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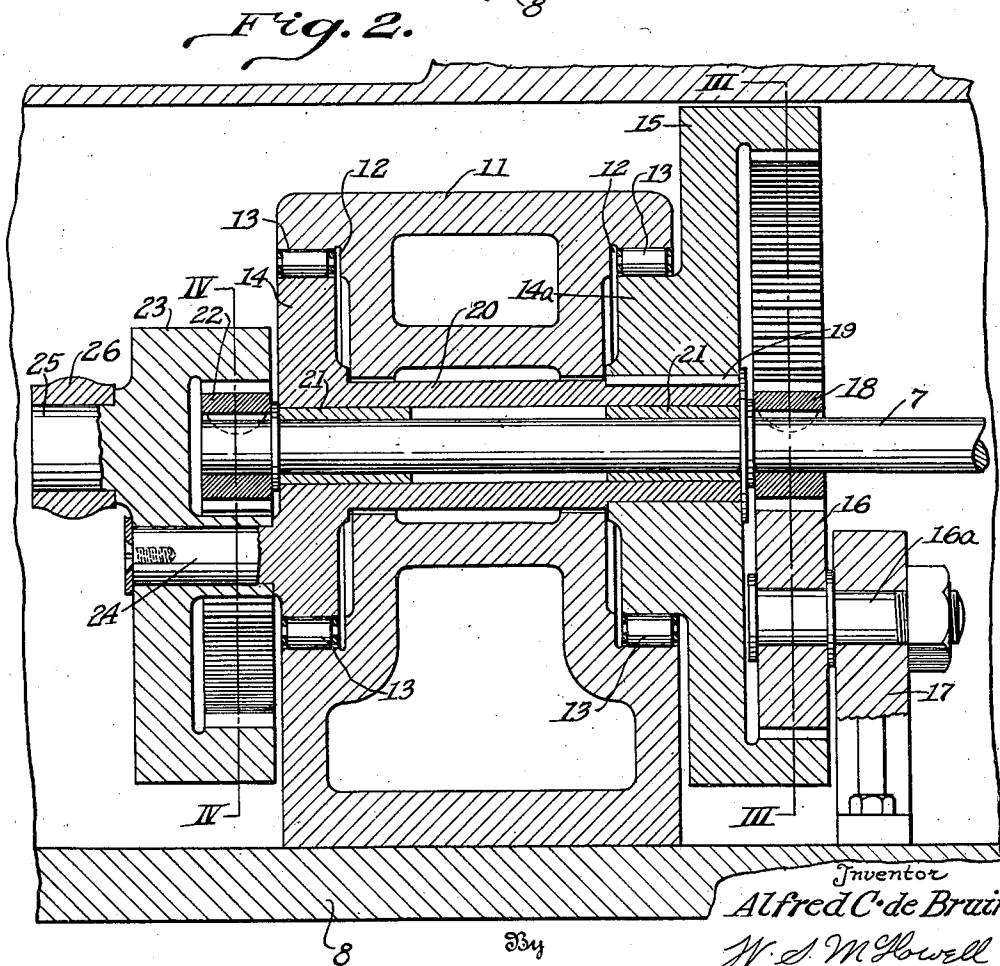
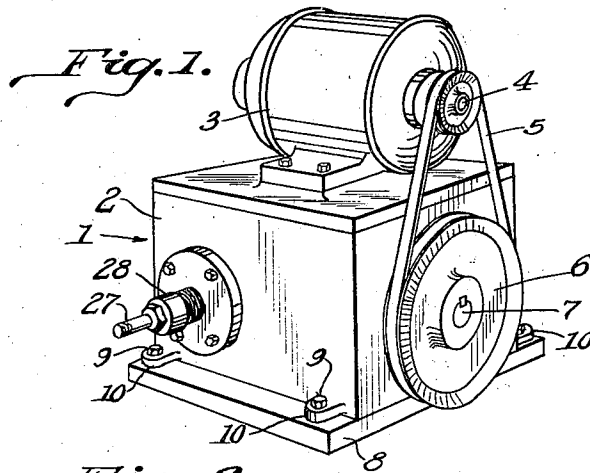
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MOTION TRANSFORMING MECHANISM

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Fig. 3.

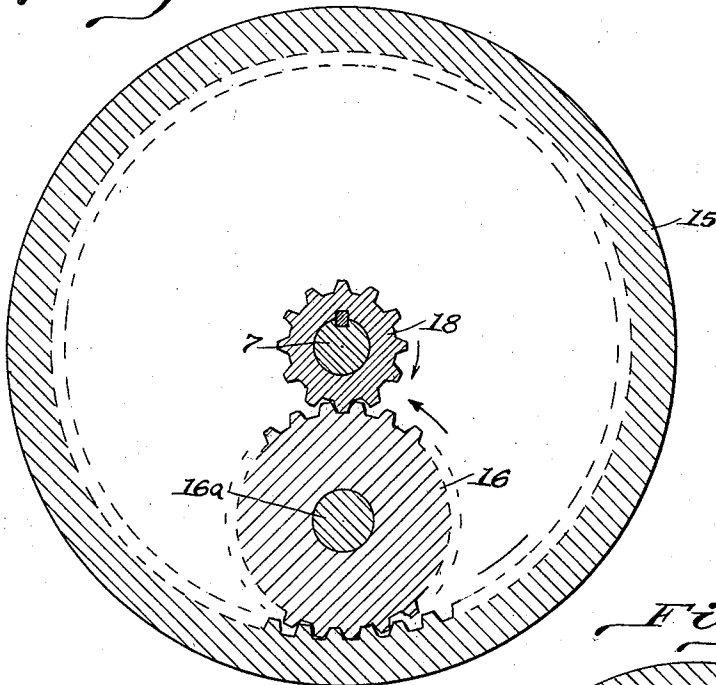


Fig. 4.

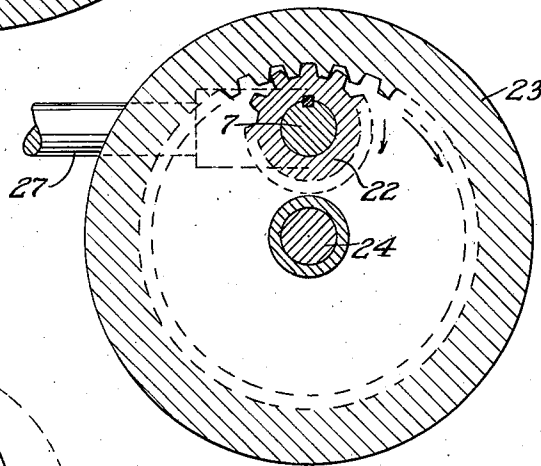
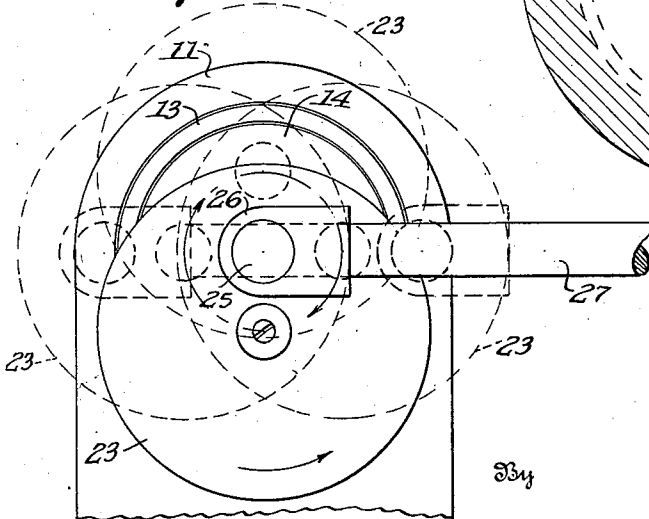


Fig. 5.



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MOTION TRANSFORMING MECHANISM

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7 Claims. (Cl. 74—52)

This invention relates generally to power transmitting mechanism. In its more specific aspects, the invention relates to power heads of the type employed in capacities where it is desired to transform rotative movement into reciprocating linear movement. This type of power head is especially adaptable for use in conjunction with deep well reciprocating plunger pumps and slide type pumps used in the mining industry for draining mines.

The primary object of the present invention resides in the provision of a power head employing a small number of working parts and one which will operate efficiently, with a minimum amount of attention.

A further object rests in the employment of roller type bearings so arranged as to support certain working parts of the power head in such manner as to eliminate excessive overhang which would introduce strain and undue wear.

A still further object is the provision of a power head employing a plurality of operating shafts positioned concentrically to produce a symmetrical design which materially decreases the overall height of the power head and makes it more compact than previous devices of this character.

Another object is the employment of a pair of gears on the power shaft which will more evenly distribute the applied load, lessening strain on any one particular part and lengthening the period of active service of the mechanism.

With these and other objects in view, the invention resides in the novel features of construction and arrangement of parts as set forth in the following description taken in connection with the accompanying drawings, wherein:

Fig. 1 is a perspective view of a power head constructed in accordance with the present invention and provided with a driving motor;

Fig. 2 is a vertical longitudinal sectional view taken through the power head;

Fig. 3 is a vertical transverse sectional view on the plane indicated by the line III—III of Fig. 2;

Fig. 4 is a similar view on the line IV—IV of Fig. 2;

Fig. 5 is a rear end elevation of the mechanism showing the same in different positions of movement in dotted lines.

Referring more particularly to the drawings, the complete power head is designated generally by the numeral 1 and includes a cast metallic housing 2 on the upper surface of which is mounted an electric motor 3. One end of the armature shaft of the motor is equipped with

a pulley 4 about which an endless driving belt 5 is passed. A second pulley 6 of considerably larger size is engaged and driven by the belt 5, the pulley 6 being keyed to the outer end of the main shaft 7 of the power head.

A base plate 8 is secured to the housing 2 by bolts 9 or the like passing through lugs 10 formed with the housing adjacent its lower edge. Secured to the base within the housing 2 is a frame member 11, the latter member being formed with a horizontal bore which extends completely through the frame. The ends of the bore are enlarged as at 12 for the reception of anti-friction roller bearings 13 which rotatably support a pair of disks 14 and 14a. The disk 14a is integrally formed with the rear face of a large internal gear 15 positioned at the forward end of the frame member 11.

Arranged in meshing relationship with the teeth of the gear 15 is an idler gear 16 rotatably supported on a stud member 16a. The stud 16a is rigidly secured in connection with a block 17 anchored to the base at the forward end thereof. A small driving pinion 18 meshes with the idler gear to transmit rotary movement from the main shaft 7 to the idler and the internal gear 15. The driving gear 18 is keyed to the shaft 7 in registration with the teeth of the gear 15 so that both the former gear and the idler gear 16 will be positioned within the confines of the gear 15 to conserve space.

It will be apparent, from an inspection of Fig. 3, that when the shaft 7 and the pinion 18 rotate, the idler 16 will cause the gear 15 to rotate in a direction opposed to that of the shaft 7.

The gear 15 is keyed as at 19 to a hollow shaft extension 20 formed with the disk 14 and the ends of the bore in the extension 20 contain sleeve bearings 21 to rotatably receive the shaft 7 in concentric relation thereto. At the inner or rear end of the shaft 7, a second driving pinion 22 is keyed to rotate in unison therewith. This pinion meshes with a second internal gear 23 which is smaller in size than the first internal gear and is carried by a circular plate which is rotatably supported on a crank pin 24 extending parallel to the shaft 7 and projecting from the face of the disk 14. When the pinion 22 is rotated by the shaft 7, the engagement of the former with the gear 23 causes rotation of the latter gear about the pin 24 in a similar direction. Since the pin 24 is carried by the disk 14 and the latter is rotating in a direction opposed to the shaft 7, a compound rotary movement is transmitted to the gear 23.

This movement is best illustrated in Fig. 5 of the drawings, wherein the gear member 23 is shown in different stages of movement by dotted lines. When the shaft 7 rotates, the pin supporting the gear 23 revolves about the center of the shaft 7 and, due to the meshing engagement of the pinion and the gear, rotation of the latter also takes place with the result that a stud-like boss 25 formed on the rear face of the gear 23 is caused to reciprocate in a plane passing through the center of the shaft. The boss 25 is located in alignment with the shaft 7 when the mechanism is in the position illustrated in the drawings. The distance from the center line of the boss 25 to the center line of the pin 24 is equal to the distance from the center line of the latter to the center line of the shaft 7.

A bearing member 26 is positioned upon the boss 25 and a connecting rod 27 secured thereto. The rod 27 extends outwardly through a packed gland 28 secured to the side of the housing 2. When the shaft 7 is revolved, reciprocary sliding movement will be transmitted to the rod 27. The outer end of the rod 27 is threaded so that a similar rod extending to the operating mechanism of a pump (not shown) may be coupled therewith.

While the boss 25 has been illustrated as moving in a horizontal plane, it will be noted that the plane of movement may be changed to any angle as desired by merely changing the position of the pin 24 with respect to the boss 25 when the latter is in alignment with the main shaft.

The ratio of the gear members 15, 16, 18, 22, and 23 is such that the latter gear will make one complete revolution for each revolution of the gear 15.

By the provision of the roller bearings and their location relative to the disk 14, undue overhang of the members 23 and 25 on the pin 24 is prevented and therefore excessive strain at this point is eliminated. Also, through the employment of the twin pinions 18 and 22, power is distributed equally to both ends of the mechanism which will result in extended and efficient service.

While there has been illustrated a single particular embodiment of the invention, it will be observed that many slight changes may be made in the construction and operation of the various parts of the machine without departing from the spirit and scope of the invention as set forth in the following claims.

What is claimed is:

1. A device for transforming rotary motion to rectilinear motion comprising a frame, a pair of concentrically arranged shafts rotatably carried by said frame, means for rotating said shafts in opposite directions, an eccentrically positioned pin carried by the outer of said shafts, an internal gear rotatably supported on said pin, an external pinion fixed to rotate with said inner shaft in meshing engagement with said internal gear, a boss projecting from the rear face of said internal gear, and a slide pivotally mounted on said boss.

2. A device for transforming rotary motion to rectilinear motion comprising a frame, a pair of concentrically arranged shafts rotatably carried by said frame, an internal gear fixed to one end of said outer shaft for rotation therewith, a pinion fixed for rotation with the inner shaft in registration with said internal gear, an idler gear mounted for rotation about a stationary center,

said idler being in meshing relationship with said pinion and said internal gear, a pin eccentrically carried by the opposite end of said outer shaft, a second internal gear rotatably carried by said pin, a second pinion keyed to said inner shaft in meshing relationship with said second internal gear, a stud-like boss projecting from the rear face of said second internal gear, and a slide pivotally connected with said boss.

3. A mechanism of the character described comprising a frame, a pair of concentrically arranged shafts rotatably supported in said frame, a pinion keyed to the inner of said shafts at opposite ends of said frame, an internal gear secured to one end of the outer of said shafts, an idler gear positioned in meshing engagement with one of said pinions and said internal gear, a pin eccentrically carried by the opposite end of said outer shaft, a circular plate rotatably carried by said pin, an internal gear formed with said plate, said internal gear being in meshing engagement with the other of said pinions, a stud projecting from the rear face of said circular plate, and a rod pivotally connected to said stud and extending at right angles thereto.

4. A mechanism of the character described comprising a frame, a pair of antifriction bearings positioned in opposite ends of said frame, a disk rotatably received in each of said bearings, means for connecting said disks for rotation together, a shaft supported in said disks in concentric relation thereto, pinions keyed to said shaft adjacent the outer faces of said disks, an internal gear formed with one of said disks, an idler gear arranged in meshing relationship with said internal gear and one of said pinions, a pin eccentrically positioned on the other of said disks, a circular plate rotatably mounted on said pin, a second internal gear formed with said plate and meshing with the other of said pinions, and a slide pivoted eccentrically of said plate.

5. A device for transforming rotary to rectilinear motion comprising a frame, a pair of concentrically arranged shafts rotatably carried by said frame, a pin eccentrically carried by the outer of said shafts, a circular plate rotatably carried by said pin, means carried by the inner of said shafts and cooperating with a portion of said plate to cause the rotation thereof, means for transmitting controlled rotary movement to said shafts whereby said plate will be rotated one complete revolution for each revolution of said outer shaft, and a slide pivoted eccentrically of said plate.

6. A device for transforming rotary to rectilinear motion comprising a support, a hollow shaft rotatably mounted in said support, a second shaft rotatably mounted in said hollow shaft in concentric relation thereto, cooperative gear mechanism carried by said shafts at one end of said support, said gearing operating to cause controlled rotation of said shafts in opposite directions, a crank pin eccentrically carried by the hollow shaft, a plate member rotatably mounted on said crank pin, means carried by said inner shaft and cooperating with said plate whereby rotation will be imparted to the latter, the direction of rotation of said plate being similar to that of said inner shaft, and a slide pivoted eccentrically of said plate, the degree of eccentricity of the connection of said rod with said plate being substantially equal to that of the crank pin on the hollow shaft.

7. A power head of the type described comprising a support, a main shaft, a tubular shaft ro-

tatably supporting said main shaft, disk means
carried by said tubular shaft adjacent the end
portions thereof, antifricition bearings provided
in said support for the rotatable reception of said
5 disk means and said tubular shaft, gear means
provided on one of said disks, a pinion positioned
intermediate the ends of said main shaft, motion
transmitting mechanism connecting said gear
means and said pinion, said motion transmitting
10 mechanism providing for the reverse rotation of
said tubular shaft with respect to said main

shaft, a second pinion positioned at one end of
said main shaft, a crank pin provided on the
other of said disks, a second gear rotatably
mounted on said crank pin, said second gear
being arranged in meshing relationship with
5 said second pinion whereby said second gear
will be rotated in a direction similar to said main
shaft, and a slide having a pivotal connection
with said second gear arranged eccentrically of
said second gear.

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