Jan. 30, 1934. R. WITKIEWICZ ET AL 1,944,960

CRANKLESS MOTOR COMPRESSOR

Filed Oct. 11, 1930

FIG. 1.

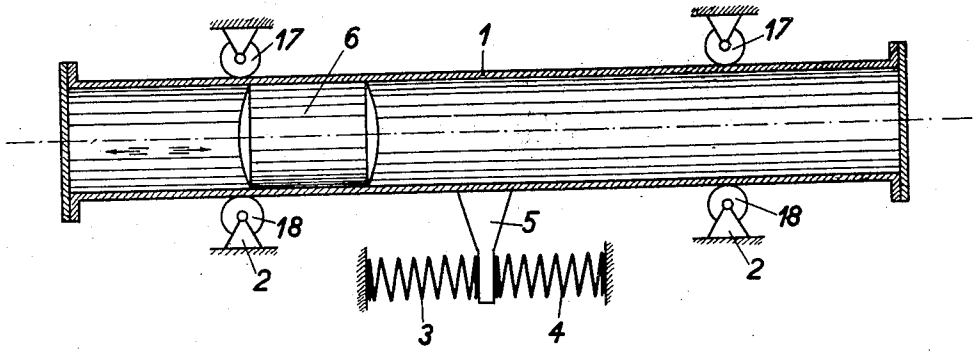



FIG. 2.

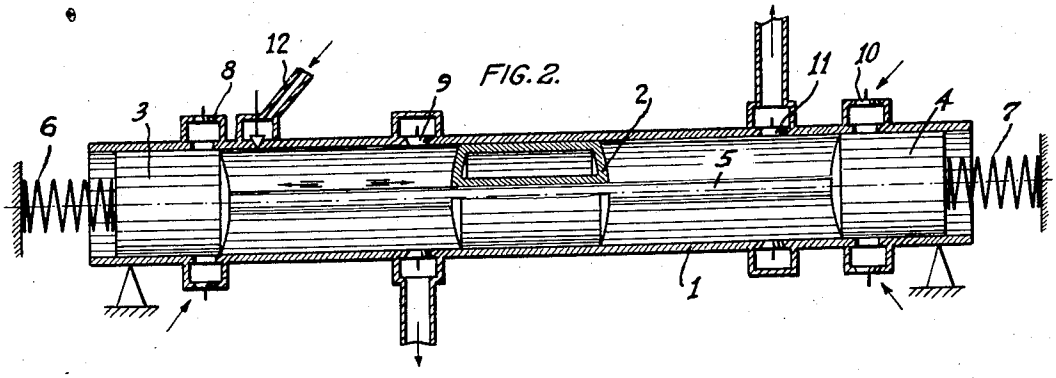
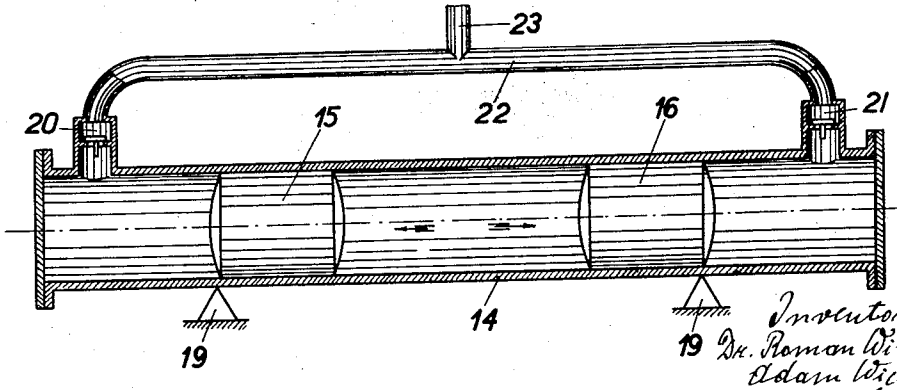



FIG. 3.




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# UNITED STATES PATENT OFFICE

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## CRANKLESS MOTOR-COMPRESSOR

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Application October 11, 1930, Serial No. 488,040,
and in Poland December 24, 1929

2 Claims. (Cl. 230—56)

We have filed an application in Poland December 24, 1929.

The present invention relates to crankless motor-compressors which are machines for compressing gases for instance, air, in which the compressor piston is directly operated by an internal combustion engine. One of the difficulties encountered in the construction of this type of motor-compressor is due to the fact that the inertia of the reciprocating mass of the piston acts upon the foundation of the motor-compressor. In ordinary motor-compressors having a crank mechanism, the balancing of the reciprocating masses does not present any difficulties as in such machines practically the whole crank power is balanced within the frame of the machine and there is practically no action upon the foundation. In crankless motor-compressors which practically consist only of a closed cylinder and a piston reciprocating in the cylinder the entire inertia of the piston acts directly upon the foundation, and consequently even with comparatively small motor-compressors very heavy foundations are required. The action of the inertia of a reciprocating piston mass upon the foundation may be balanced by the action of the inertia of another mass which moves simultaneously with the piston but in the opposite direction. Such a balancing mass may be positively connected with the piston, but it may also not be directly connected to the piston. In the latter case, the balancing mass moves independently of the piston, the movements of the piston and the balancing mass being both caused by the pressure in the working cylinder. The object of the invention is to provide a method of avoiding the action of the inertia of the reciprocating piston upon the foundation of a crankless motor-compressor, by balancing said action by the counter action of another reciprocating mass which is not directly or positively connected with the piston and is acted upon in the opposite direction by the pressure acting simultaneously upon the piston.

The accompanying drawing shows diagrammatically by way of example, structures suitable for carrying out the new method.

Fig. 1 is a diagrammatic section through an arrangement in which the motor compressor has a cylinder mounted to reciprocate in opposition to a piston.

Fig. 2 shows in diagrammatic section a motor-compressor in which the cylinder is stationary and the inertia of the working piston is balanced by the inertia of two opposing pistons.

Fig. 3 is a diagrammatic section through an arrangement in which the cylinder is stationary and two opposing working pistons are used.

Referring in the first place to Fig. 2 of the drawing, the cylinder, which is denoted by the reference numeral 1, is provided on the internal combustion engine side (i. e. the left hand side) of the motor compressor with an air admission valve 8, a fuel admission valve 12 and an exhaust valve 9. On the compressor side (i. e. the right hand side) of the motor compressor an air admission valve 10 and an air delivery valve 11 are provided. The reference numeral 2 denotes the working piston.

In the two ends of the cylinder 1 are mounted balancing pistons 3 and 4 acted upon respectively by springs 6 and 7 and connected together by a rod 5. These pistons 3 and 4 which act at the same time as movable covers of the cylinder 1 will perform under the action of the pressures existing in the cylinder 1 reciprocating movements in a direction opposite to that of the piston 2, thus producing the balancing effect required. A centering device is provided which comprises two springs 6 and 7 acting upon the ends of the pistons 3 and 4 in such manner as to tend to return these latter to the middle position.

In the arrangement shown in Fig. 1 the cylinder 1, provided with a piston 6, is mounted on a foundation 2 so as to be axially reciprocable, the cylinder being guided and supported by means of rollers 17 and 18. Means are provided for returning the cylinder 1 to its middle position, said means comprising, for example, as shown, a projection 5 integral with the cylinder and springs 3 and 4 acting upon the projection 5. It will be seen that under the influence of the pressures existing in the cylinder 1, the latter and the piston 6 will perform reciprocating movements in opposite directions.

In the construction shown in Fig. 3 a stationary cylinder 14 mounted on a foundation 19 and containing two entirely independent pistons 15 and 16 is provided and the movement of these latter is automatically synchronized by means of a synchronizing device consisting of two automatic delivery valves 20 and 21, the discharge chambers of which are connected with one another by means of a conduit 22 provided with an outlet 23.

We claim—

1. A crankless motor compressor comprising in combination: a stationary cylinder; a working piston reciprocable in said cylinder; two auxiliary

cover-pistons connected together and arranged on opposite sides of the working piston; means for controlling the admission and delivery of the motive fluid, and means for controlling the admission and delivery of the fluid pumped, substantially as described.

2. A crankless motor compressor comprising in combination: a stationary cylinder; a working piston reciprocable in said cylinder; two auxiliary cover-pistons connected together and arranged on opposite sides of the working piston; means for returning said auxiliary cover-pistons to a centre position; means for controlling the admission and delivery of the motive fluid, and means for controlling the admission and delivery of the fluid pumped, substantially as described.

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