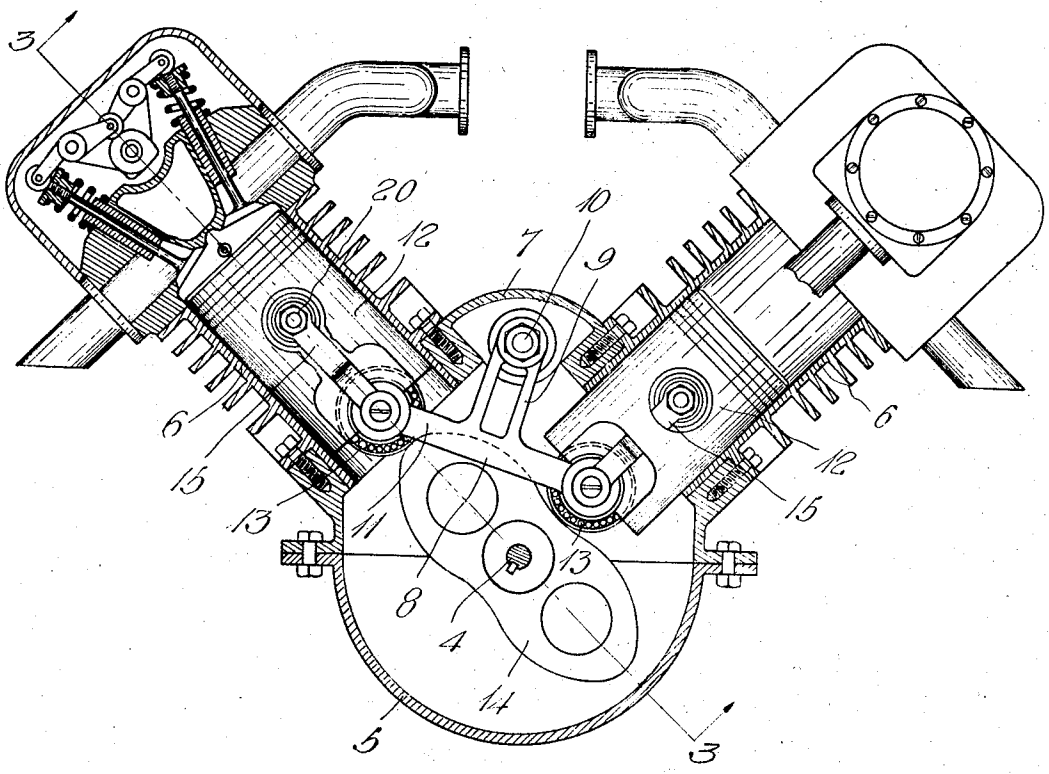
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RECIPROCATORY PISTON MACHINE

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Fig. 1



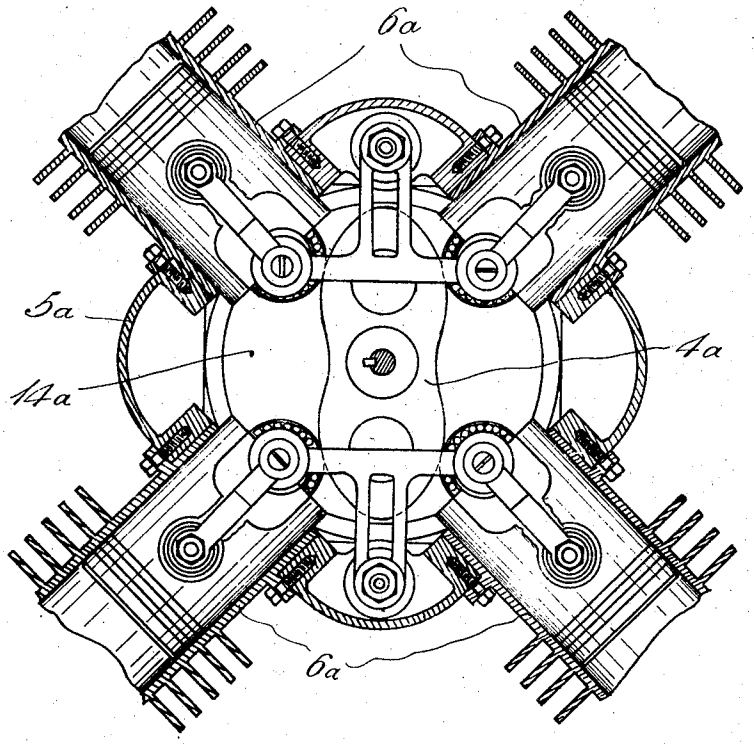
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Fig. 2



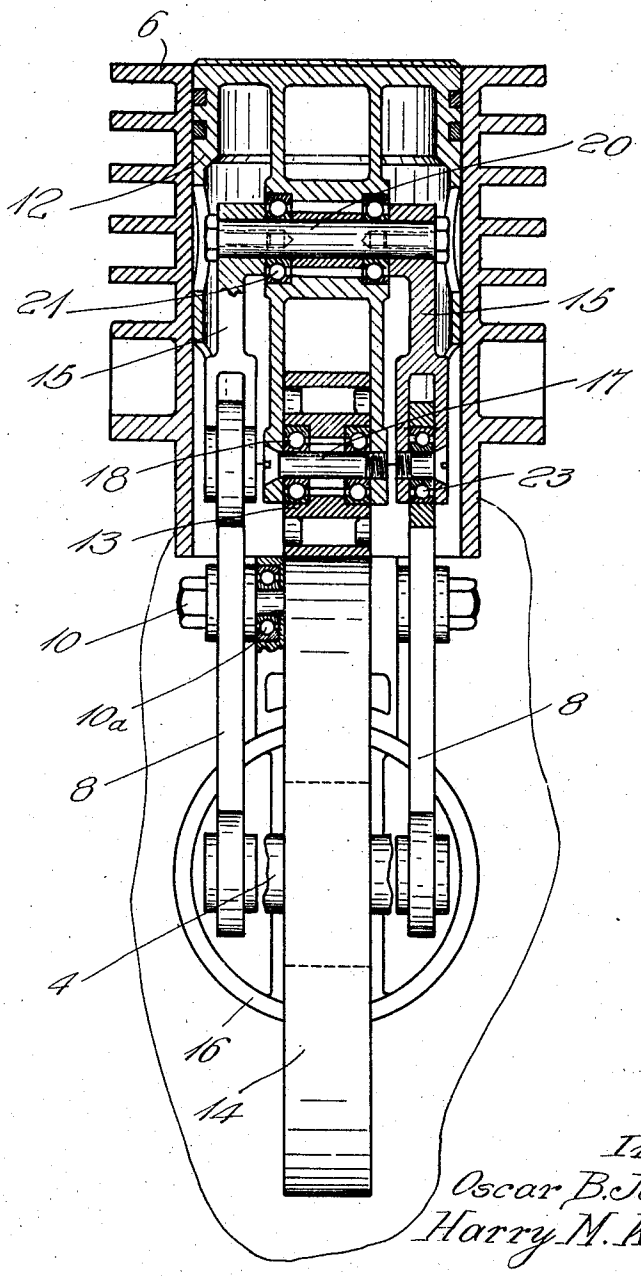
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Fig. 3



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UNITED STATES PATENT OFFICE

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RECIPROCATORY-PISTON MACHINE

Application filed December 6, 1928. Serial No. 324,147.

The invention relates to machines embodying reciprocatory pistons, such as engines, compressors and pumps, and the present disclosure is devoted to an internal combustion engine.

The machine is of the general type in which the main shaft is provided with a cam or cams instead of being in the form of a crank shaft, and in which the pistons operate rollers which engage the peripheral portions of said cam or cams, and it is the primary object of the invention to provide a new and improved construction in which the cam-engaging rollers are mounted directly upon the inner ends of the pistons and in which unique provision is made for holding the rollers in contact with the co-acting cam edge.

In carrying out the above end, the machine embodies a pair of cylinders and pistons or a number of such pairs, and for each pair, a rocker is provided which is linked to the pistons to hold the rollers of the latter against the cam, and it is a further aim to provide a novel construction of piston provided with unique means for supporting the rollers and the outer link pivots.

Yet another object is to provide a construction which is rather simple and inexpensive, yet will be efficient, reliable and in every way desirable.

With the foregoing in view, the invention resides in the novel subject matter hereinafter described and claimed, description being accomplished by reference to the accompanying drawings.

Fig. 1 is a transverse sectional view through a V-type of engine embodying our invention.

Fig. 2 is a view similar to Fig. 1 but showing the invention in connection with a radial cylinder engine in which the cylinders may either be stationary or may rotate about the shaft.

Fig. 3 is a vertical sectional view on line 3—3 of Fig. 1.

The form of construction detailed in Figs. 1 and 3 will first be described. In these views, 4 denotes a main shaft extending through a casing 5 which may be of any desired length according to the number of pairs of cylinders 6 which it is to carry. Only one pair of these cylinders is shown and the description will be correspondingly abridged. The cylinders 6 diverge from the shaft 4 and are suitably secured to the casing 5, and between the inner ends of said cylinders, said casing is provided with an internal fulcrum support 7 of rigid nature. Two T-shaped rockers 8 have their shanks 9 disposed at opposite sides of the fulcrum support 7, and a fulcrum 10 passes through said shanks and support. The T-head 11 of each rocker 8 has its ends disposed at the inner ends of the cylinders 6 and said head ends are swingable into said cylinder ends during oscillation of the rockers.

Pistons 12 are disposed in the cylinders 6 and are provided at their inner ends with rollers 13 engaging the peripheral edge of a cam 14 which is secured to the shaft 4, and by means of links 15, the pistons 12 are connected with the ends of the rockers 8, said links and rockers being independent of the rollers 13 and serving to hold the latter tightly against the edge of the cam 14 during all strokes of the piston. The cam 14 possesses two high points 180° apart and two low points 180° apart and incident to one rotation of the shaft, effects a complete cycle (four strokes) of each piston.

In the preferred form of construction herein illustrated, each piston 12 is provided across its interior with two spaced parallel longitudinally extending webs 16 integral with the head and the skirt of said piston. Between the inner ends of these webs, the roller 13 is mounted by means of a bolt or the like 17 and appropriate ball or roller bearings 18. The portions of the webs 16 between the roller 13 and the piston head, are integrally connected by a wrist pin bearing body 19 through which a wrist pin 20 passes for pivoting the outer ends of the links 15 to the piston, these links being disposed at the outer sides of said webs 16. Preferably, the wrist pin bearing embodies roller bearings 21. Similar bearings 23 (Fig. 3) are preferably employed at the pivotal connection 22 between the links 15 and the rockers 8, and

other bearings 10^a of the same nature are preferably associated with the fulcrum 10.

In the construction shown in Fig. 2, two pairs of cylinders 6^a are shown and with each pair, pistons, links, rockers and rollers such as those above described, are associated, all of the rollers contacting with a single cam 14^a on the shaft 4^a. If the engine be of the rotating cylinder type, this shaft will of course be fixed but otherwise the cylinders and the casing 5^a to which they are secured, will be non-rotatably mounted and the shaft will be free to rotate.

It will be seen from the foregoing that rather simple and inexpensive provision has been made for use in the production of a reciprocatory piston machine, regardless of the exact type of the latter, dispensing with cranks on the main shaft and replacing these cranks and the connecting rods with cams and rollers, the latter being directly carried by the pistons. Then too, particular attention is invited to the novel arrangement of rockers and links which has been provided for insuring contact of the rollers with the cams at all times without any parts having any tendency to exert excessive lateral or other stress upon the pistons and cylinders. Furthermore, the unique piston construction and the association of the rollers and links therewith, are features of merit.

While excellent results are obtainable from the details disclosed, and they are therefore preferably followed, it is to be understood that within the scope of the invention as claimed, variations may be made.

We claim:—

1. In a reciprocatory piston machine, a shaft, two cylinders diverging from said shaft, a rigid fulcrum support between the inner ends of said cylinders, a rocker fulcrumed between its ends to said fulcrum support, said ends of said rocker being swingable into said cylinders respectively, pistons in said cylinders, pivoted links connecting said pistons with the adjacent ends of said rocker, rollers mounted on the inner ends of said pistons independently of the pivots of said links, and a cam on said shaft with which said rollers are held in contact by said links and rocker.

2. In a reciprocatory piston machine, a shaft, two cylinders diverging from said shaft, a rigid fulcrum support between the inner ends of said cylinders, a T-shaped rocker whose shank is fulcrumed to said fulcrum, the ends of the T-head of said rocker being swingable into said cylinders respectively, pistons in said cylinders, pivoted links connecting said pistons with said ends of said T-head of the rocker, rollers mounted on the inner ends of said pistons independently of the pivots of said links, and a cam on said shaft with which said rollers are held in contact by said links and rocker.

3. In a reciprocatory piston machine, a shaft, two cylinders diverging from said shaft, a rigid fulcrum support between the inner ends of said cylinders, pistons in said cylinders each provided across its interior with two spaced parallel longitudinally extending webs, rollers disposed one in each piston and mounted between the ends of said webs toward said shaft, wrist pin bearings carried by said webs between said rollers and the piston heads, links disposed two in each piston and positioned longitudinally of said pistons at the outer sides of said webs, wrist pins engaged with said wrist pin bearings and pivoting the outer ends of said links to the pistons, a cam on the aforesaid shaft contacting with said rollers, and twin rockers fulcrumed to the aforesaid fulcrum support and pivoted at their ends to the inner ends of said links.

4. In a reciprocatory piston machine, a piston provided across its interior with two spaced parallel longitudinally extending webs, a cam-engaging roller mounted between the inner ends of said webs, bearing means carried by said webs between said roller and the piston head, links disposed longitudinally of the piston at the outer side of said webs, means pivoting the outer ends of said links to said bearing means, and means for pivoting the inner ends of said links to another member.

In testimony whereof we have hereunto affixed our signatures.

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HARRY M. KORTRIGHT.