

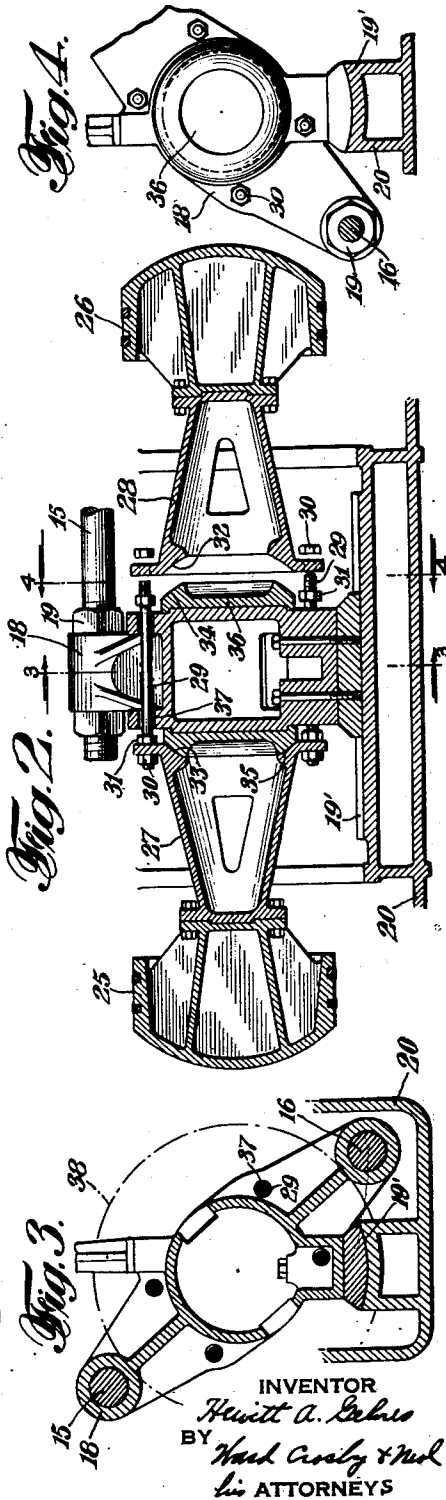
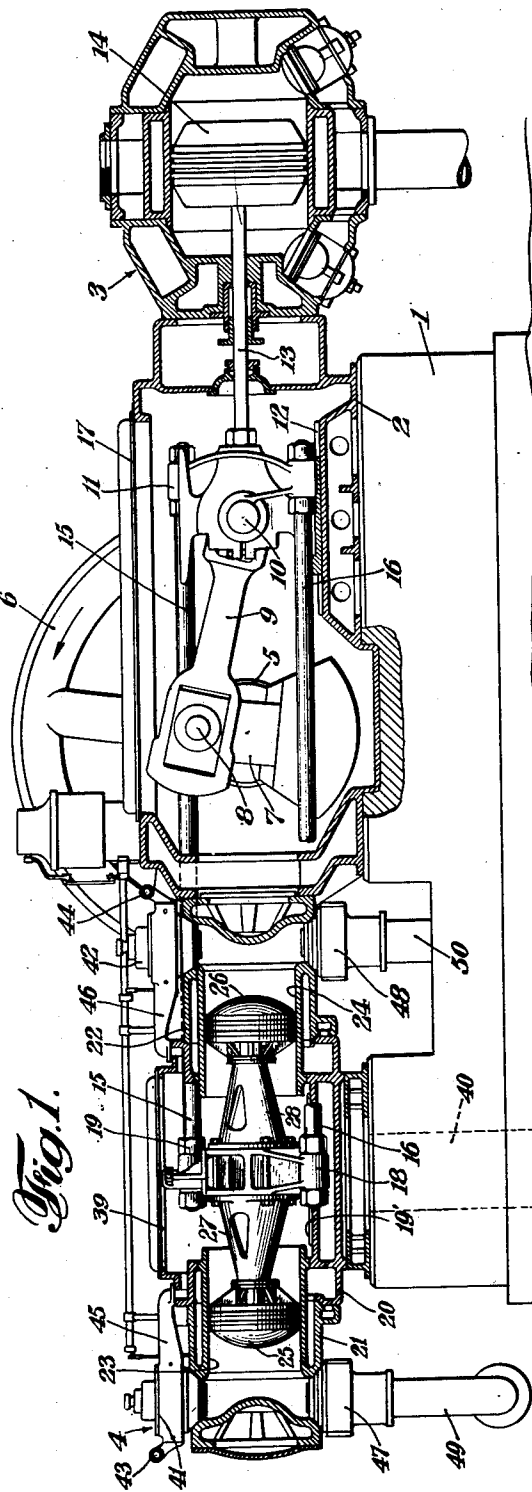
May 21, 1935.

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2,002,200

ENGINE COMPRESSOR ASSEMBLY

Filed Oct. 3, 1931



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## UNITED STATES PATENT OFFICE

2,002,200

## ENGINE COMPRESSOR ASSEMBLY

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Application October 3, 1931, Serial No. 566,631

3 Claims. (Cl. 121-117)

This invention relates to engine compressors and is particularly adapted to internal combustion engine compressors, of the type where the engine and compressor units are provided with a common crank shaft and fly wheel interposed between said units.

In apparatus of this character it has been customary to mount the respective engine or power unit and a compressor unit on respectively opposite ends of a main frame and to provide two crossheads carried in the main frame and interconnected by distance rods. The mounting of the cross heads in this manner requires the apparatus to be relatively large in size and this necessitates a corresponding large space for installation.

In apparatus of this character it is desired to provide relatively great power in a single device while keeping the dimensions down to a minimum; and further, to provide a well balanced device in which reciprocating parts are free from undue wear or binding.

An object of this invention is to provide means for obviating the above disadvantages and for obtaining the above desired characteristics and advantages.

The invention consists in the novel features, arrangements and combinations of parts embodied by way of example in the apparatus hereinafter described as illustrating the preferred form of the invention, and the invention will be more particularly pointed out in the appended claims.

Other objects, features and advantages of the invention will appear from the following specification and claims taken in connection with the accompanying drawing in which

Fig. 1 is a transverse longitudinal section showing such features of the apparatus as are necessary to a complete understanding of the invention,

Fig. 2 is an enlarged longitudinal section taken through the power pistons, crosshead connected thereto and the crosshead guide; one of the pistons and its connected piston strut is shown detached in order to more clearly illustrate certain features of the construction.

Fig. 3 is a transverse section taken at line 3-3 of Fig. 2 in the direction indicated by the arrows, and

Fig. 4 is a transverse section taken at line 4-4 of Fig. 2 in the direction indicated by the arrows.

Referring to the drawing, which illustrates a present preferred form of the invention, the apparatus is mounted on a suitable base or pedestal 1 which supports the main frame 2, to the right hand end of which is attached a compressor unit 3 and to the left hand end of which is attached the power unit 4. The compressor unit is entirely supported from the main frame 2 while the power

unit 4 is partially supported by an extension of the pedestal 1.

Only such details of the compressor unit and power unit as are comprehended in the present invention will be described, since the construction and operation of other features will be well understood by those skilled in the art.

A crank shaft 5 is suitably supported on the pedestal 1 and frame 2 and carries the fly wheel 6. The crank shaft is provided with a crank 7 carrying a crank pin 8 which is engaged by the connecting rod 9, the other end of which engages a pin 10 journaled in a crosshead 11 which is supported on a suitable crosshead guide 12 formed integral with the main frame 2. The crosshead 11 connects directly to the compressor piston rod 13 which passes through suitable stuffing boxes carried jointly by the main frame 2 and the casing of the compressor 3 and the rod 13 carries at its outer end a compressor piston 14.

The crosshead 11 is also connected directly to the ends of distance rods 15 and 16. These distance rods extend within the main frame 2 and for the major portion of their length are substantially entirely enclosed therein; access to the interior of the main frame 2 being available through the removable cover plate 17, thus permitting access to the moving parts within the main frame 2.

The distance rods are spaced outwardly from the center of the crank shaft 5, the upper rod being positioned inside of the crank 7 and the outer rod being positioned outside of the lower balanced end of the crank 7. The distance rods then pass out through the left hand end of the main frame 2 and connect to a second crosshead 18 by means of suitable nuts such as 19 which serve to rigidly connect the distance rods 15 and 16 to the crosshead 18.

The crosshead 18 is supported on a crosshead guide 19' (see also Figs. 2, 3 and 4) which is formed integral with the engine base 20 which is supported by the pedestal 1. The base 20 carries the opposed tandem power cylinders 21 and 22 which are in axial alignment with the center of the crosshead 18, the center of the crank shaft 5, the center of the crosshead 11 and the axis of the compressor piston 14. The cylinders 21 and 22 are provided with cylinder bores 23 and 24 in which are mounted the power pistons 25 and 26. The power pistons are rigidly attached respectively (Fig. 2) to piston struts 27 and 28, the inner ends of which are spaced apart and rigidly attached by means of spacer bolts 29 and suitable nuts such as 30-31.

The inner ends of the struts 27 and 28 are provided with spherical seats such as 32-33, and these are spaced apart so as to come into co-operative sliding engagement with the cooperating respectively corresponding spherical faces 60

34—35 formed on the sleeve 36 which is rigidly attached to the crosshead 18. The strut spacing bolts such as 29 pass through enlarged openings 37 formed in the crosshead 18, thereby permitting relative angular movement of the crosshead 18 with respect to the axis of the pistons 25—26. The nuts 30—31 provide for proper adjustment between the spherical seats formed on the crosshead and those formed on the spaced apart inner ends of the piston struts to thereby permit proper initial setting and to compensate for wear. This provision for relative angular movement between the crosshead 18 and the pistons 25 and 26 permits the pistons to freely reciprocate on their normal axis free of any binding effect from uneven expansion of the distance rods 15 and 16. This expansion is quite common in practice and normally results in a binding or wearing between one or more of the crossheads and seats thereof; and in the particular construction herein provided this provision also eliminates the wearing of the power pistons and their cylinders due to uneven expansion of the rods 15 and 16. Undue wearing or binding between the power pistons and their cylinders is prevented by supporting the pistons and their interconnected struts from the crosshead 16 which is supported on the guide 19'. It will therefore be seen that the entire weight of the pistons and their interconnected struts is supported free from any appreciable engagement with the cylinder bores 22 and 23.

The distance rods 15 and 16 are positioned with respect to the axis of travel of the crosshead 18 (Fig. 3) so that the distance rods 15 and 16 lie externally of the cylinder 22; the external diameter of the cylinder 22 being indicated on Fig. 3 by the dash and dot line 38.

The cylinder base 20 substantially entirely encloses the space between the cylinders 21 and 22, and as will be understood from the foregoing description the crosshead guide 19', the crosshead 18 and attached ends of the distance rods 15 and 16 are contained within the said enclosure. A removable cover plate 39 is provided for access to the movable parts enclosed therein. The interior of the enclosure is in communication with the atmosphere or a suitable supply of air by means of the opening or bore 40 extending vertically upward through the pedestal 1 and in communication with the interior of the enclosure. This not only permits a proper breather means for the cylinder base but provides for cooling the power unit and more particularly the moving parts therein; it being understood that the air supply to the combustion spaces of the power unit is taken from the cylinder base as is customary in usual practice.

Such details of the power unit have been referred to with particularity as will enable those skilled in the art to understand the features which I consider to fall particularly within the scope of the present invention; but in order to provide a better understanding of the general form of the power unit shown in the present preferred form of the invention, the general features of the power unit will now be described briefly.

The power unit illustrated is adapted to be operated by industrial gas and is of the four-stroke cycle type. The inlet chambers are designated as 41 and 42 respectively and are connected respectively to gas supply pipes 43 and 44 and to air intake manifolds 45 and 46, which communicate with the interior of the cylinder base 20.

Suitable throttle means and adjustment means for the intake mixture are provided in a manner well understood in the art. The exhaust chambers are designated respectively as 47 and 48 and comprise the usual exhaust valves and other features well understood to those skilled in the art. These exhaust chambers are in communication respectively with the exhaust pipes 49 and 50.

It will be particularly noted that in the construction embodied the connecting rod extends toward the power cylinders instead of away from them and the engine runs under, instead of over, as is usual in common practice in apparatus of this kind. This serves to maintain a downward pressure on the guide 12 of the main crosshead 11. The direction of rotation of the crank shaft 5 and fly wheel 6 is indicated by arrows in Fig. 1.

Having thus described my invention with particularity with reference to its preferred form, it will be obvious to those skilled in the art, after understanding my invention, that other changes and modifications may be made therein without departing from the spirit and scope of my invention, and I aim in the appended claims to cover such changes and modifications as are within the scope of the invention.

What I claim is:

1. An apparatus of the class described, having opposed engine cylinders, pistons for said cylinders, a crosshead interposed between said cylinders, means connecting said crosshead to reciprocate with said pistons, a second crosshead located beyond one of said cylinders, means connecting said crossheads to drive the second from the first, a connecting rod extending from said last mentioned crosshead toward said cylinders, a driven element connected to the end of the connecting rod which is so extended toward the cylinders, and a driven rod extending from said last mentioned crosshead in a direction opposed to said connecting rod.

2. An apparatus of the class described, having opposed engine cylinders, pistons for said cylinders, a crosshead interposed between said cylinders, means connecting said crosshead to reciprocate with said pistons and coupling said pistons to form a rigid structure, a second crosshead located beyond one of said cylinders, a connecting rod extending from said last mentioned crosshead toward said cylinders, distance rods connecting said crossheads to drive the second from the first, a driven rod extending from said last mentioned crosshead in a direction opposed to said connecting rod, and said connecting means affording a slight rocking movement of said first mentioned crosshead in any direction relative to the aforesaid piston structure.

3. An apparatus of the class described having opposed engine cylinders, pistons for said cylinders, connecting members extending between said pistons and connecting the same to form a rigid structure, a crosshead interposed between and reciprocable with said connecting members, said crosshead at least partially supporting the aforesaid piston structure, said crosshead having a spherically shaped part located between the pistons and said connecting members having spherical bearing seats engaging said spherically shaped part and affording angular rocking of the piston structure in any direction relative to the crosshead during operation, and power transmitting distance rods connected with said crosshead and reciprocating therewith.

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