

No. 645,985.

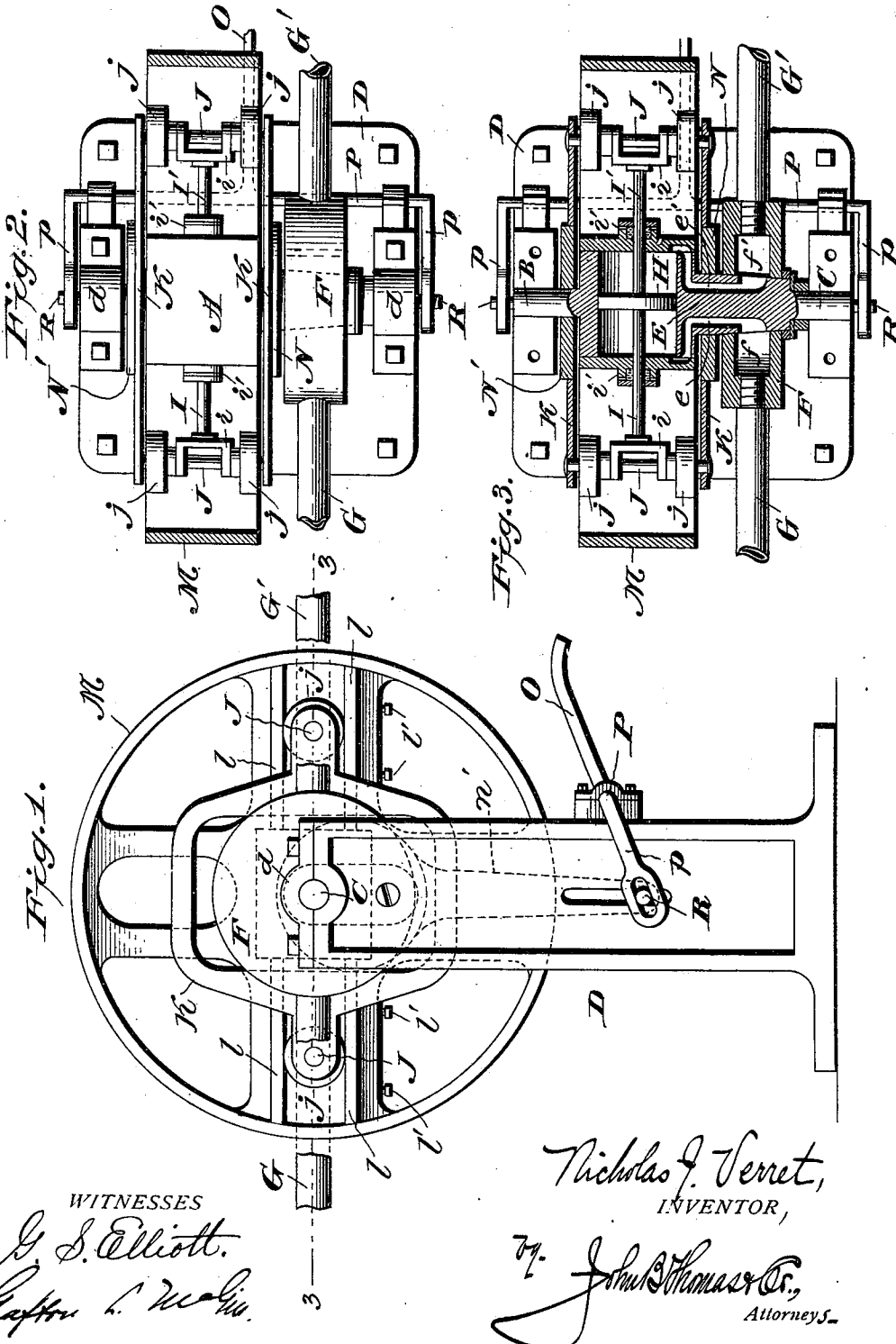
Patented Mar. 27, 1900.

N. J. VERRET.
ENGINE.

(No Model.)

(Application filed June 14, 1899.)

2 Sheets—Sheet 1.



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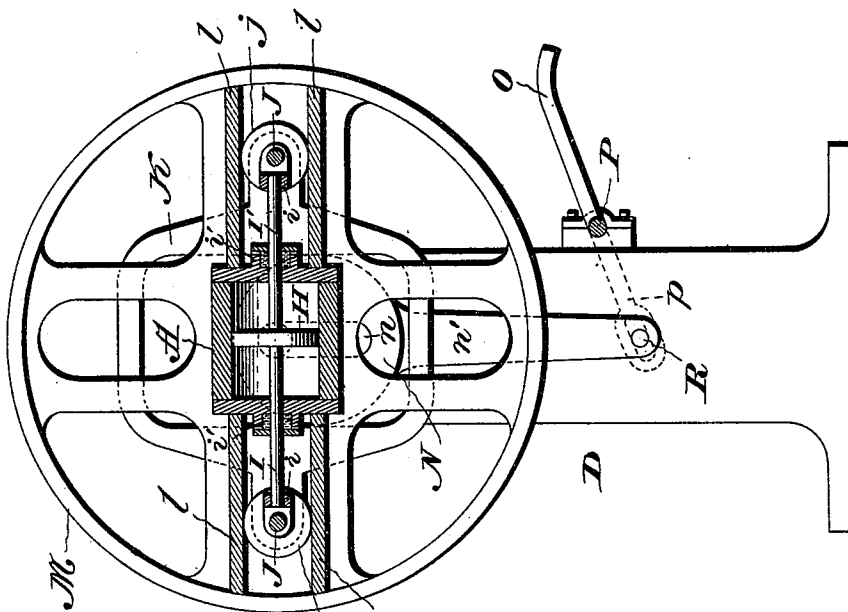
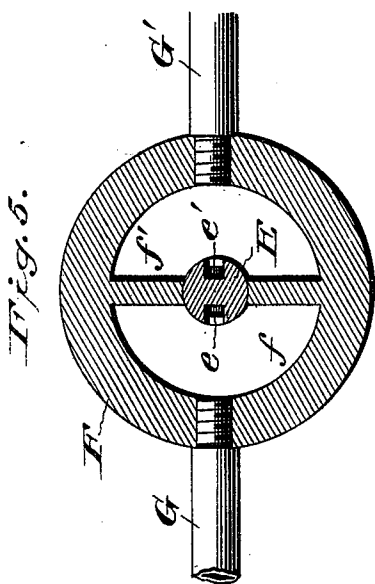
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2 Sheets—Sheet 2



WITNESSES
G. S. Elliott.
Chauncey L. McKim.

Fig. 4.

Nicholas J. Verret,
INVENTOR,
By John B. Thomas & Co.,
Attorney S.

UNITED STATES PATENT OFFICE.

NICHOLAS J. VERRET, OF LITTLE ROCK, ARKANSAS, ASSIGNOR OF TWO-THIRDS TO HENRY N. SAMSTAG AND CHARLES H. ROSS, OF SAME PLACE.

ENGINE.

SPECIFICATION forming part of Letters Patent No. 645,985, dated March 27, 1900.

Application filed June 14, 1899. Serial No. 720,550. (No model.)

To all whom it may concern:

Be it known that I, NICHOLAS J. VERRET, a citizen of the United States of America, and a resident of Little Rock, in the county of Pulaski and State of Arkansas, have invented a new and useful Engine, of which the following is a specification.

This invention is an improvement in engines; and the objects of the same are to produce an engine that shall be simple and compact in its construction and arrangement of instrumentalities, to economize floor space, reduce the weight and number of parts, and consequently the friction thereof, to a minimum, and attain the highest possible speed by applying the power in a peculiar manner directly to the shaft.

A further object of the invention is to provide such a high-speed engine with mechanism by which it can be readily controlled for reversing the direction of rotation or bringing the operative parts to rest while the shaft continues to run and for stopping the engine quickly when desired.

With the above objects in view the invention contemplates the production of an engine that shall embody the desirable features of a rotary engine in connection with those of the ordinary reciprocating engine in such manner that the cylinder or cylinders will revolve with the shaft and the pistons which reciprocate in said cylinders will impart a rotary motion to the shaft through the intervention of yoke-frames which revolve around eccentrics or cams, the latter being movable on the shaft to change the direction of rotation and bring the pistons to rest while the engine is running and also stop the engine forcibly, if necessary.

The invention consists, primarily, of one or more cylinders revolving with the shaft, pistons reciprocating in the cylinders, yoke-frames connected to the pistons, and cams or eccentrics around which the yoke-frames revolve, in connection with a very simple valve mechanism for introducing steam to the cylinders and exhausting therefrom.

The invention further consists of an engine in which are combined one or more cylinders revolving with a shaft, a fly-wheel inclosing

said cylinders, pistons reciprocating in the cylinders and having rods extending beyond opposite ends, yoke-frames connected to the outer ends of the rods, and cams or eccentrics around which the yoke-frames revolve, said cams or eccentrics being movable vertically on the shaft to change the direction of rotation of the rotary parts, control the reciprocations of the pistons, and also stop the rotation, in connection with a peculiar arrangement of ports in the shaft or hub to control the admission of steam by automatic cut-off.

The invention consists, furthermore, in the particular construction of detail parts or mechanisms and in their combination or relative arrangement in producing the complete engine, the following specification entering into a precise description of the construction and operation, while the novel features are specifically set forth in the appended claims.

In the accompanying drawings, which illustrate my improved engine and in which like letters of reference indicate similar parts throughout the several views, Figure 1 is a side elevation of an engine constructed in accordance with my invention. Fig. 2 is a plan view with the fly-wheel in section to show the connection between the piston-rods and yoke-frames. Fig. 3 is a horizontal sectional view on the line 3-3 of Fig. 1. Fig. 4 is a vertical sectional view through the cylinder. Fig. 5 is a detail sectional view of the steam and exhaust chamber, showing the ports in the shaft or hub. Fig. 6 is a diagrammatic view illustrating the different positions assumed by the eccentrics or cams with relation to the yoke-frames in determining the direction of rotation of the latter and controlling their operation.

Referring more particularly to the said drawings, A designates a cylinder, which may be of any approved type used in connection with a reciprocating engine, and in carrying out my invention the said cylinder has firmly attached to the opposite sides thereof or formed integrally with said sides shafts or trunnions B and C, which bear in journal-boxes *d d* on the standards of an upright frame D, in which the engine is mounted. The shaft C has a hub E fixed thereon ad-

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joining the cylinder A and connecting therewith, said hub providing for ports or passages *e* and *e'*, which lead from opposite sides of the periphery thereof through the adjoining sides of the cylinder to open into the latter at opposite ends thereof, as clearly shown in Fig. 3 of the drawings. The hub E tapers from the cylinder, and upon the same is fitted a cylindrical supply and exhaust chest F, which is stationary and provided with a vertical partition forming two chambers *f* and *f'*, respectively, one receiving steam, compressed air, or other fluid-pressure from a suitable source, and for this purpose has a supply-pipe G connected thereto, while the other receives the exhaust from the cylinder and discharges through the pipe G'. The aforesaid chambers of the chest communicate with the passages or ports *e e'* of the hub E by way of slots, as shown in Fig. 5, so that the communication will be kept up to supply and exhaust the cylinder during nearly a half-rotation, it being here noted that the ports *e e'* are alternately inlet and exhaust ports.

Within the cylinder A is located a piston H, adapted to reciprocate between the ports *e e'*, and to the opposite sides of said piston are attached piston-rods I and I', which extend through the ends of the cylinder and have cross-heads *i* secured to their outer ends. Where the piston-rods I and I' pass through the ends of the cylinder, stuffing-boxes *i'* are provided, said stuffing-boxes being of the usual construction. Through the cross-heads *i* pass transverse shafts J, and to said shafts are pivotally connected yoke-frames K, which connect the ends of the two shafts J and are positioned a short distance beyond each side of the cylinder, the said yoke-frames presenting rectangular openings or large slots, as shown more clearly in Fig. 6 of the drawings. The shafts J, to which the yoke-frames are connected, as hereinbefore described, have rollers *j j* mounted thereon, which travel on ways or guide-plates *ll* in a fly-wheel M, which incloses the cylinder A and in operation turns therewith, having rotary motion imparted thereto through the intervention of the piston and yoke-frames in connection with the cams or eccentrics hereinafter described. The fly-wheel may be made up in any suitable manner, though it is essential that it be provided with radial openings for the cross-heads and rollers to work in, and the guide-plates *ll*, against which the rollers bear, are preferably adjustable through the set-screws *l'* in order to take up any wear and leave only a small space between the rollers and one of said guide-plates when the rollers are bearing against the other guide-plate, the guide-plate against which the rollers of each set bear depending upon the direction of rotation of the fly-wheel and parts located therein. Shoes may be employed in place of rollers, if desired.

N and N' designate cams or eccentrics located one on each side of the cylinder and

fly-wheel immediately adjoining the same. These cams or eccentrics are really circular plates or disks and form eccentrics or cams only in connection with the yoke-frames, according to their position within the slots or elongated openings. When moved to an intermediate position, (see diagram Fig. 6,) the centers of the disks or cams correspond with the axis of the yoke-frames, and consequently have no action on the latter. The cams or disks do not revolve with the yoke-frames, but have a movement in the slots or elongated openings therein, the shaft passing through a slot *n*, so as not to interfere with said movement. The disks or cams are operated by a lever O, attached to a rock-shaft P, having arms *p*, which are connected to a transverse shaft or rod R, forming a connection between arms *n'*, that depend from the aforesaid cams or disks.

The mechanism for operating the cams or disks herein shown and described is applicable to the engine when it is mounted in an upright frame; but it is obvious that other mechanism may be employed for adjusting the cams or disks and also that the engine could be mounted in a horizontal bed-frame, if desired.

From the foregoing description, in connection with the accompanying drawings, the operation of my improved engine will be readily apparent, for supposing the upper chamber *f* of the chest to be the supply and the chamber *f'* the exhaust, with the cylinder in the position shown and the disks or eccentrics shifted to the limit of their downward movement, the steam, compressed air, or other fluid-pressure entering through the port *e* will force the piston to the right, and a corresponding movement being conveyed to the yoke-frames through the intervention of the piston-rods and connections will cause said yoke-frames to swing around the eccentrics, carrying the fly-wheel with them. The longitudinal center of the yoke-frames being to one side of the center of the cams or disks throws a greater portion of the yoke-frames beyond one side of the periphery of said cams or disks, by which said yoke-frames act as levers with the cams as a fulcrum, and thereby swing around said cams, practically converting the reciprocations of the pistons and yoke-frames into a rotary motion, which is imparted to the shafts B and C, and from which shafts the power may be taken. On one stroke of the piston the projecting portion of the yoke-frames travels around one-half of the cams and passing the center is continued in the same rotation by the opposite reciprocation of the piston and parts carried thereby. To reverse the engine, it is only necessary to shift the cams or disks to the other end of the elongated openings or slots, changing the projecting part of the yoke-frames from one side to the other, whereby the operations of the piston and corresponding movements of the yoke-frames will cause the rotary parts to ro-

tate in an opposite direction to that described. It will also be noted that by positioning the cams or eccentrics at the center of the elongated openings or slots said cams become concentrics by corresponding with the axis of the yoke-frames, bringing the reciprocations of the parts to a standstill, thereby reducing the wear upon the cylinder, piston-rings, yoke-frames, and cams. The engine can therefore be readily controlled, and when started the fly-wheel assists in throwing the yoke-frames beyond the center, so that the reciprocating piston will act upon the yoke-frames to give the proper impulses.

By the particular construction and arrangement of parts constituting my improved engine a very simple valve mechanism is provided and the operating parts are so few that the engine is extremely compact, and consequently will occupy but little floor-space. It will also be noted that the reciprocations of the piston being applied to parts which revolve around the shaft and carry the cylinder with them applies the power directly to said shaft and in such manner that an exceedingly high speed can be attained, the action of all the parts being quick and positive owing to the concentration of the few working parts. In view of the high speed which can be attained by the engine constructed as herein shown and described the said engine is particularly serviceable as a marine or automobile engine.

Having thus described my invention, I do not wish to be limited to the precise construction and arrangement of parts as herein shown and described, for it is apparent that slight changes or modifications could be resorted to without sacrificing any of the advantages of my invention or departing from the spirit and scope of my claims.

I claim—

1. In an engine, the combination, of a revolving cylinder, a piston reciprocating in the cylinder, rods projecting from the piston through the cylinder, a fly-wheel inclosing the cylinder and piston-rods, yoke-frames connected to the ends of the rods, and cams or eccentrics around which the yoke-frames revolve; together with valve mechanism for the cylinder, substantially as shown and described.

2. In an engine, the combination, of a cylinder revolving with a shaft, a piston reciprocating in the cylinder, rods projecting from the piston through opposite ends of the cylinder, a fly-wheel inclosing the cylinder and piston-rods, yoke-frames connected to the piston-rods, and cams or eccentrics around which the yoke-frames revolve; together with valve mechanism for the cylinder, substantially as shown and described.

3. In an engine, the combination, of a cylinder revolving with a shaft, a piston reciprocating therein and having rods extending through opposite ends of said cylinder, trans-

verse shafts at the outer ends of said rods, yoke-frames connecting the ends of the shafts, rollers mounted on the transverse shafts, a fly-wheel embracing the cylinder and having ways against which the rollers bear, and cams or disks located within the yoke-frames and around which said yoke-frames revolve; together with valve mechanism for the cylinder, substantially as shown and described.

4. In an engine, the combination, of a cylinder, shafts projecting from opposite sides thereof, one of the shafts presenting a hub having ports which lead into the cylinder, a piston reciprocating in the cylinder and having rods projecting through the ends of said cylinder, transverse shafts connected to the ends of the piston-rods and carrying antifric-tion-rollers, yoke-frames connecting the ends of the rods, and cams or disks located within the yoke-frames and around which said yoke-frames revolve; together with a chest fitted upon the hub and having chambers which communicate alternately with the ports in said hub, substantially as shown and described.

5. In an engine, the combination, of a cylinder revolving with the shaft, a piston reciprocating in the cylinder and having piston-rods extending through said cylinder, yoke-frames connected to the outer ends of the piston-rods and positioned on opposite sides of the cylinder, said yoke-frames having transverse openings or slots therein, cams movable in the openings or slots of the yoke-frames, and means for adjusting said cams; together with valve mechanism for the cylinder, substantially as shown and described.

6. In an engine, the combination, of a cylinder revolving with a shaft, a piston reciprocating in the cylinder and having rods extending through said cylinder, a fly-wheel embracing the cylinder and presenting surfaces against which the piston-rods bear, yoke-frames connected to the outer ends of the piston-rods and positioned on opposite sides of the cylinder, said yoke-frames having transverse slots or openings therein, cams or disks movable in the openings or slots of the yoke-frames, and means for adjusting said cams; together with valve mechanism for the cylinder, substantially as shown and described.

7. In an engine, the combination, of a cylinder having shafts projecting from opposite sides thereof, one of said shafts being enlarged forming a hub in which are located ports leading into the cylinder and out through opposite sides of the periphery of said hub, a piston reciprocating in the cylinder and having rods extending through opposite ends of said cylinder, transverse shafts carried by the outer ends of said piston-rods and having antifric-tion-rollers, yoke-frames connecting the outer ends of the transverse shafts, disks or cams located in the yoke-frames and around which said yoke-frames revolve, and a fly-wheel embracing the cylinder, said fly-wheel having guide-plates against which the rollers bear; to-

gether with a chest fitting the hub and having chambers which communicate with the ports in said hub, substantially as shown and described.

- 5 8. In an engine, the combination with a cylinder, shafts projecting from opposite sides thereof, one of said shafts being enlarged and tapered from the cylinder to provide for ports leading from opposite sides of the tapered enlargement into the cylinder, a piston reciprocating in the cylinder and having piston-rods extending through said cylinder, transverse shafts at the outer ends of the piston-rods, yoke-frames connected to the ends of the transverse shafts and having transverse openings or slots, cams or disks located in said openings or slots and movable therein, and a fly-wheel embracing the cylinder and having guide-plates upon which the rollers carried by the piston-rods travel or slide, substantially as shown; together with a chest fitting the tapered hub of the cylinder and provided

with chambers communicating with the ports in said hub, substantially as set forth.

9. In an engine, the combination, of a cylinder revolving with a shaft, a piston reciprocating in said cylinder and having rods extending through the ends of the cylinder, transverse shafts at the ends of the piston-rods carrying rollers, yoke-frames connected to the ends of the rods, and cams or disks around which the yoke-frames revolve; together with a fly-wheel embracing the cylinder and having radial openings or spaces in which the piston-rods play, guide-plates forming the sides of said openings or spaces, and means for adjusting the guide-plates, substantially as shown and described.

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

NICHOLAS J. VERRET.

Witnesses:

W. H. KENNY,
J. O. WILLIAMS.