No. 776,385. PATENTED NOV. 29, 1904.

J. R. CROW.

DRIVING MECHANISM FOR ENGINES.

APPLICATION FILED SEPT. 9, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

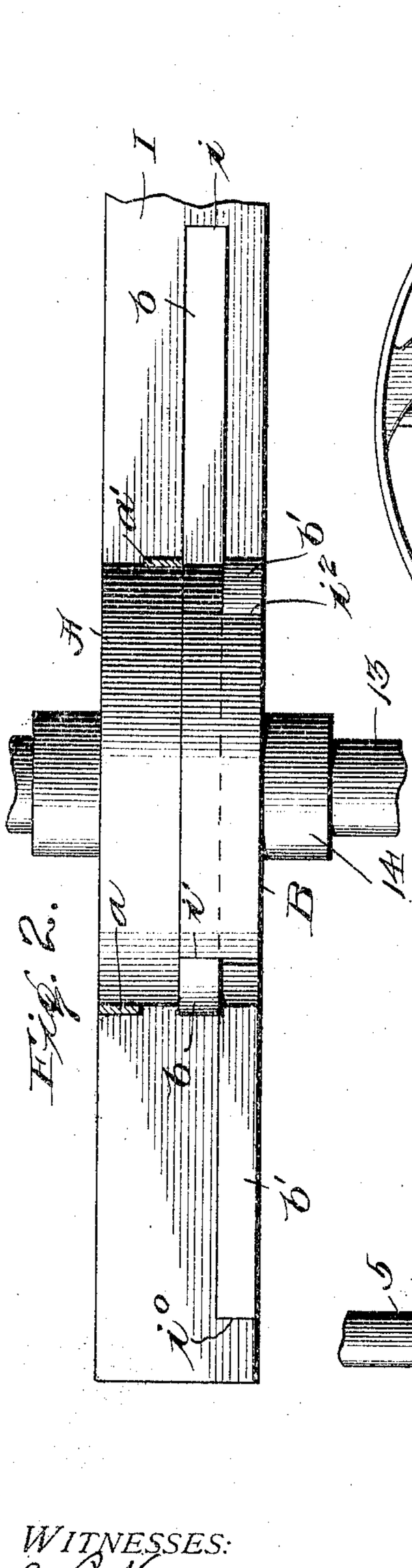

Fig. 2.

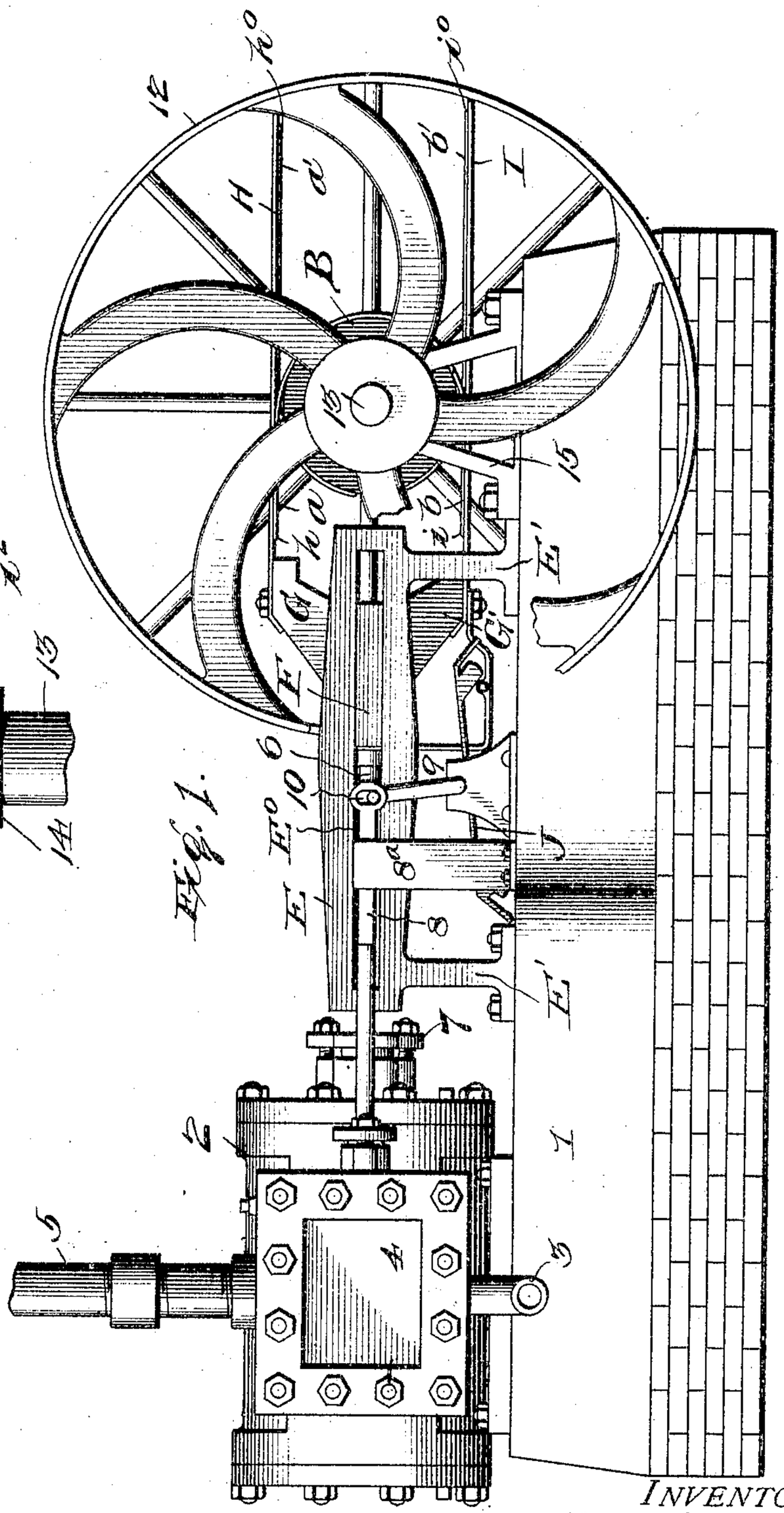

Fig. 1.

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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 3.

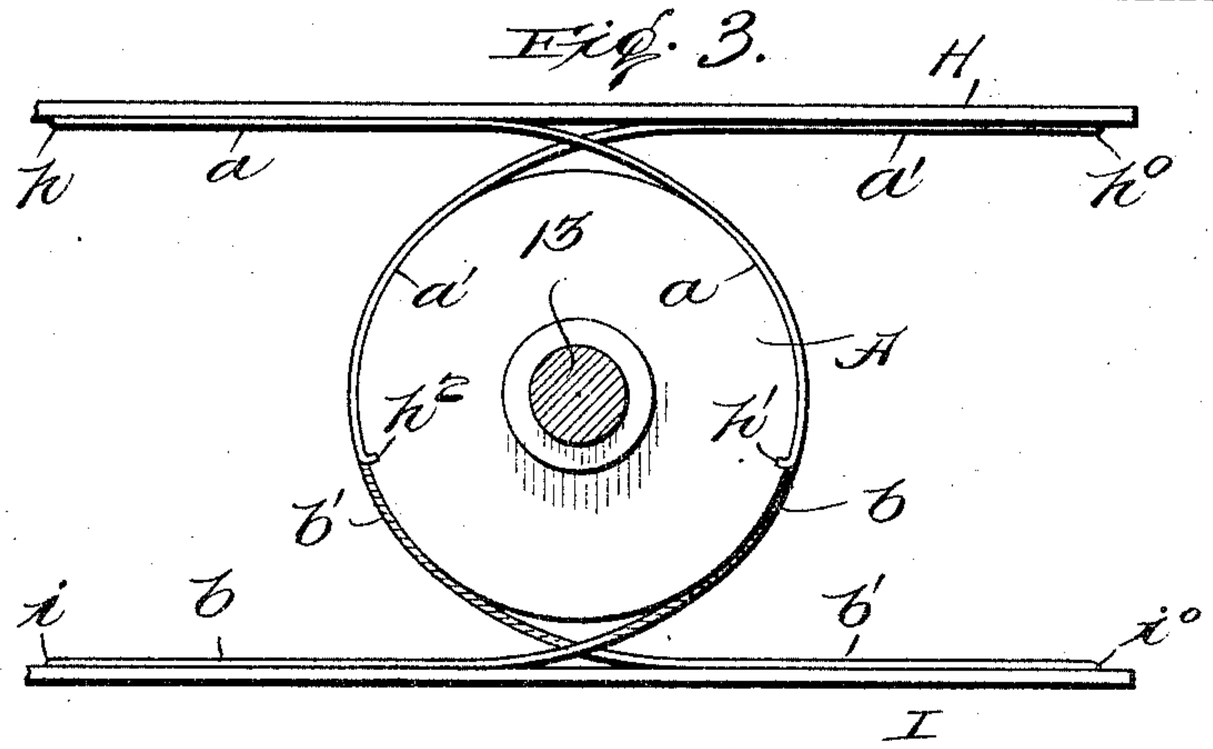
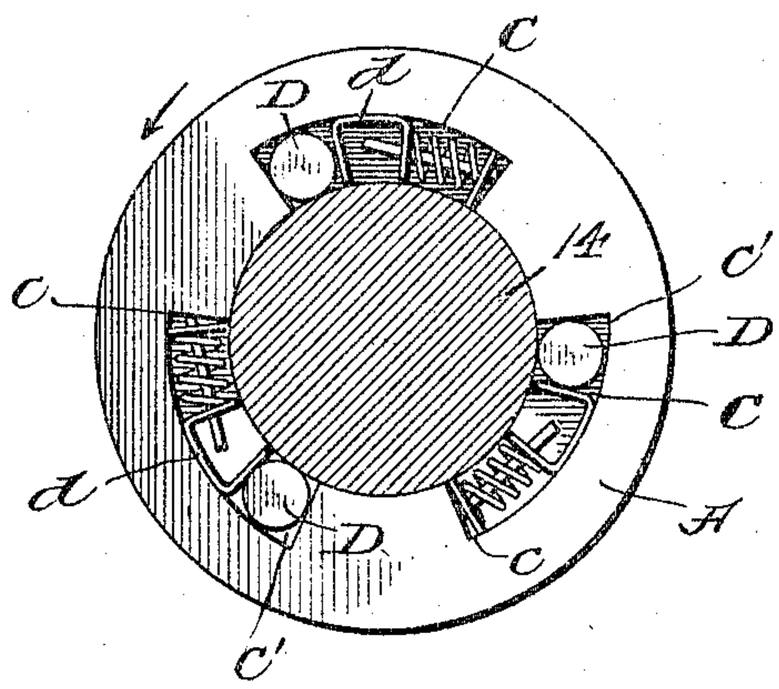


Fig. 4.



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No. 776,385. Patented November 29, 1904.

UNITED STATES PATENT OFFICE.

JAMES R. CROW, OF CLEVELAND, TENNESSEE.

DRIVING MECHANISM FOR ENGINES.

SPECIFICATION forming part of Letters Patent No. 776,385, dated November 29, 1904.

Application filed September 9, 1903. Serial No. 172,504. (No model.)

To all whom it may concern:

Be it known that I, JAMES R. CROW, a citizen of the United States, residing at Cleveland, in the county of Bradley and State of Tennessee, have invented certain new and useful Improvements in Driving Mechanism for 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 improvements in driving mechanism for engines, and has for its principal object to provide a certain novel means whereby the usual crank mechanism is dispensed with and a simple, light, and effective mechanism substituted therefor.

Another object and advantage of my invention resides in the fact that there are no dead-centers to overcome and that therefore the engine can be stopped or started at any point of the piston's strokes.

The novel features of my improvements will be apparent from the following description and will be more particularly specified in the claims, and to more clearly understand the same reference is had to the accompanying drawings, wherein the same parts are designated by the same characters in the several views, and in which—

Figure 1 is a side elevation of an engine with my improvements applied thereto; Fig. 2, a plan view of the rotary disks, the lower drive-plate, and flexible connections therebetween, the inner end of the drive-plate being broken away; Fig. 3, a detail view, in side elevation, of the rotary disks, drive-plates, and flexible connections; and Fig. 4, a side elevation of the inner face of one of the rotary disks, showing the clutch mechanism therein.

1 designates a suitable support for the engine; 2, the usual steam-cylinder; 3, the exhaust-pipe; 4, the valve-chest; 5, the inlet-pipe; 6, the piston-rod; 7, the valve-rod squared at 8 and provided at its end with the oval-shaped head 9, vertically slotted at 10.

8^a is a vertical support for the squared end 8 of the valve-rod, 11 the driving-wheel, and 12 a balancing-wheel mounted on the shaft 13, provided with the enlarged central shoulder 14 and journaled in suitable supports 15.

Rotatably supported on the shoulder 14 are a pair of reversible disks A and B. These disks, as illustrated in Fig. 4, are provided on their inner faces with a plurality of circumferentially-disposed recesses C, gradually increasing in depth from their shallowest end c to their deepest end c'. In the ends c' of the said recesses are located roller-clutches D, of a diameter slightly less than the depth at the ends c' of the recesses, and are normally held out of clutch with the rotary disks and the shoulder 14 by the spring-operated plunger d.

E represents a pair of spaced longitudinally-disposed plates supported by the uprights E′ on the base or support 1 and are slotted, as at E^0, forming a guideway for the cross-head. This cross-head comprises the flat plate F, slotted at one end, as at F^0, to receive the end of the piston-rod 6, to which it is secured, and at its other end provided with the vertically-disposed plates or arms G G′ on its upper and lower face, respectively, preferably formed integral therewith and extending therefrom a suitable distance, so as to bring their outer horizontal faces in planes a little above and below, respectively, the periphery of the disks A B.

Suitably secured to and projecting longitudinally beyond the arms G G′ are the elongated flat drive bars or plates H I.

Lying in parallel planes and secured to the inner and outer ends, respectively, of the lower drive-plate I, as at i i^0, Fig. 2, are flexible bands b b', preferably metallic, and these flexible bands extend edge to edge peripherally around a portion of the disk B and are secured thereto on opposite sides, as at i' i^2, in any suitable manner—for instance, as shown, by having their ends bent over and set in transverse grooves in the periphery of the disk. Similar flexible bands a a' are similarly secured, as at h h^0, to the upper drive-plate H and to the disks A, as at h' h^2, extending in

like manner peripherally around a portion of the disk A.

When my improved driving mechanism is used in connection with steam-engines, any suitable valve and valve-gear may be employed.

In the drawings, J represents a teeter-plate operated by the cross-head and operatively connected with the valve-rod 8.

Assuming the engine to be in the position shown in Fig. 1, steam is being admitted in front of the piston, and the cross-head and drive-plates are moving inwardly, then the flexible band *b* rotates the disk B, (winding up the band *b'*,) and the disk B, rotating forwardly, rolls the clutch-rollers D in the direction of the shallow end *c* of the recess C in the disk and firmly locks the disk B to the shoulder 14, thereby rotating the shaft 13 forwardly. At the same time the flexible band *a* is rotating the disk A in the reverse direction, (winding up the band *a'*,) the disk A being unlocked from the shoulder 14 as the clutch-rollers D of that disk are held in the enlarged end *c'* of the recess C by the rearward rotation of the disk and the action of the spring-pressed plunger *d*. On the return stroke it is obvious that the disks A and B are now rotating in a direction the reverse of the direction of rotation on the rearward stroke—that is to say, the band *a'* rotates the disk A forwardly in the direction indicated by the arrow, Fig. 4, (winding up the band *a*,) and the band *b'* rotates the disk B in the reverse direction (winding up the band *b*) until the end of the stroke is reached.

It will be observed that the disks are always locked in their forward and unlocked in their rearward direction of rotation and that the disks always revolve in reverse directions relatively to each other. By this construction it is apparent that the rotation of the shaft 13 is continuous and that there can be no dead-centers.

By the application of my improvements, therefore, there is produced a very easy-running engine of great efficiency and of simple construction, and although I have illustrated and described the improvements as applied to a steam-engine it is obvious that my invention might equally be adapted for use with gas or oil engines or other motive power, and I do not limit myself to the use of steam as the motive power. It is also obvious that many modifications might be made in the details of construction without departing from the spirit of my invention, and,

Having thus described my invention, what I claim is—

1. In driving mechanism for engines, the combination of the driving-shaft, a pair of oppositely-rotatable disks mounted on said shaft, clutch mechanism between said disks and shaft adapted to alternately lock said disks to the shaft, and means for simultaneously rotating said disks in opposite directions, consisting of a cross-head comprising a horizontal plate with vertically-disposed upper and lower arms, means for slidingly supporting said horizontal plate, drive-bars carried by said vertically-disposed arms and extending above and below said disks, suitable flexible connections coöperating between said drive-bars and disks, and means for operating said cross-head.

2. In driving mechanism for engines, the combination of the driving-shaft, a pair of oppositely-rotatable disks mounted side by side on said shaft, clutch mechanism between said disks and shaft adapted to alternately lock said disks to the shaft, and means for simultaneously rotating said disks in opposite directions, consisting of a cross-head comprising a horizontal plate with vertically-disposed upper and lower arms, means for slidingly supporting said horizontal plate, drive-bars carried by said vertically-disposed arms and extending above and below said disks, flexible bands secured at the inner and outer ends of said drive-bars, adapted to extend peripherally around a portion of their respective disks and be secured at opposite sides thereon, and means for operating said cross-head.

3. In driving mechanism for engines, the combination of the driving-shaft provided with a central enlarged shoulder, a pair of oppositely-rotatable disks mounted on said shaft provided on their inside faces with an annular cut-away portion adapted to loosely fit over said enlarged shoulder, and a plurality of annularly-disposed elongated recesses adjacent said cut-away portion, said recesses varying in depth from one end to the other, a roller-clutch located in the enlarged end of each of said recesses, whereby said disks are locked to said enlarged shoulder during their rotation in one direction and unlocked therefrom during rotation in the opposite direction, and means for simultaneously rotating said disks in opposite directions, comprising drive-bars and means for operating same, and flexible connections between said drive-bars and disks.

4. In driving mechanism for engines, the combination of the driving-shaft provided with a central enlarged shoulder, a pair of oppositely-rotatable disks mounted on said shaft provided on their inside faces with an annular cut-away portion adapted to loosely fit over said enlarged shoulder, and a plurality of annularly-disposed elongated recesses adjacent said cut-away portion, said recesses varying in depth from one end to the other, a roller-clutch located in the enlarged end of each of said recesses whereby said disks are

locked to said enlarged shoulder during their rotation in one direction and unlocked therefrom during rotation in the opposite direction, and means for simultaneously rotating said disks in opposite directions, comprising upper and lower drive-bars, and means for operating same, flexible bands connecting said upper drive-bars to one of said disks and extending peripherally around a portion thereof, and similar bands connecting the lower drive-bar to the other disk and extending peripherally around a portion thereof.

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

JAMES R. CROW.

Witnesses:
JACK J. KILE,
GEORGE M. LILLARD.