H. F. JACOBS.

MECHANICAL MOVEMENT.

APPLICATION FILED NOV. 26, 1909.

1,108,844.

Patented Aug. 25, 1914.

2 SHEETS—SHEET 1.

Fig. 1.

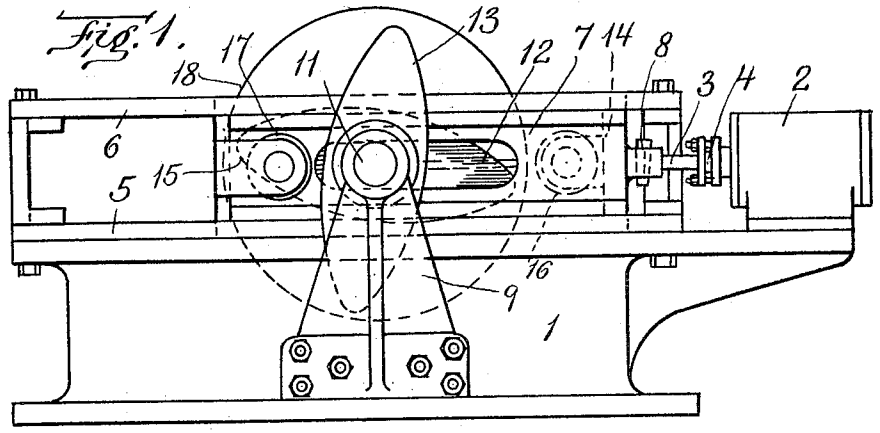


Fig. 2.

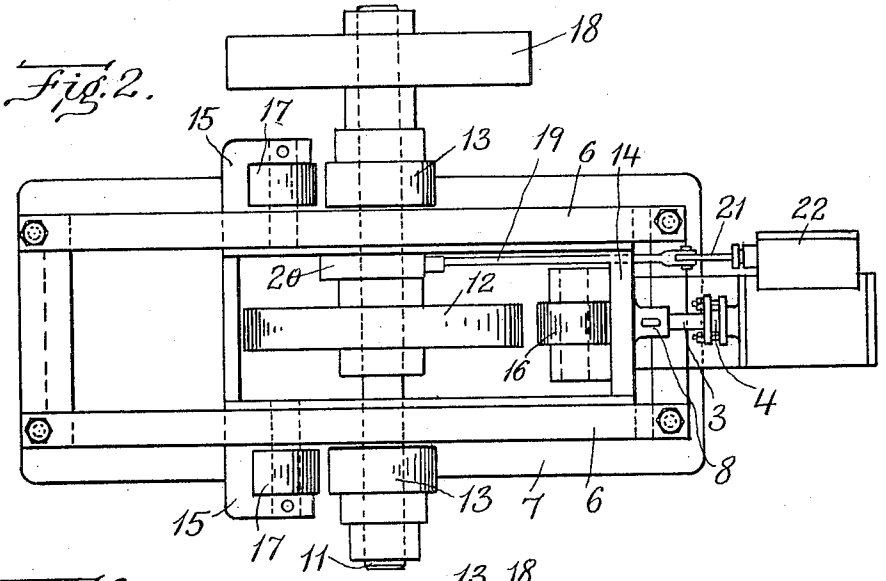
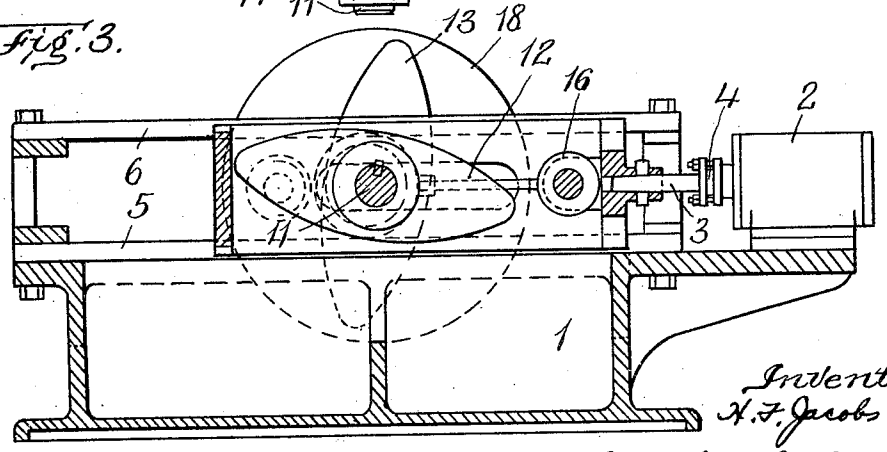


Fig. 3.



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2 SHEETS—SHEET 2.

Fig. 4.

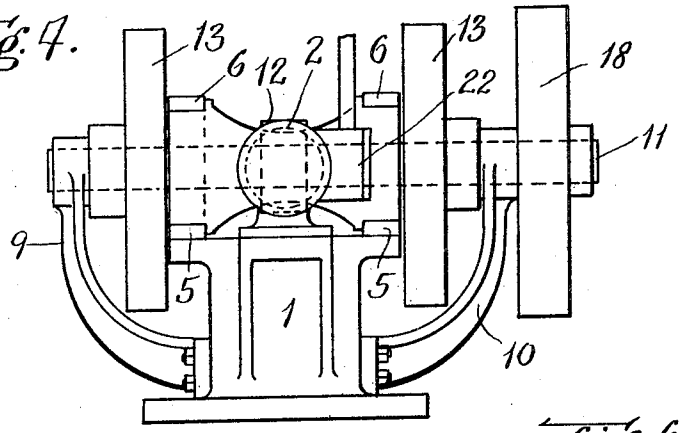


Fig. 5.

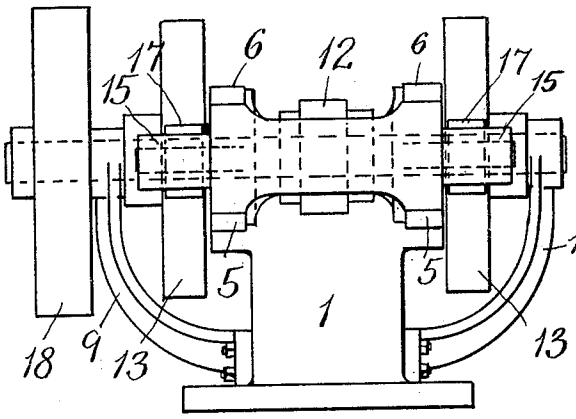


Fig. 6

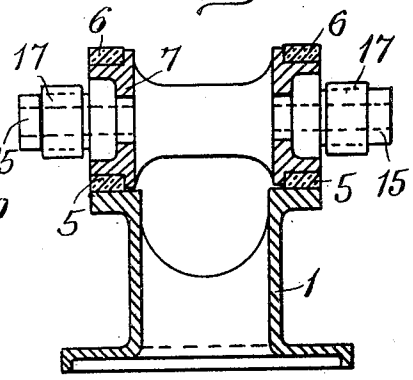


Fig. 7.

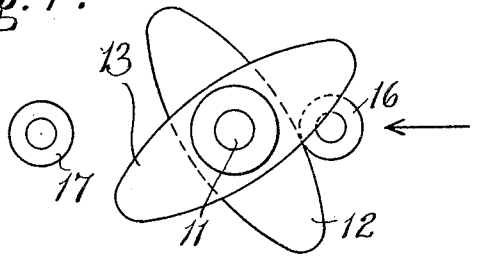
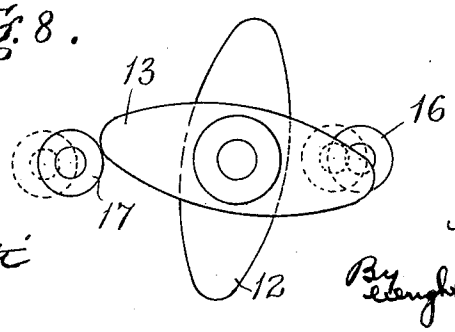


Fig. 8.



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UNITED STATES PATENT OFFICE.

HERMAN F. JACOBS, OF NATICK, MASSACHUSETTS.

MECHANICAL MOVEMENT.

1,108,844. Specification of Letters Patent. **Patented Aug. 25, 1914.**

Application filed November 26, 1909. Serial No. 529,886.

To all whom it may concern:

Be it known that I, HERMAN F. JACOBS, of Natick, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Mechanical Movements, of which the following is a specification.

This invention relates to mechanical movements, and is illustrated herein as embodied, in an engine operated by steam, air or other expansive fluid of the reciprocating type and relates particularly to new and improved means for converting the reciprocations of the engine piston or other moving element into rotary movement of the shaft to which the power is applied.

In carrying the invention into effect I provide means by which the rectilinear movements of the piston are converted directly into rotary movement of a shaft without the interposition of a crank and pitman and with the development of more effective power than is possible with the ordinary crank and connecting rod, while also obtaining a more uniform distribution of power throughout the entire revolution of the shaft and a more uniform acceleration and retardation of the speed of the piston.

In developing the principles of my invention in practical form I have devised an engine of which one embodiment is shown in the accompanying drawings, such embodiment not being the only one possible but being merely illustrative of one way in which the invention may be carried into effect.

In the drawings Figure 1 represents a side elevation of such an engine. Fig. 2 is a plan view of the same. Fig. 3 is a longitudinal section of the same. Fig. 4 is an end elevation as viewed from the cylinder end of the engine. Fig. 5 is an elevation of the opposite end of the engine to that shown in Fig. 4. Fig. 6 is a cross section. Figs. 7 and 8 are diagrammatic views illustrating different positions of the stroke of the engine.

The same reference characters indicate the same parts in all the figures.

The engine comprises a base 1 on one end of which is supported a cylinder 2, in which reciprocates the piston acted upon by the steam or other expansive fluid, and from which projects the piston rod 3 through a stuffing box 4. On the base are supported cross head guides 5 and 6 between which is guided a cross-head frame 7 connected to the piston rod 1 by a key or other suitable connection 8. The frame 7 is moved back and forth with the reciprocations of the piston in the cylinder 2. Extending transversely of the base 1 and supported by bearing brackets 9, 10 on opposite sides thereof is a main shaft 11, which also traverses the cross-head guide 7 between the opposite ends thereof. This shaft carries members 12, 13, which for convenience may be termed levers or impulse members. The cross-head frame 7 carries a number of cross-head elements 14, 15 respectively, of which the former is arranged centrally, that is, in the socket line of thrust of the piston, and the latter are arranged in the same plane therewith, but equidistantly on opposite sides of said line. These cross-head members carry anti-friction rolls 16 and 17 respectively.

The impulse member or lever 12 is arranged centrally of the engine in line with the roll 16 as shown in Fig. 2, while the members 13 are on different sides of the center line and in alinement with the rolls 17 respectively. By this arrangement the roll 16 acts on the lever 12 in one stroke of the engine and the roll 17 acts on the levers 13 on the return stroke. The levers or impulse members are elongated in one direction having approximately the form of an ellipse as shown in Figs. 1, 3, 7 and 8, and the relative arrangement of the levers 12 and 13 is such that the major axis of the former is approximately at right angles to those of the latter, the axes of the two members 13 being in the same plane. Thus in the outward stroke of the piston one end of the member 12 is acted upon and the shaft turns through nearly a quarter revolution, the momentum thus carrying the levers 13 past the dead point so that they may be acted upon in the proper direction by the rolls 17 on the return stroke of the piston to continue the rotation of the shaft in the same direction. The levers are two-armed so that first one end and then the other of each is acted upon by its corresponding impulse roll, the other lever or levers being acted upon intermittently by the other roll or rolls. The momentum may be alternated by a fly wheel 18 on the shaft.

A valve gear of any improved form may

be employed for governing the admission of the working fluids to the cylinder, such as an eccentric rod 19 acted upon by the eccentric 20 and working a valve rod 21 connected with a valve in the valve chest 22. The engine may be made reversing by any appropriate shifting or alteration of the valve gear.

It is obvious that an engine constructed and illustrated as above is double-acting. Two or more cylinders may be mounted side by side and arranged to act upon a similar arrangement of levers on the same shaft. Where two cylinders are employed the levers acted upon by one may be arranged at an angle of 45° with the corresponding reverse of the other, and thus impulses will be applied to the shaft for each 45° of revolution thereof. Even with a single cylinder the number of impulses applied to the shaft during its rotation is doubled over that of the ordinary type using a crank and connecting rod, for with the arrangement as shown four impulses are applied during each rotation of the shaft and thus the same uniform turning movement is applied thereto. Furthermore by properly shaping the sides of the levers or impulse members, the motion of the piston must be made more regular than with that of the ordinary engine and be caused to have a perfect acceleration and retardation, thereby overcoming the defects due to the angularity of the piston rod in the ordinary type of engine. By the arrangement of the two cross-head members 15, 17, equally distant on each side from the center line of the engine the pressure is equalized on the shaft and there is no tendency for the shaft to be moved out of alinement and to bind in its bearings.

I claim,

1. A mechanical movement comprising a reciprocating cross-head frame, means for reciprocating said cross-head frame, a transverse shaft between the ends of said cross-head frame, a pair of diametrically opposite arms projecting perpendicularly from said shaft in the line of thrust of said cross-head reciprocating means, two pairs of arms quartering with said first pair of arms secured to said shaft at equal distances on each side of such line of thrust, and anti-friction means carried by said cross-head frame arranged to bear on said arms oppositely during opposite reciprocations of the cross-head.

2. A mechanical movement comprising a reciprocating cross-head frame, guides for said frame, a shaft crossing the frame perpendicular to the direction of movement thereof, a pair of oppositely projecting arms on the shaft in the line of thrust applied by the frame, an engaging element on the frame in the same line arranged to bear on the sides of the arms on successive strokes in one direction, two pairs of oppositely projecting arms at right angles to the first-named pair fixed to the shaft at equal distances on each side of the line of thrust, and engaging elements carried by the frames in line with said two pairs of arms respectively, and on the opposite side of the shaft from the first-named engaging member.

In testimony whereof I have affixed my signature, in presence of two witnesses.

HERMAN F. JACOBS.

Witnesses:
ARTHUR H. BROWN,
JAS. H. CHURCHILL.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."