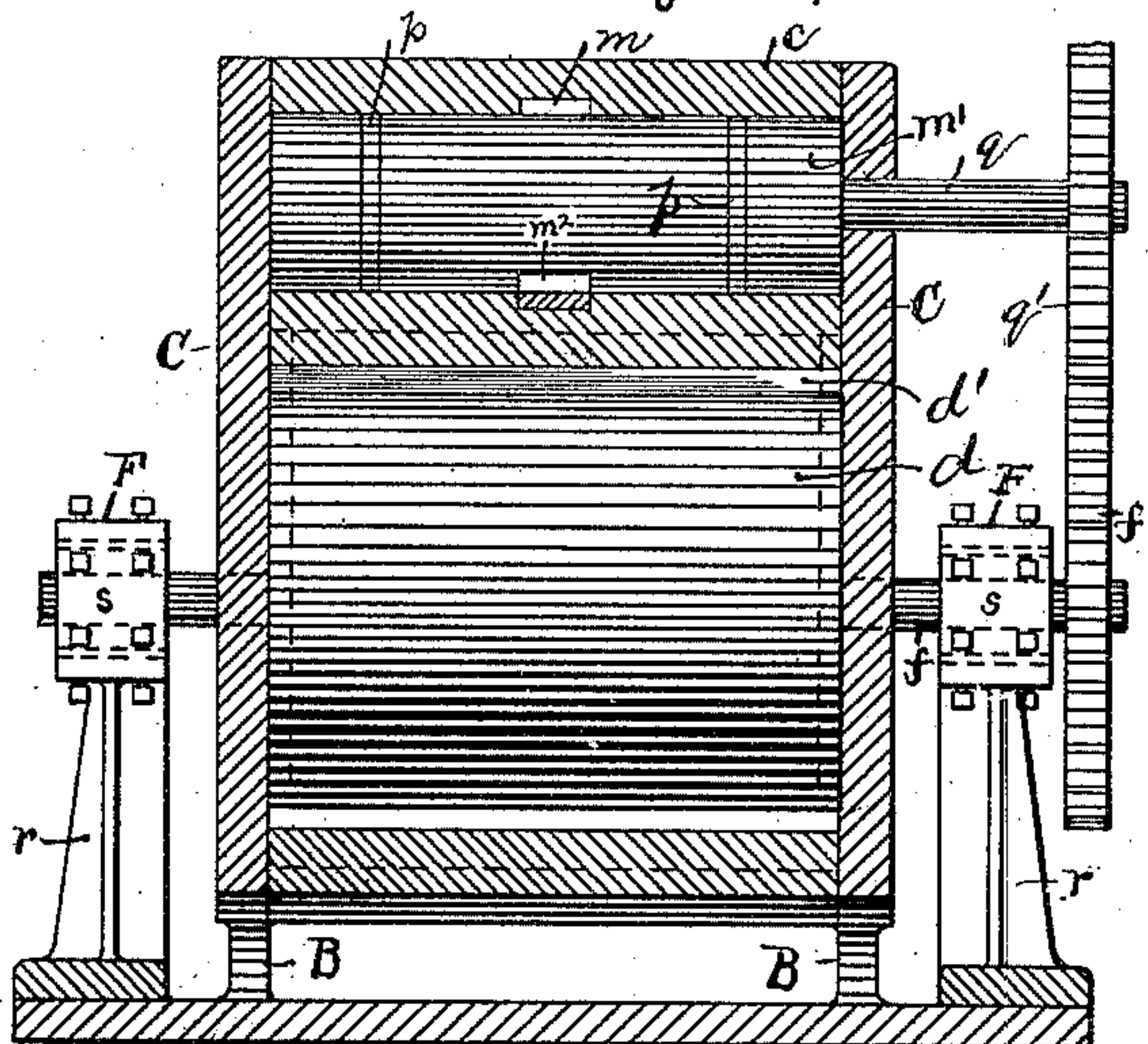


Fig. 1

Fig. 2

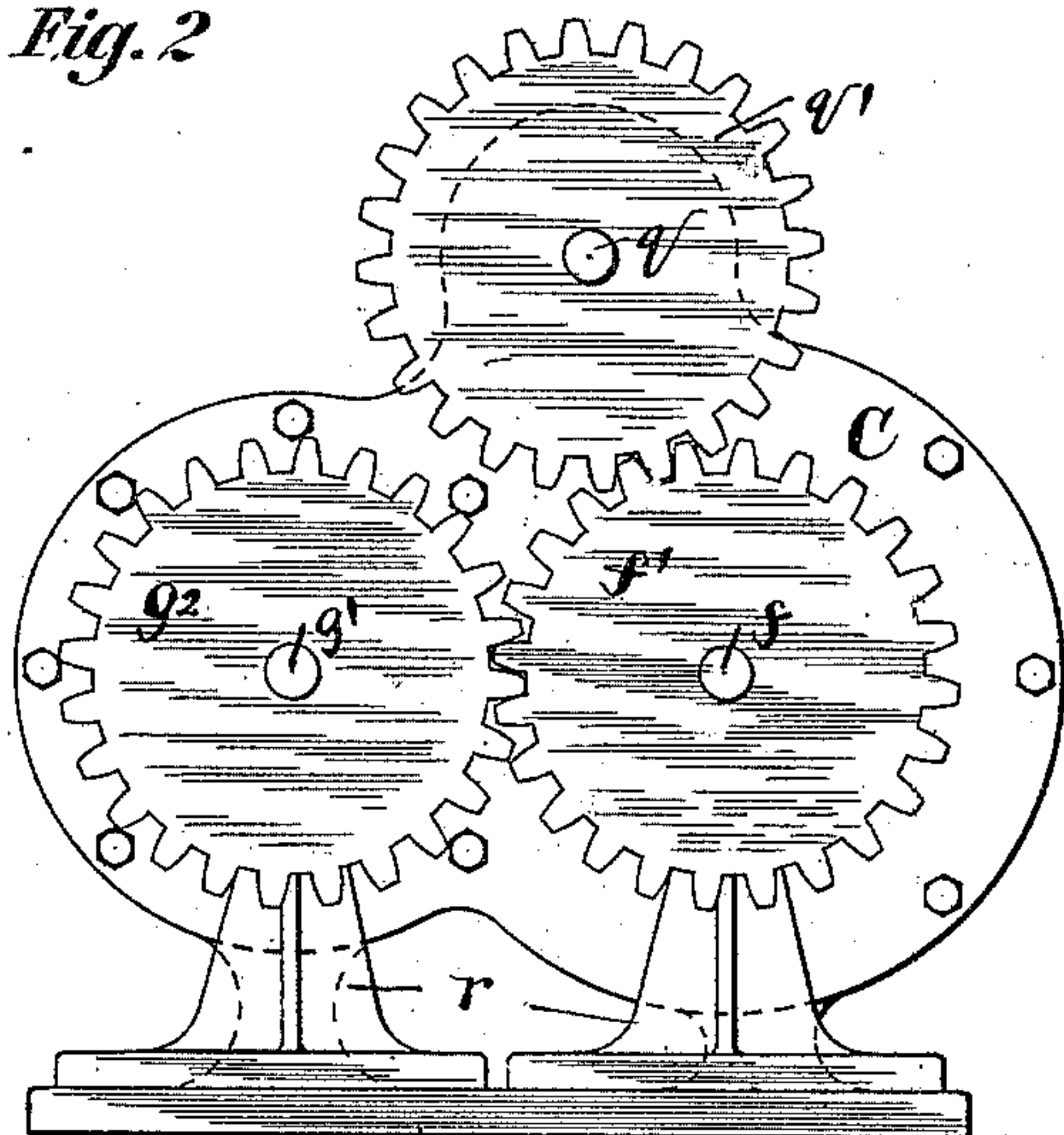


Fig. 3

Fig. 4

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NICHOLAS RATCHFORD AND CLARK HARPER, OF PLAIN CITY, OHIO; SAID HARPER ASSIGNOR TO SAID RATCHFORD AND EDWARD M. FIEBIGER, OF SAME PLACE.

STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 432,677, dated July 22, 1890.

Application filed January 6, 1890. Serial No. 336,026. (No model.)

To all whom it may concern:

Be it known that we, NICHOLAS RATCHFORD and CLARK HARPER, citizens of the United States, residing at Plain City, in the county of Madison and State of Ohio, have invented a certain new and useful Improvement in Steam-Engines, of which the following is a specification.

Our invention relates to the improvement of steam-engines, and the objects of our improvement are to provide an engine of this class which shall be simple of construction, and by means of which high speed and power can be attained, to prevent a waste of power and loss of motion, and to produce said engine in a durable and reliable form. These objects we accomplish in the manner illustrated in the accompanying drawings, in which—

Figure 1 is a central transverse section. Fig. 2 is a sectional view at right angles with Fig. 1. Figs. 3 and 4 are respectively opposite end views.

Similar letters refer to similar parts throughout the several views.

A represents the cylinder-casing of our improved engine, the main portion of which consists, as shown, approximately of two parallel cylinders b b' , said cylinders being joined and having their interiors communicating laterally. As shown in the drawings, the cylinder b' is of a diameter somewhat less than the cylinder b .

c represents a third cylindrical portion, which, being formed with the cylinder-casing A, is located above and slightly to one side of the center thereof.

The casing A, as shown in the drawings, is provided with a suitable base or support B. The body formed by the casing A is closed at its ends by end plates C.

Supported centrally within the cylinder b is a shaft d , the diameter of which is somewhat less than the diameter of the cylindrical chamber of said cylinder b . This shaft d is of such length as to cause its ends to come into frictional contact with or in close proximity to the end plates C, and has each of its ends provided with a journal f , which, extending outwardly, passes through an opening in

the plate C and rests in boxing F, more fully hereinafter described. Projecting longitudinally from the periphery of the shaft d is a lug or piston d' , which corresponds in length with the length of the shaft and which extends sufficiently outward therefrom to meet and form a steam-tight joint with the inner wall of the cylinder b .

Supported within the cylinder b' is a shaft g , which, in dimension and manner of support, corresponds with the shaft d , and which, as described for said shaft d , has its outwardly-extending journal g' bearing in the boxes F' , which corresponds in form with the boxing F. The diameter of the chamber of the cylinder b' being less than that of the cylinder b , the periphery of the shaft g is brought into close proximity with the inner wall of its cylinder and is made to form a steam-tight connection therewith by means of inwardly-projecting longitudinal ribs b^2 , formed on the inner wall of the cylinder b' . Formed in the periphery of the shaft g is a longitudinal groove or piston-way h , which extends throughout the length of the shaft and which is of such depth as to receive the projecting portion of the piston d' . The body of the shaft g projects sufficiently within the chamber of the cylinder b to cause the contact of the peripheries of the two shafts.

One of the outer ends of each of the journals f and g' on the outer side of the boxing has mounted thereon a gear-wheel, which we will indicate, respectively, by the reference-letters f' and g^2 .

Formed in the bottom of the casing A, between the two cylinders, is a steam outlet or port i .

As shown in the drawings in dotted lines, we may provide the ends of the shafts with the ordinary form of steam-packing ring k .

Formed in the inner wall of the upper and smaller cylinder c is a depression m , which forms, as shown, a circular offset. This offset m and the chamber of the cylinder c is made to communicate with the chamber of the cylinder b by a port n .

Fitting and adapted to be made to revolve within the cylinder c (which we will term the "valve-cylinder") is a valve plug or roller m' .

This valve-roller is provided on its periphery at the center of its length with a peripheral depression or pocket m^2 , opposite and of a width equal to that of the offset m . The space within the offset m , immediately about the entrance to the port n , is built up flush with the surface of the inner wall of the valve-cylinder. The steam-supply pipe l enters the central portion of the offset m and valve-cylinder at a point preferably in the upper side of said valve-cylinder.

Steam-packing rings p may be made to encircle the valve-roller m' , if desired. Extending outwardly from the center of one end of the plug m' , through the end plate C, is a shaft or journal q , which carries on its outer end a gear-wheel q' , which is of an equal size and gears with the gear-wheel g^2 of the shaft g' , which, as shown, is on the corresponding side end of the engine.

The boxing FF' each consists of a suitable standard r , which rigidly supports a metallic sleeve s , which is square in cross-section. Through each wall of this sleeve extends inwardly, through screw-holes formed therein, two or more set-screws s' . The set-screws of the lower half of the sleeve bear against and support the lower half boxing-plate t , while the upper set-screws similarly clamp against the upper half boxing-plate t' . These boxing-plates embrace the journal in the usual manner.

The operation of my device is as follows: The steam from the supply-pipe enters the cylinder c and fills the central enlargement thereof and the depression m^2 . The plug being then turned until the pocket or depression communicates with the valve or port n , the consequent discharge of steam through the port n into the cylinder b will result in such pressure upon the piston d' as to impart rotary motion to the shaft d . This motion of the shaft d , through its gear-wheel f'' , is communicated to gear-wheels q' and q^2 , and through the former to the valve-plug m' , through the shaft q . The volume of steam heretofore described as entering the cylinder b , having forced the piston past the port i , is allowed to escape through said port i . The momentum of the shaft d , imparted as above described, is sufficient to bring the piston again to its original position—that is, slightly

past the port n —where it is ready to receive the steam from the valve above, as hereinbefore described. The shafts d and g are so set with relation to each other as to cause the groove h of the latter to meet and receive the piston of the former during the contact of those portions of the shafts, thus preventing the latter from proving an obstruction.

Belt-wheels for transmitting power may be mounted upon the outer ends of either or both of the shafts f and g' .

The gear-wheels herein mentioned are, as shown, of equal size, thus creating uniformity and steadiness of motion.

From the description herein given it will be seen that the movement of the piston is continuous in one direction, and that the loss of motion is comparatively slight.

The engine herein described is not of complicated or expensive construction, and the peculiar method of introducing steam into the cylinder prevents an excessive use or waste of steam.

In case it is desired to adjust or change the position of the journals of the shafts b g , it may be readily accomplished by turning the desired sleeve set-screws, the inner ends of which bear against and support the boxing.

Having now fully described our invention, what we claim, and desire to secure by Letters Patent, is—

In a steam-engine, the combination, with the laterally-communicating cylinders b and b' , of shaft d , journaled within said cylinder d and provided, as described, with piston or lug d' , and having longitudinal groove h and outlet-port i , said cylinder b of the valve-cylinder c , located as described, and having internal depression or enlargement m , valve-closing plug m' , having shaft q and central steam-depression m^2 , port n , connecting, as described, the cylinders b and c , the gear-wheels g^2 , f'' , and q' , mounted, respectively, upon the journals of the shafts d and g , and plug m' , the wheels q' and f'' and f' and g^2 gearing together, substantially as set forth.

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In presence of—

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