March 31, 1931. R. P. PESCARA 1,798,697

AIR COMPRESSOR

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Fig. 1

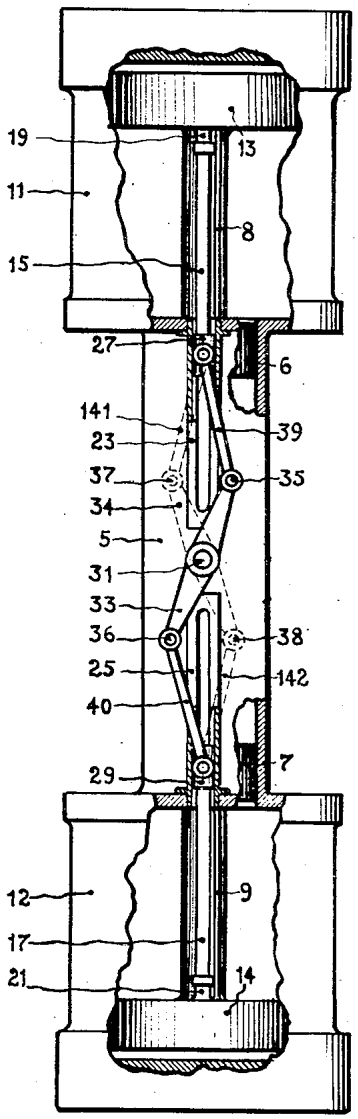

Fig. 2

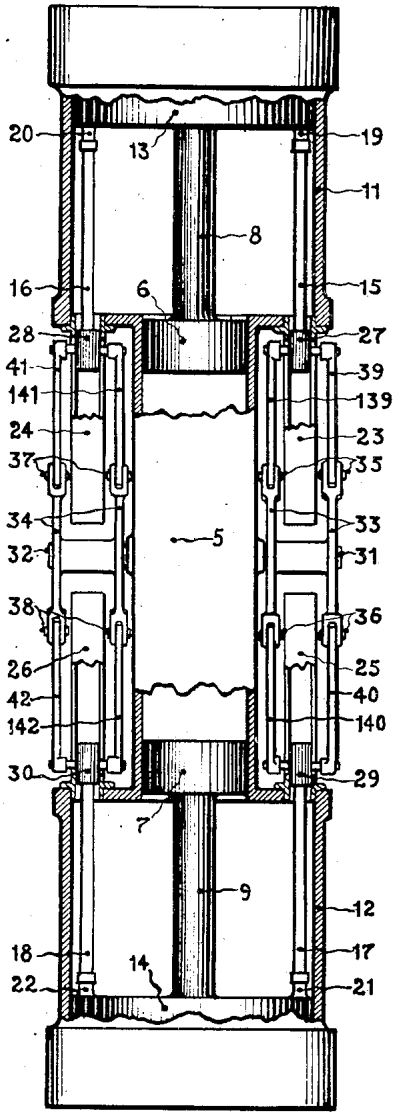

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Fig. 3

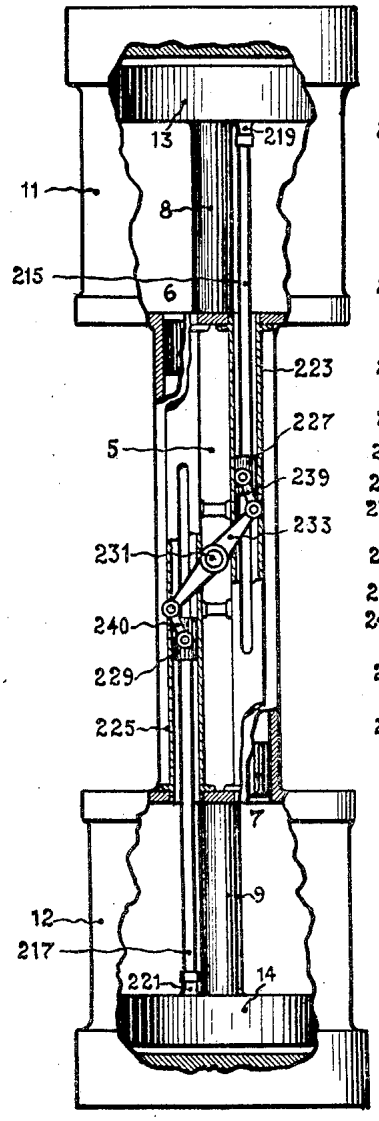
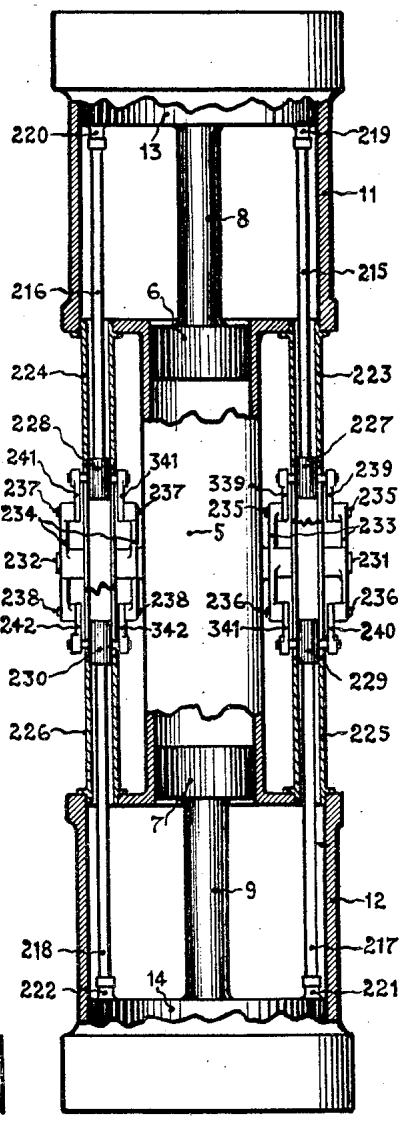


Fig. 4



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UNITED STATES PATENT OFFICE

RAUL PATERAS PESCARA, OF PARIS, FRANCE

AIR COMPRESSOR

Application filed March 24, 1927, Serial No. 177,938, and in France April 1, 1926.

My invention relates to improvements in air compressors of the type in which two direct driving pistons operate in opposite directions.

The object of the invention is to provide a means for establishing the proper kinematic between the pistons and thus assure the synchronizing of said pistons, but at the same time not interfering with the proper transfer of energy from said pistons.

My present invention is best suited for use with my two cycle direct acting gas engine compressor claimed and disclosed in my copending application, Serial No. 181,553, filed April 6, 1927, but may be obviously utilized in any compressor where a synchronization of the driving pistons is desired.

Briefly outlined my invention consists in furnishing the two driving pistons of the compressor with a plurality of rods parallel to their axes, adapting the ends of said rods to slide in suitable guide bearings, providing a rocker arm midway between the extremities of said rods and connecting the ends of said rocker arm to the ends of said rods by links, thus assuring that when a piston moves in a given direction the other piston will move in the opposite direction and vice-versa.

Other objects of my invention will be obvious to those skilled in the art in the following specification taken in connection with the accompanying drawing in which:

Fig. 1 is a vertical elevation of my apparatus, parts being shown in section, for purposes of clarity;

Fig. 2 is a view similar to Fig. 1 in side elevation;

Fig. 3 is a view similar to Fig. 1 of a modification conforming to the present invention; and

Fig. 4 is a view similar to Fig. 2 of the modification in Fig. 3.

Referring to the drawing and particularly Figs. 1 and 2, my air compressor comprises a cylinder 5 furnished with two driving pistons 6 and 7. The extremities of cylinder 5 are provided with and open into two laterally extending cylinders 11 and 12 respectively, which are provided with compressing pistons 13 and 14. Pistons 6 and 13 and 7 and 14 are connected together by means of piston rods 8 and 9 respectively. Each pair of pistons may be made integral with its corresponding rod if desired. The mechanism for synchronizing the movement of each pair of pistons with respect to the other pair will now be described.

Rigidly secured to piston 13 are two rods 15 and 16. Piston 14 is furnished with two similar rods 17 and 18. Rods 15 and 17 are disposed in the same longitudinal axis and parallel to the axis of their respective pistons. Corresponding rods 16 and 18 are disposed in like manner. The rods 15 and 16 are attached to piston 13 in any convenient manner at diametrically opposite points 19 and 20 equidistance from the center of said piston on the idle or nonactive side of said piston. The rods 17 and 18 are attached in like manner to piston 14 at points 21 and 22.

Said rods are provided with enlarged cylindrical portions 27, 28, 29 and 30 respectively at their extremities and are adapted to slide in slotted guide bearings 23, 24, 25 and 26 in a direction parallel to the movement of the pistons, bearings 23 and 25, and 24 and 26, being disposed respectively in the same straight line.

Cylinder 5 carries two trunnions 31 and 32 fixed at diametrically opposite points midway between the extremities of said cylinder. A pair of double armed levers 33 and 34 are pivoted on said trunnions. The arms of said levers are of equal length and are bifurcated at their extremities as shown at 35, 36, 37 and 38. A pair of links 39, 139 connect the members 27 and 35 and a second pair of links 40, 140 connect the members 29 and 36. Similarly a pair of links 41, 141 and 42, 142 connect the members 28, 37 and 30, 38 respectively. Thus the pistons 13 and 14 are coupled together by means of the mechanism just described and their rods 15, 16, 17 and 18.

A simple inspection of the mechanism disclosed in connection with Figs. 1 and 2 will allow anyone skilled in the art to which the device appertains to readily understand the function and purpose of the same. It will be sufficient to state that the mechanism thus far described assures a synchronous relation be-

tween the reciprocating movements of pistons 13, 6 and 14, 7. The particular arrangement and disposition of parts has the advantage that only a very small portion of the energy imparted to driving pistons 6, 7 is required to bring about the kinematic transformation between said pistons.

In the embodiment illustrated in Figs. 3 and 4, the guide-bearings 223, 224, 225 and 226 are disposed side by side and parallel to each other rather than in the same straight line as in the former embodiment. The rods 215 and 216, and 217 and 218 are likewise disposed side by side and parallel to each other instead of lying on the same longitudinal axis as previously described in connection with Figs. 1 and 2. The elements here illustrated are precisely the same as before described and need not be explained in detail. The reference numerals, with the exception of those relating to the compressor elements, per se, have all been raised 200 so as not to confuse them with those of Figs. 1 and 2. In each case, however, similar numerals refer to like parts. It will be sufficient to state that the embodiment set forth in Figs. 3 and 4 has the advantage that the extremities 227, 228, 229 and 230 of rods 215, 216, 217 and 218 can be extended beyond trunnions 231 and 232 respectively which permits, in certain cases, the reduction of the longitudinal dimensions of the air compressor proper.

Many variations in my apparatus may be made by those skilled in the art without departing from the spirit of my invention, since

What I claim is—

1. An air compressor comprising a main driving cylinder, driving pistons mounted in said cylinder, a compressing cylinder mounted at each extremity of said main cylinder, compressing pistons mounted in said compressing cylinders, a plurality of rods carried by each of said compressing pistons disposed on the non-effective side thereof, guides at the extremities of said rods, guide bearings for said guides and oscillatable synchronizing means interconnecting said guides.

2. An air compressor comprising a main driving cylinder, driving pistons mounted in said cylinder, a compressing cylinder mounted at each extremity of said main cylinder, compressing pistons mounted in said compressing cylinders, a plurality of rods carried by each of said compressing pistons disposed on the non-effective side thereof, guides at the extremities of said rods, guide bearings for said guides, a plurality of double armed levers pivotally mounted on said main cylinder and oscillatable means connecting the extremities of said double armed levers to said rods whereby movement of either piston in either direction is transmitted to the other piston in the opposite direction.

3. An air compressor comprising a main driving cylinder, driving pistons mounted in said cylinder, a compressing cylinder mounted at each extremity of said main cylinder, compressing pistons mounted in said compressing cylinders, a plurality of rods carried by each of said compressing pistons disposed on the non-effective side thereof, guides at the extremities of said rods, guide bearings for said guides, a plurality of trunnions fixed to the mid-point of said main cylinder, a plurality of double-armed levers pivoted on said trunnions at their mid points and links connecting the extremities of said double armed levers to said rods whereby movement of either piston in either direction is transmitted to the other piston in the opposite direction.

4. An air compressor comprising a main driving cylinder, driving pistons mounted in said cylinder, a compressing cylinder mounted at each extremity of said main cylinder, compressing pistons mounted in said compressing cylinders, a plurality of rods on one of said compressing pistons disposed on the non-effective side thereof, a second plurality of rods on the other of said compressing pistons disposed on the non-effective side thereof, slotted guide bearings for said rods and oscillatable kinematic transforming mechanism interconnecting said first and second mentioned rods.

5. An air compressor comprising a main driving cylinder, driving pistons mounted in said cylinder, a compressing cylinder mounted at each extremity of said main cylinder, compressing pistons mounted in said compressing cylinders, a plurality of rods on one of said compressing pistons disposed on the non-effective side thereof, a second plurality of rods on the other of said compressing pistons disposed on the non-effective side thereof, slotted guide bearings for said rods, trunnions mounted between certain of said guide bearings, a plurality of double armed levers pivoted on said trunnions and oscillatable means for operatively connecting said rods to the arms of said levers.

6. In an air compressor having a main driving cylinder and differential pistons associated therewith adapted to be operated in opposite directions, a plurality of rods supported by and extending from a non-effective side of each of said pistons, and oscillatable kinematic transfer means having relatively low power consuming properties interconnecting said rods for synchronizing said pistons.

RAUL PATERAS PESCARA.