G. ENGELBREKT.

COMPRESSOR MECHANISM.

APPLICATION FILED OCT. 4, 1917.

1,319,213.

Patented Oct. 21, 1919.

2 SHEETS—SHEET 1.

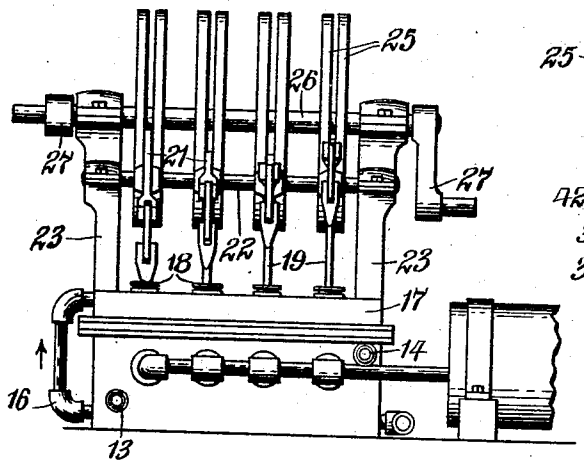


Fig. 1.

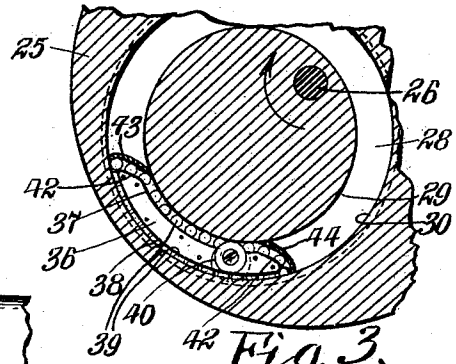


Fig. 3.

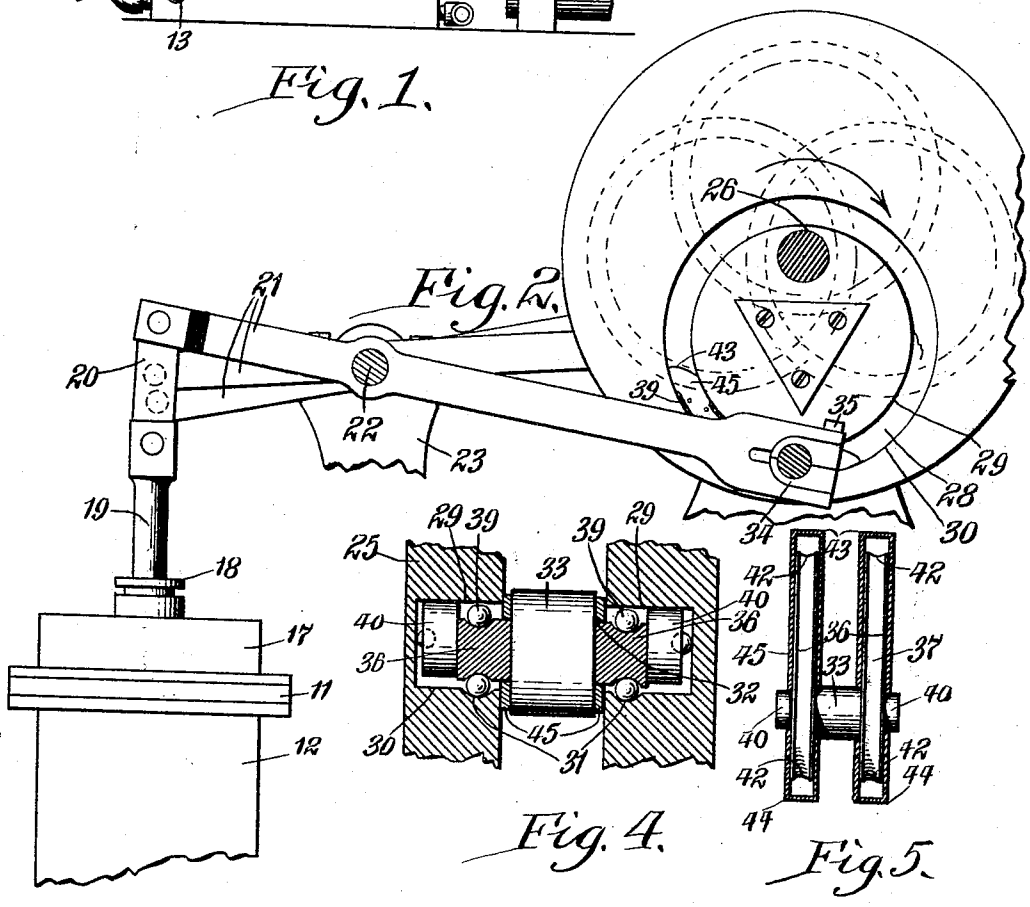


Fig. 2.

Fig. 4.

Fig. 5.

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2 SHEETS—SHEET 2.

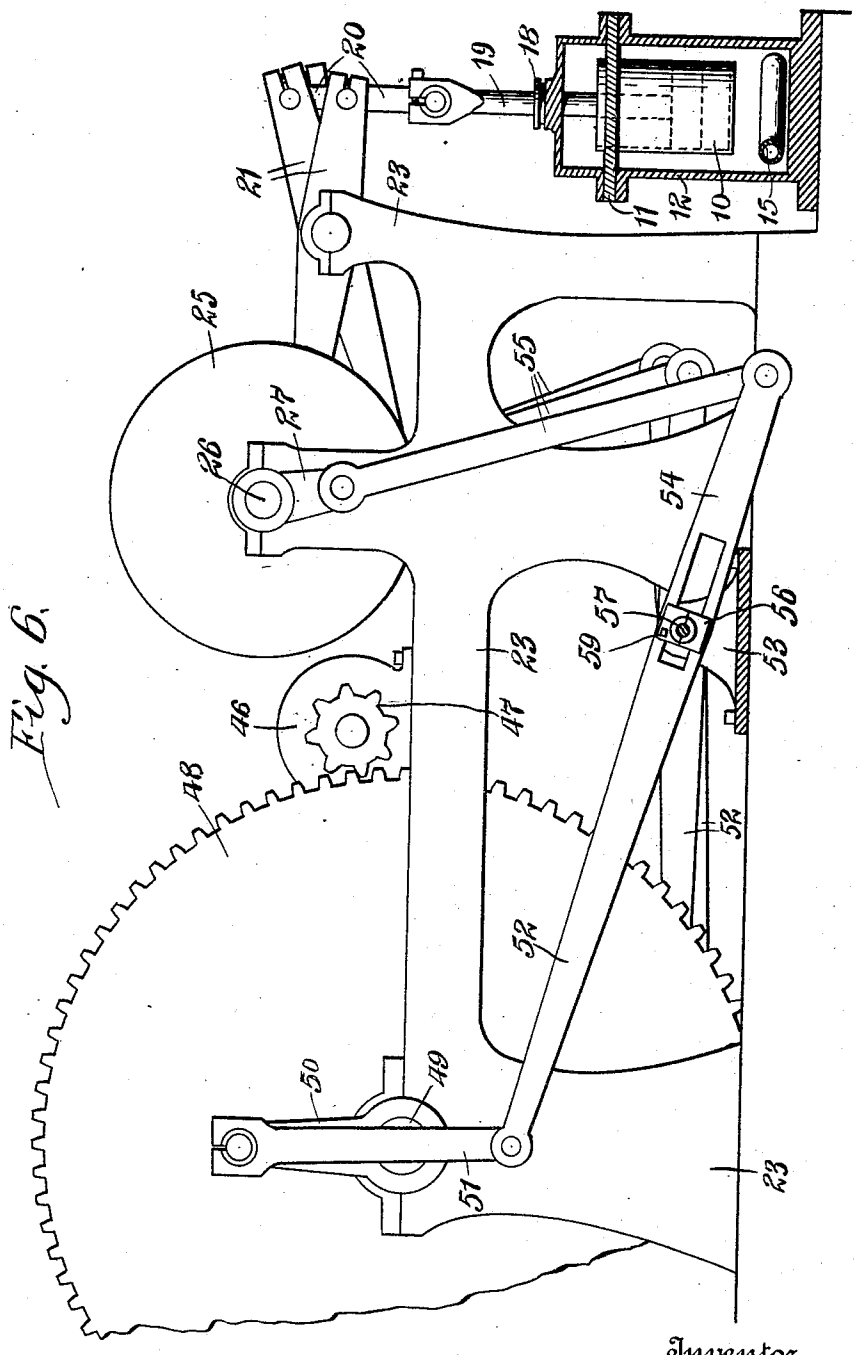


Fig. 6.

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UNITED STATES PATENT OFFICE.

GUSTAF ENGELBREKT, OF SUPERIOR, WISCONSIN.

COMPRESSOR MECHANISM.

1,319,213. Specification of Letters Patent. Patented Oct. 21, 1919.

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To all whom it may concern:

Be it known that I, GUSTAF ENGELBREKT, a citizen of the United States, residing at Superior, in the county of Douglas and State of Wisconsin, have invented certain new and useful Improvements in Compressor Mechanism, of which the following is a specification.

The invention has for an object to give a compressor mechanism of an especially efficient character, and aims particularly to give a means for converting rotary motion to reciprocatory motion for the operation of pump pistons, in a manner to minimize the power required for the operation of the pump. It is a further aim to give an improvement in structural features of such appliances tending to improve the functioning of the appliance, and cheapening the manufacture and assemblage of the parts.

Additional objects, advantages and features of invention will appear from the combination, arrangement and construction of parts, hereinafter described and shown in the drawings, wherein:

Figure 1 is a front elevational view of a compressor device constructed in accordance with my invention.

Fig. 2 is a fragmentary elevation showing the cam levers and piston rods, as viewed from the left in Fig. 1, with the bearing support and other interposed details broken away.

Fig. 3 is a detail of the anti-friction element engaged in the cam disks.

Fig. 4 is a cross section of the anti-friction device.

Fig. 5 is a detail of the wrist carriage as viewed from above.

Fig. 6 is an elevation of the power train for the compressor.

There is illustrated a compressor device including a four cylinder pump equipment, the cylinders and pistons of which may be of any familiar construction in which the intake is through the upper end of the cylinder, the cylinders 10 in the present instance being shown cast *en bloc*, and having an integral flange portion 11, resting upon the upper flanged part of a box 12, having a depth greater than that of the cylinders, having water-cooling connections 13 and 14, and provided with an air-cooling coil 15 in its lower part from which connections are extended as at 16, to an air box 17, inclosing the upper ends of the cylinders 10, and having suitable guides and packing boxes 18 in which the piston rods 19 of the pump may reciprocate. These rods are connected by links 20 to respective levers 21 supported upon a shaft 22 carried by a frame 23 of suitable form. The levers 21 are of the first order, the shaft 22 being the fulcrum, and their ends opposite the links are disposed between respective pairs of cam disks 25, splined upon a main shaft 26 having cranks 27 at the ends disposed on 90 degree radii of the shaft. The disks of each pair are provided with opposed circular cam grooves or races 28, circumscribing the shaft 26, being located very close thereto at one side, and close to the periphery of the disks at the opposite side. The inner wall 29 of each of these grooves is of plain cylindrical form, and the outer wall 30 concentric therewith is also cylindrical in form at its inner part, but provided with a ball race 31 near the adjacent face of the disk in the outer part of the groove. The inner end of the groove is planiform or otherwise formed as found convenient and desirable. Positioned in the grooves and engaged revolubly in the adjacent end of each respective lever 21, there is a cam wiper carriage 32, including a central enlarged wrist portion 33 engaged in a split bushing 34 adapted to be presented in the bifurcated end of the lever 21 and secured by means of a clamping bolt 35 engaged across the end of the furcations. Formed integrally with the wrist 33, at respective sides there are parallel bearing blocks 36, having a form conforming to the curve of the grooves 28 and having grooved inner and outer faces 37 and 38 respectively, opposed to the faces 29 and 30 of the cam grooves 28. The grooves in the faces of the blocks 36 serve as race-ways for balls 39 disposed

around the blocks 36. The dimensions of the blocks 36 between the faces 37 and 38 is such that when the balls at the outer side are in bearing upon the race 31 and grooved portion 38, the balls at the opposite side of the blocks are clear of the side 29 of the groove 28. Upon their outer side and closely adjacent the axis of the wrist 33, rollers 40 are mounted, having constant bearing upon the inner face 29 of the grooves 28, but with their axis so disposed and their diameter so proportioned that they do not engage the outer face 30 of the groove. In this way, a ball bearing is provided between the cam block and race 31 at the outer side, while a roller support is provided at the inner side. It is presumed that the compression stroke of the pump will be downward, so that during the period of application of greatest force upon the levers 21, the block 36 will be supported over a large part of their length, and utilization made of the roller 40 and the smaller strength of its support for the return stroke of the pistons of the pump. The wrist 33 is located closer to one end of the blocks 36 than the other, and the longer ends of the blocks, beyond the wrist are disposed so as to extend upwardly in the grooves 28 in the direction of rotation of the cam disks. In this way, the balls will be carried upwardly at the outer side of the blocks 36, and permitted to return by action of gravity upon the opposite side of the blocks, the upper ends of the blocks being sloped as at 42 in such a manner as to facilitate their return movement, and small guide plates 43 and 44 are disposed outwardly of respective ends of the blocks, to guide the balls and retain them in proper operative relation to the blocks at their ends. These plates may be fastened upon the inner vertical faces of the blocks 36, and may have portions extended throughout the length of the blocks or as far as desirable, as indicated at 45, in Fig. 4.

While various constructions may be employed for the operation of the shaft 26, it is thought preferable to use an electric motor 46, mounted upon the frame 23, with intermediate connections now to be described. The motor shaft is provided with a small driving pinion 47, meshed with a large gear 48 splined upon a shaft 49 carried upon a suitable extension of the frame 23, this shaft having a large crank 50 thereon connected by the link 51 to the long arm of a main lever 52 carried upon a small pedestal 53 on the lower part of the frame. This lever has a short arm 54 connected by a link 55 to one of the crank arms 27 of the shaft 26. The shaft 49 is provided with a similar crank at its opposite end from the crank 50, this detail not being illustrated, and similar connections are made with the crank 27 at the opposite end of the shaft 26.

The lever 52 is slotted intermediately of its length, and provided with a sliding bearing box 56, engaged through which there is a shaft 57 carried upon the pedestal 53. The boxing 56 is made in two parts, so that when the shaft is driven out it may be separated for removal from the slot 58 in the lever 52. Suitable means is provided for securing the boxing 56 against longitudinal movement in the lever, in the present instance a set screw 59 being indicated.

By the multiplication of the pairs of disks 25 upon the shaft 26 and locating the cam centers on equally spaced radii as shown, an even application of power is secured, so that the operation of the four pumps does not produce intermittent periods of resistance to the power tending to operate the device. The power required for operating the device, as will be readily understood by prior practice in this direction will be much less than where a crank shaft is used to operate the pumps, by reason of the fact that the point of application of power by the cams during the period of maximum compression of air in the cylinders is of very short radius, requiring only a small amount of power to drive the mechanism, while on the outer part of the movement of the piston the wrists 33 being near the outer part of the disks, very rapid movement is attained and likewise only a small amount of power is required.

By means of the adjustable block in the lever 52, the ratio of power applied may be changed without modifying the gear connections, by shifting the boxing in the lever and changing the length of the crank arms at one end or the other and the link connections, as required. For this purpose any usual telescopic construction might be employed in the links and crank, in accordance with the usual practices in telescoping machine elements.

What is claimed is:

1. An appliance of the character described comprising a shaft, pairs of similar registered cams thereon, the centers of the pairs being located on equally spaced radii of the shaft, each cam having parallel inner and outer faces, one face having a ball race, a wiper device including blocks adapted to fit in respective opposed cams and having raceways therearound, balls therearound, a wrist carried therebetween adjacent one end, the opposite ends of the blocks being extended upwardly in the cams and sloped for return of the balls from one side of a block to the other.

2. In a device of the character described, a cam comprising opposed parallel circular

elements each having parallel faces one having a ball race at its outer part, blocks curved to engage slidably in the respective elements, balls closely spaced around each block, means to retain the balls the blocks being of a dimension for bearing upon the balls at one side only, a roller on each block at the inner part of the cam and located to bear upon the cam face opposite the raced face, a connecting element between the blocks at one end, the longer projecting ends being disposed upwardly in the cams and sloped downwardly from one side to the other and a member to be operated, connected to said connecting element.

In testimony whereof I have affixed my signature.

GUSTAF ENGELBREKT.

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