

July 27, 1937.

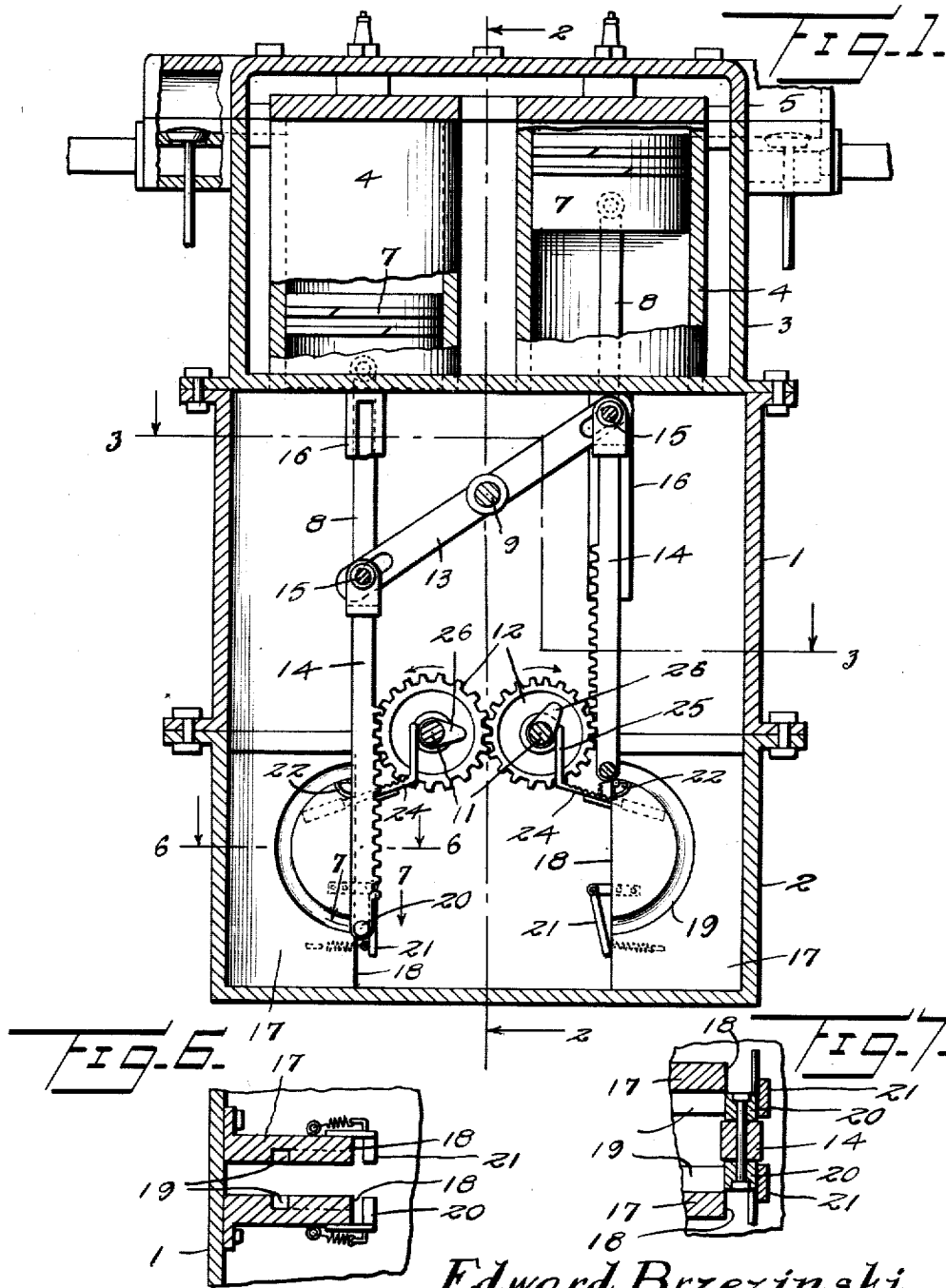
E. BRZEZINSKI

2,088,504

CRANKLESS MOTOR

Filed Oct. 20, 1936

3 Sheets-Sheet 1



Edward Brzezinski

INVENTOR

BY *Victor J. Evans & Co.*

ATTORNEY

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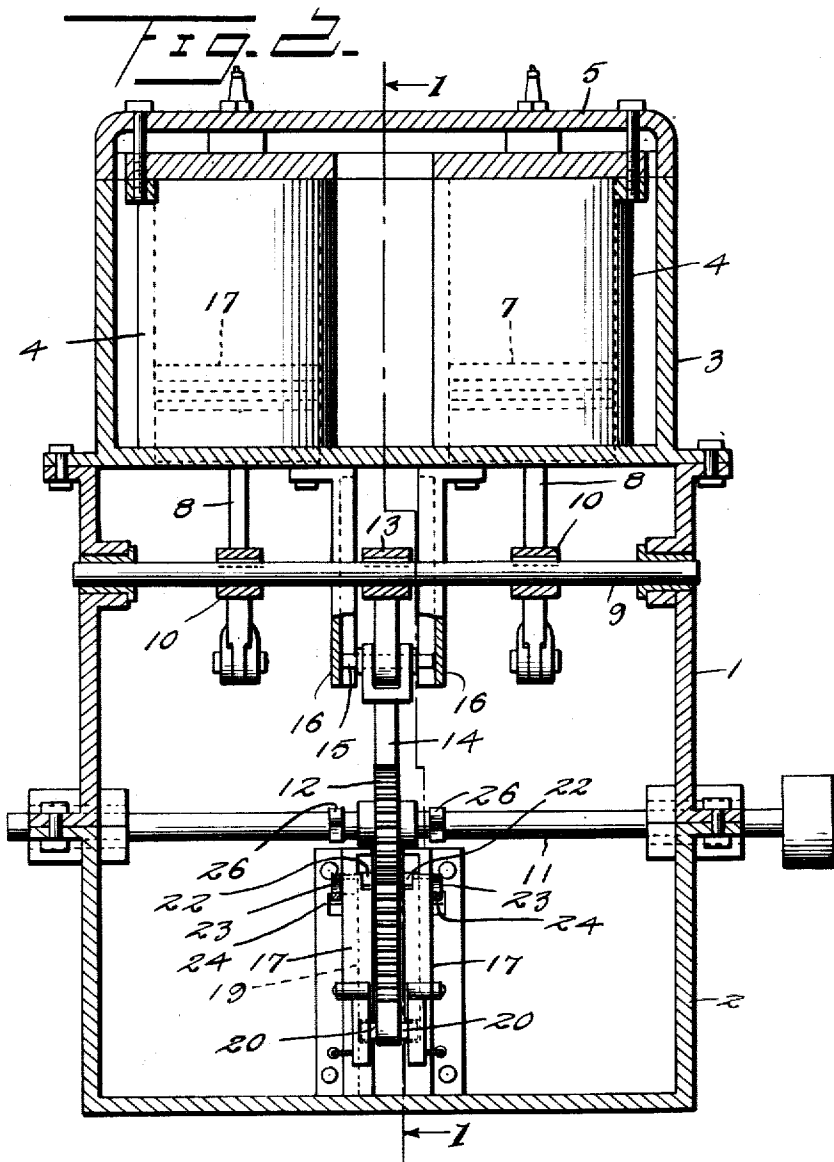
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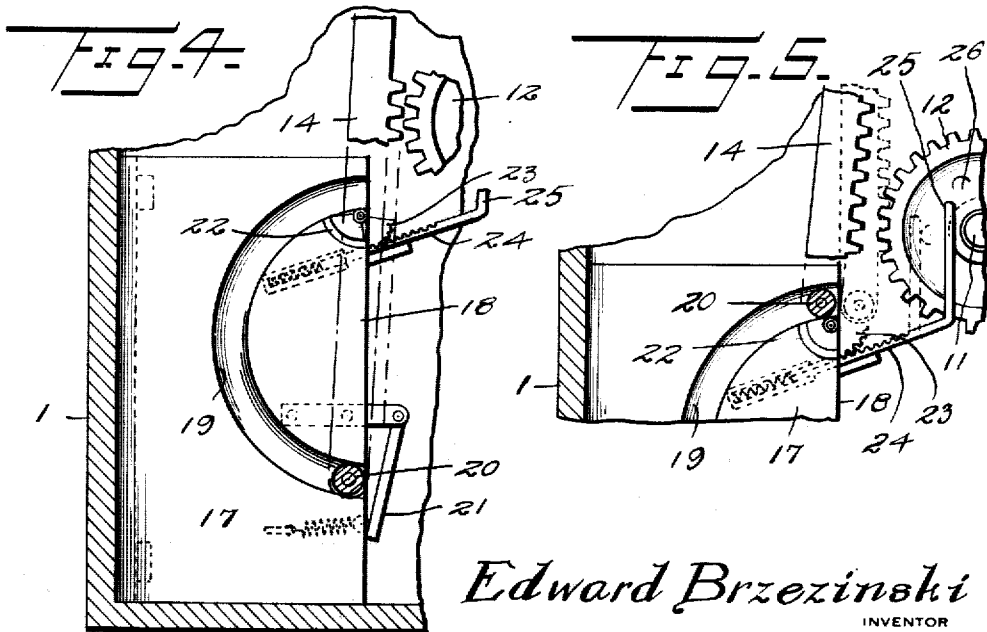
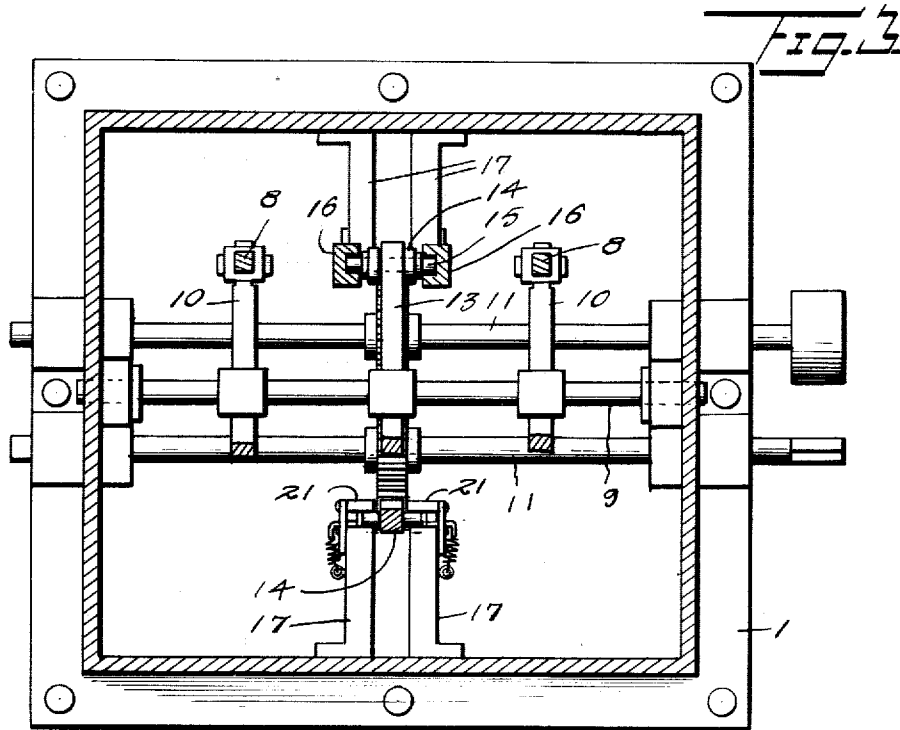
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Edward Brzezinski

INVENTOR

By Victor J. Evans & Co.

ATTORNEY

UNITED STATES PATENT OFFICE

2,088,504

CRANKLESS MOTOR

Edward Brzezinski, South Milwaukee, Wis.

Application October 20, 1936, Serial No. 106,637

4 Claims. (Cl. 74—30)

This invention relates to engines of the reciprocating piston type and has for the primary object the provision of means for converting reciprocal motion into a rotary motion with the elimination of the conventional crank shaft for such a purpose and the disadvantages of such device.

With these and other objects in view, this invention consists in certain novel features of construction, combination and arrangement of parts to be hereinafter more fully described and claimed.

For a complete understanding of my invention, reference is to be had to the following description and accompanying drawings, in which

Figure 1 is a sectional view taken on the line 1—1 of Figure 2 illustrating a crankless engine constructed in accordance with my invention.

Figure 2 is a sectional view taken on the line 2—2 of Figure 1.

Figure 3 is a sectional view taken on the line 3—3 of Figure 1.

Figure 4 is a fragmentary sectional view illustrating the means of guiding the movement of a rack bar.

Figure 5 is a fragmentary sectional view illustrating in dotted lines the disengagement of the rack bar from a drive gear of a power delivery shaft.

Figure 6 is a detail sectional view taken on the line 6—6 of Figure 1.

Figure 7 is a detail sectional view taken on the line 7—7 of Figure 1.

Referring in detail to the drawings, the numeral 1 indicates an engine base having a removable pan 2 and supported by said base is a cylinder block 3 having cylinders 4 grouped vertically and in opposed pairs. The block 3 has detachably secured thereto a head 5 of a conventional construction for closing the cylinders. Reciprocally mounted in the cylinders are pistons 7 provided with connecting rods 8 extending into the base. A rocker shaft 9 is journaled on the base and has secured thereto a pair of connecting rod arms 10 to which are pivotally connected the connecting rods 8. The arms 10 bring about reciprocation of the pistons of each pair of cylinders in the same direction to each other, as shown in Figure 2. The pistons of one pair of cylinders reciprocate oppositely to the pistons of the other pair of cylinders.

Power delivery shafts 11 are rotatably supported by the base 1 in a plane below the shaft 9 and either of which may be employed as a power takeoff shaft. The shafts 11 are connected by

gears 12 and bring about rotation of the shafts 11 in opposite directions. A rocker arm 13 is secured to the shaft 9 and its ends are connected to rack bars 14 by a pin and slot connection, as indicated at 15. The pins of the pin and slot connections 15 are received by vertically arranged guides 16 located in the base 1 for the purpose of guiding the upper ends of the rack bars in a vertical path but which will permit said rack bars to swing towards and from the gears 12. The teeth of the rack bars match the teeth of the gears. The reciprocation of the pistons 7 brings about reciprocation of the rack bars 14 and during the power strokes of the rack bars they move in a vertical path and being in mesh with the gears 12, impart rotary motion to the power delivery shafts 11. During the upward or non-working strokes of the rack bars 14 they are caused to swing away from the gears 12 and become disengaged therefrom so that said shafts 11 will be non-influenced by the upward movements of the rack bars, permitting said shafts 11 to rotate in one direction.

Guides 17 are located in the pan 2 of the base 1 and include vertically disposed tracks 18 and arcuately formed tracks 19. The tracks 19 connect with the tracks 18 at the ends thereof. The tracks 18 and 19 are formed by providing in the guides 17 grooves of proper shape. Rollers 20 are journaled to the lower ends of the rack bars and engage with the tracks 18 and 19. During the downward movement of the rack bars the rollers travel in the tracks 18 maintaining the rack bars in mesh with the gears 12 and during the upstroke of the rack bars the rollers 20 travel in the tracks 19 to disengage said rack bars from the gears 12.

Tension guides 21 are carried by the guides 17 where the lower ends of the tracks 18 and 19 meet. The tension guides 21 are engaged by the rollers 20 as the rack bars reach the limit of their downward movement so as to shift said rollers from the vertical tracks to the arcuately curved tracks and thereby bring about a quick disengagement of the rack bars from the gears 12.

Pivotally mounted shifting elements 22 are capable of moving into the arcuately curved tracks 19 where they join with the upper ends of the vertical tracks 18 and have secured thereto segmental gears 23 which are in mesh with auxiliary rack bars 24. The rack bars 24 are provided with cam engaging elements 25 which ride on cams 26 secured to the shafts 11. The rack bars 24 are spring pressed to maintain the portions 25 thereof in contact with the cams. The

portions 25 of the rack bars when engaged by the high faces of the cams swing the shifting elements 22 into the tracks 19 and in engagement with the rollers to shift the rollers from the tracks 19 into the tracks 18 to bring about meshing of the rack bars 14 with the gears 12. The cams 26 are so arranged that the shifting of the rollers 20 of the rack bars from the tracks 19 into the tracks 18 takes place when the rack bars 14 reach the limit of their uppermost position.

From the foregoing description taken in connection with the accompanying drawings it will be seen that a very efficient, practical and economical means has been provided for converting the reciprocating motion into a rotary motion and is especially adaptable to engines of the reciprocating piston type whereby the motion of the pistons will impart rotary motion to a power takeoff shaft with minimum vibration and wear on the various parts.

Having described the invention, I claim:

1. An engine comprising a base, cylinders carried by said base, pistons reciprocally mounted in the cylinders, a shaft journaled in the base, means connecting the pistons to said shaft to rotate the latter in opposite directions, power takeoff shafts journaled in the base, a rocker arm secured to the first-named shaft, gears connecting the second-named shafts, rack bars pivotally and slidably connected to the rocker arm to move into and out of mesh with said gears for imparting continuous rotation to the second-named shafts, means for guiding the movement of the connected ends of the rack bars in a given path, and automatic means for guiding the opposite ends of the rack bars both in a vertical and arcuately curved path to engage and disengage the rack bars with the gears.

2. An engine comprising a base, cylinders carried by said base, pistons reciprocally mounted in the cylinders, a shaft journaled in the base, means connecting the pistons to said shaft to rotate the latter in opposite directions, power takeoff shafts journaled in the base, a rocker arm secured to the first-named shaft, gears connecting the second-named shafts, rack bars pivotally and slidably connected to the rocker arm to move into and out of mesh with said gears for imparting continuous rotation to the second-named shafts, means for guiding the movement of the connected ends of the rack bars in a given path, guides carried by the base, straight and arcuately curved and connected tracks formed on said guides, rollers secured to the non-connected ends of the rack

bars and engageable with said tracks to engage and disengage the rack bars with the gears.

3. An engine comprising a base, cylinders carried by said base, pistons reciprocally mounted in the cylinders, a shaft journaled in the base, means connecting the pistons to said shaft to rotate the latter in opposite directions, power takeoff shafts journaled in the base, a rocker arm secured to the first-named shaft, gears connecting the second-named shafts, rack bars pivotally and slidably connected to the rocker arm to move into and out of mesh with said gears for imparting continuous rotation to the second-named shafts, means for guiding the movement of the connected ends of the rack bars in a given path, guides carried by the base, straight and arcuately curved and connected tracks formed on said guides, rollers secured to the non-connected ends of the rack bars and engageable with said tracks to engage and disengage the rack bars with the gears, tension guide means for shifting the rollers from the vertical tracks to the arcuately curved tracks, and cam actuated means for shifting the rollers from the arcuately curved tracks to the vertical tracks.

4. An engine comprising a base, cylinders carried by said base, pistons reciprocally mounted in the cylinders, a shaft journaled in the base, means connecting the pistons to said shaft to rotate the latter in opposite directions, power takeoff shafts journaled in the base, a rocker arm secured to the first-named shaft, gears connecting the second-named shafts, rack bars pivotally and slidably connected to the rocker arm to move into and out of mesh with said gears for imparting continuous rotation to the second-named shafts, means for guiding the movement of the connected ends of the rack bars in a given path, guides carried by the base, straight and arcuately curved and connected tracks formed on said guides, rollers secured to the non-connected ends of the rack bars and engageable with said tracks to engage and disengage the rack bars with the gears, tension guide means for shifting the rollers from the vertical tracks to the arcuately curved tracks, cam actuated means for shifting the rollers from the arcuately curved tracks to the vertical tracks, cams secured to the second-named shafts, spring pressed auxiliary rack bars engaging said cams and slidably supported by the guides, and shifting elements operated by the auxiliary rack bars to engage with the rollers for shifting them from the arcuately curved tracks to the straight tracks.

EDWARD BRZEZINSKI.