

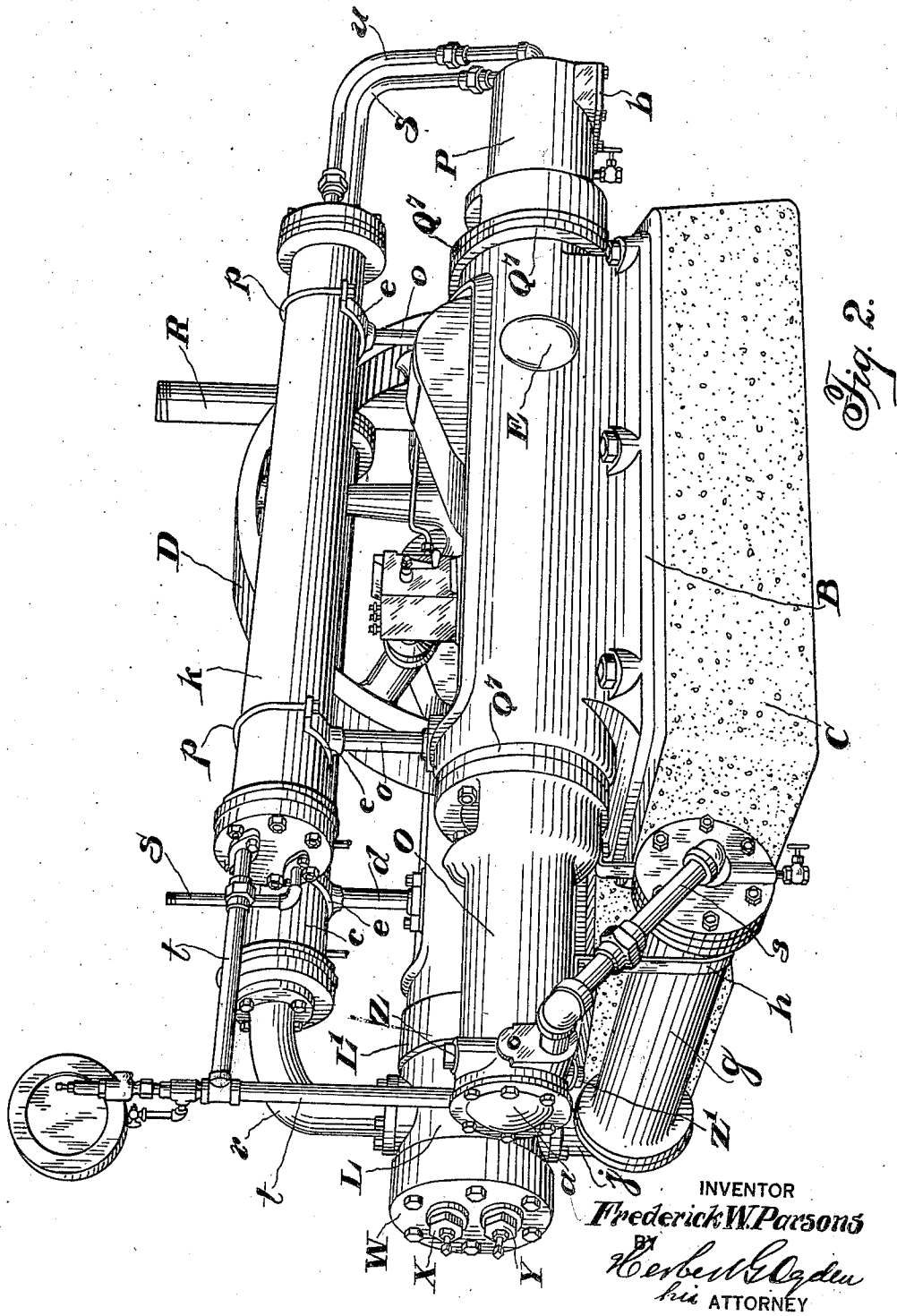
1,430,581.

INVENTOR
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F. W. PARSONS.
HIGH PRESSURE COMPRESSOR UNIT.
APPLICATION FILED SEPT. 3, 1921.

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6 SHEETS—SHEET 2.



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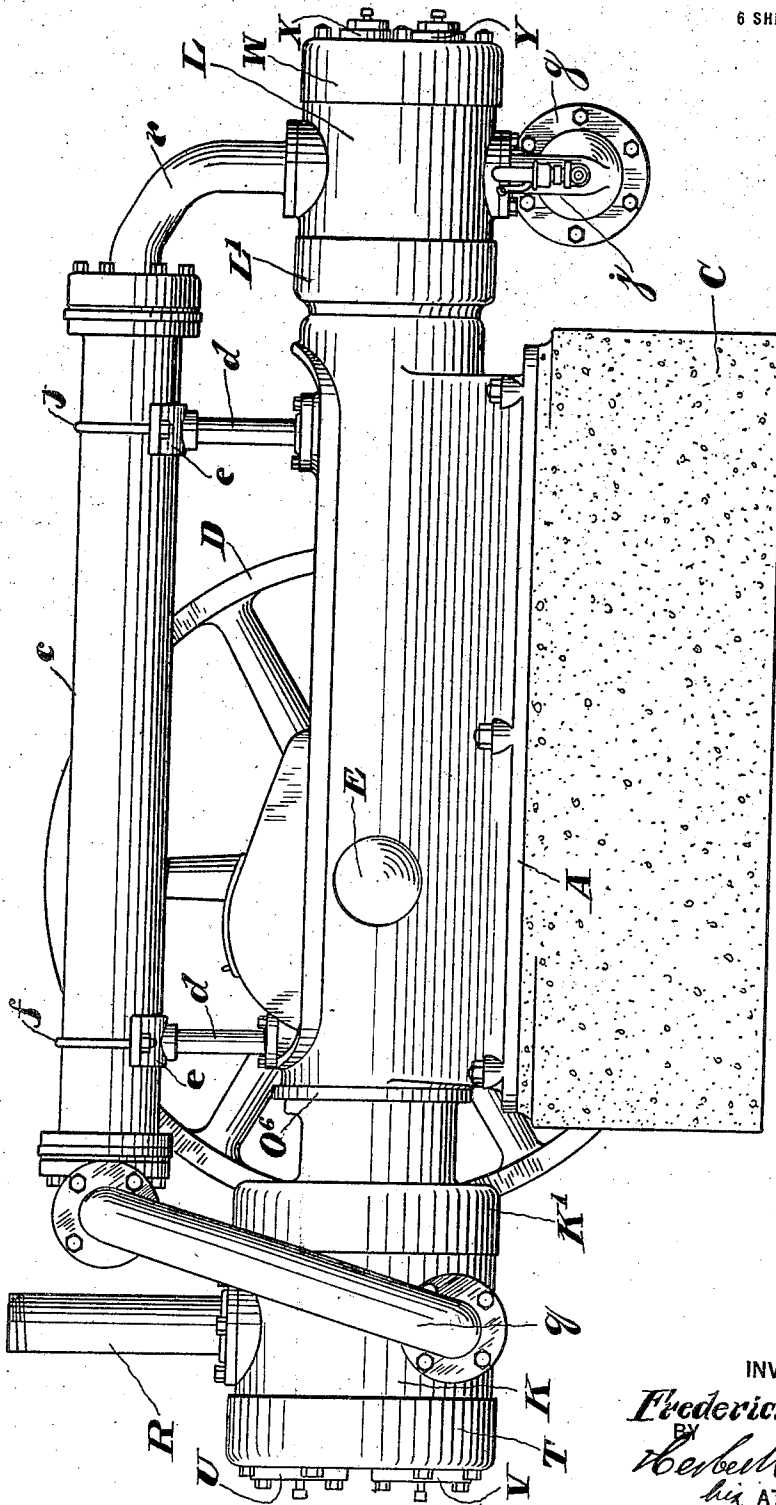


Fig. 3.

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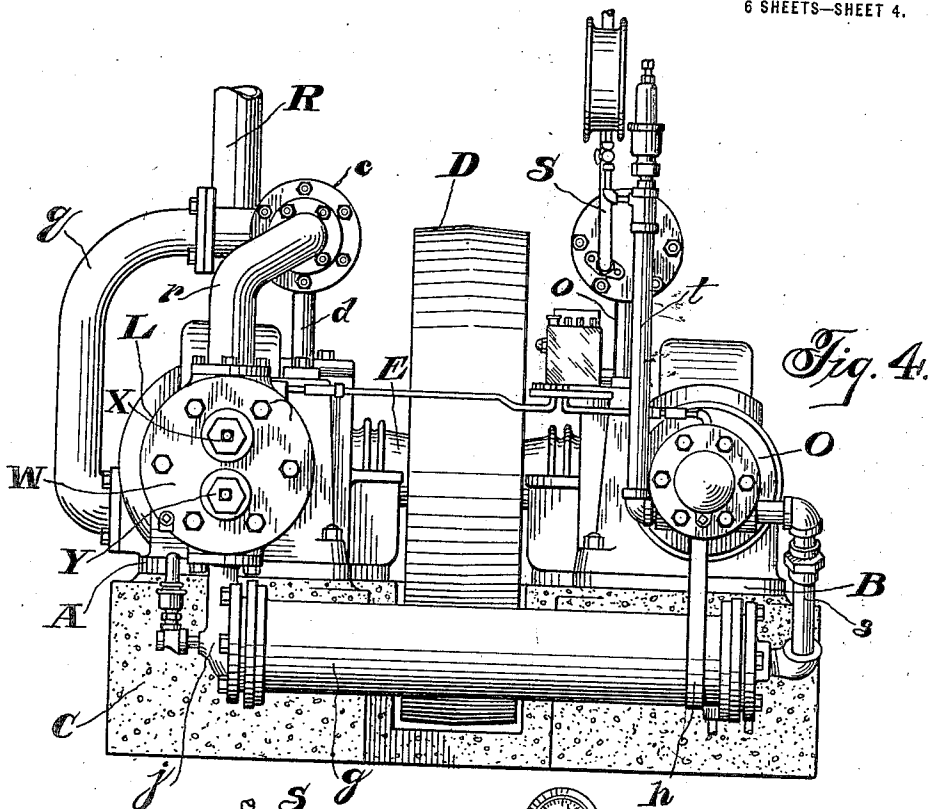


Fig. 4.

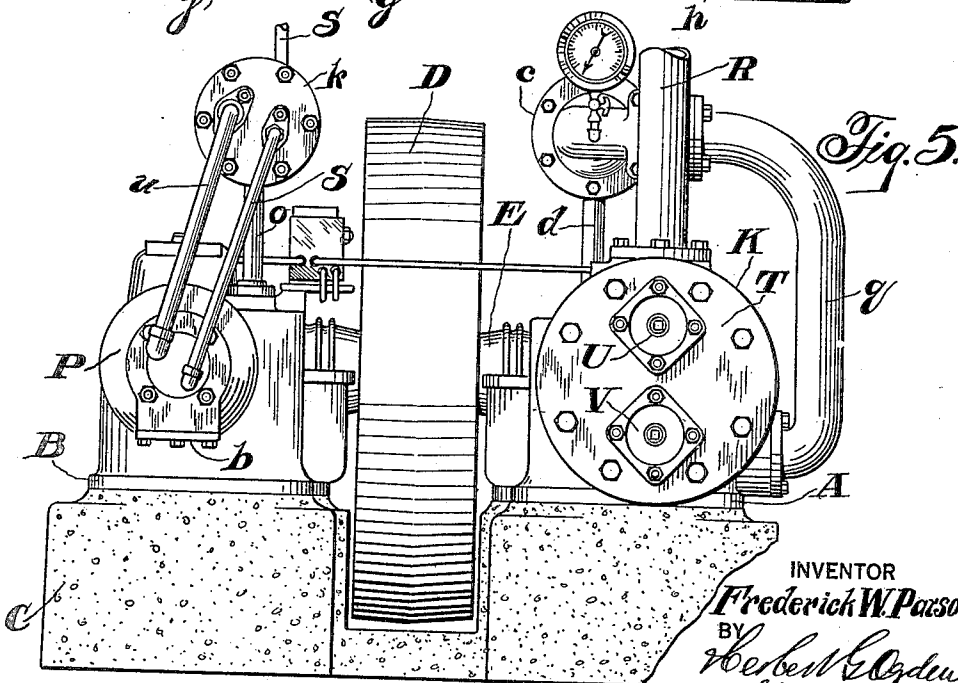


Fig. 5.

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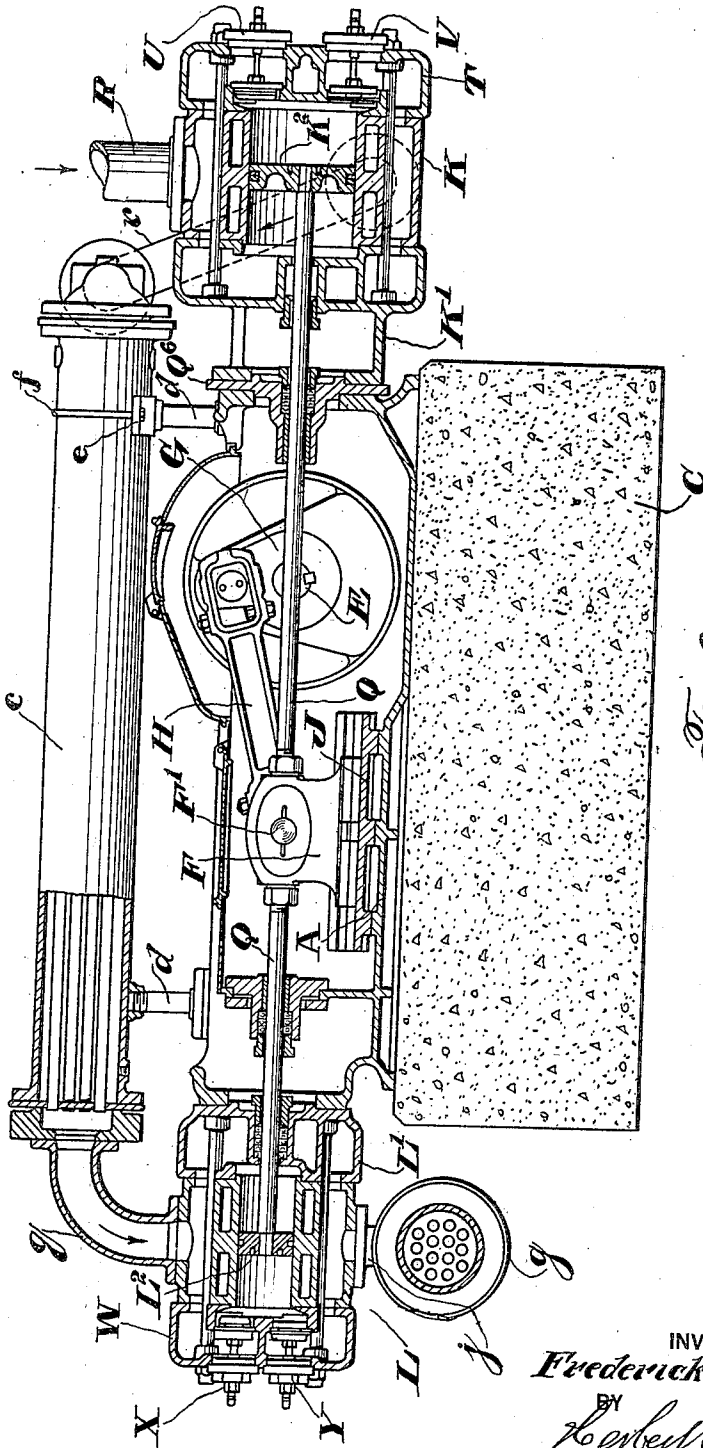


Fig. 6.

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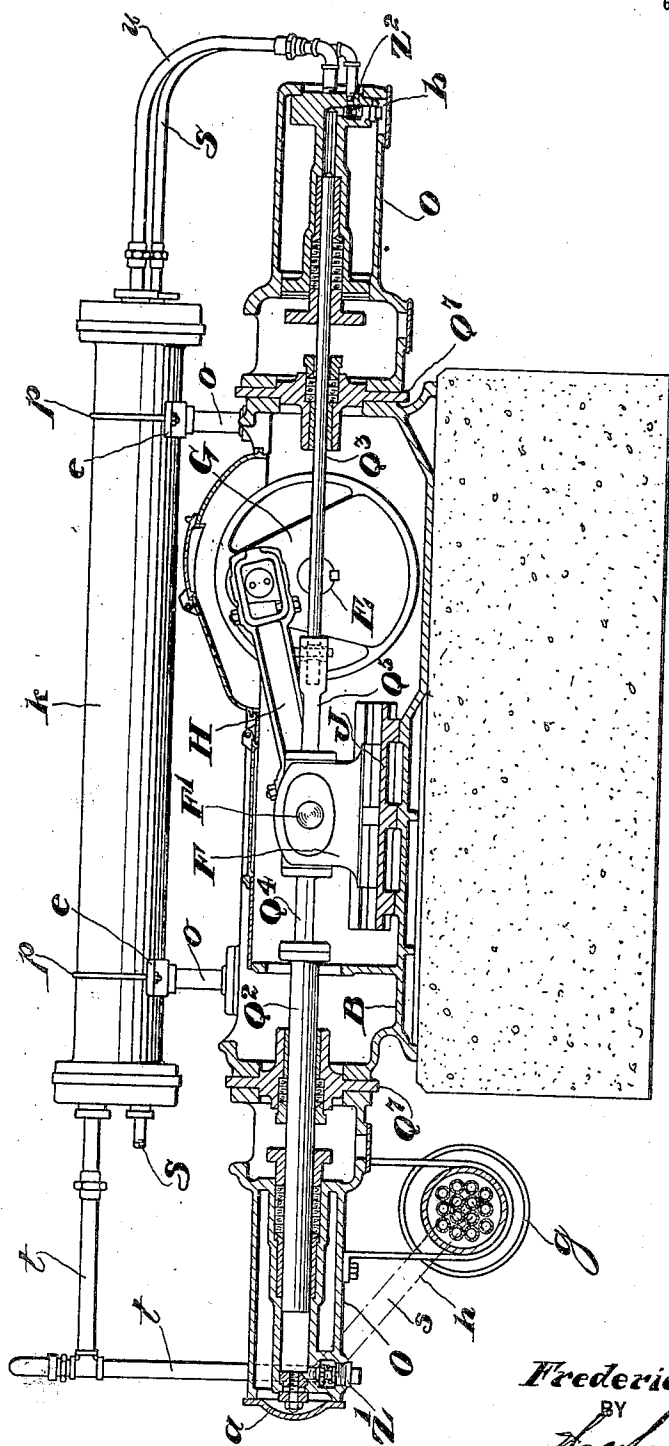


Fig. 1.

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UNITED STATES PATENT OFFICE.

FREDERICK W. PARSONS, OF ELMIRA, NEW YORK, ASSIGNOR TO INGERSOLL-RAND COMPANY, OF JERSEY CITY, NEW JERSEY, A CORPORATION OF NEW JERSEY.

HIGH-PRESSURE COMPRESSOR UNIT.

Application filed September 3, 1921. Serial No. 498,580.

To all whom it may concern:

Be it known that I, FREDERICK W. PARSONS, a citizen of the United States, a resident of Elmira, county of Chemung, and State of New York, have invented a certain High-Pressure Compressor Unit, of which the following is a specification, accompanied by drawings.

This invention relates to a high pressure multi-stage motor driven compressor unit of the horizontal type, but more particularly to a four stage machine, having a low pressure cylinder, two intermediate pressure cylinders and a high pressure cylinder.

The objects of the invention are to afford ready accessibility to all the cylinders, permit any one cylinder and its associated parts to be assembled and disassembled without disturbing any of the other cylinders or their associated parts, eliminate certain stuffing glands heretofore required and enable more perfect alignment to be more easily obtained on a high pressure machine, enable the intercoolers to be more advantageously arranged and permit the use of longer intercoolers without adding to the floor space, simplify the piping and obtain a better distribution of weight in the machine than heretofore.

Further objects of the invention will hereinafter appear and to all of these ends the invention consists of the features of construction, arrangement of parts and combinations of elements substantially as hereinafter fully described and claimed in this specification and shown in the accompanying drawings, in which—

Figure 1 is a plan view partly broken away and partly in horizontal section of a compressor unit embodying the invention.

Figure 2 is a side elevation of one side of the machine.

Figure 3 is a side elevation of the other side of the machine.

Figure 4 is an end elevation of one end of the machine.

Figure 5 is an end elevation of the opposite end of the machine.

Figure 6 is a longitudinal sectional elevation through the low pressure and first intermediate cylinder, and

Figure 7 is a longitudinal sectional elevation through the second intermediate and high pressure cylinder.

Referring to the drawings, the machine comprises bed plates, which may be formed on a plurality of frame sections, A and B lying horizontally and parallel to each other, side by side, on a suitable foundation C. The frame sections A and B, which may or may not be tied or cast together, form a substantially rectangular four cornered frame with sufficient space between the sections for a driving member D shown as a belt wheel. A main crank shaft E for the wheel D is provided with suitable bearings in the frame sections, and cross-heads F are connected to the cranks G of the main crank shaft E by the connecting rods H. The cross-head pins F' on the cross-heads F which reciprocate on the guides J, are offset from the center line of the cylinders in accordance with my former United States Patent No. 704,914 granted to me the 15th day of July, 1902, as a preferable construction.

Compressor cylinders are mounted at the four corners of the rectangular frame and these cylinders extend outwardly from, or over-hang the frame. In accordance with my preferred construction, a low pressure cylinder K and an intermediate pressure cylinder L are connected in longitudinal alignment on one frame section A, with the interposition of yokes K' and L', and another intermediate pressure cylinder O and a high pressure cylinder P are mounted in longitudinal alignment in this instance directly on the other frame section B. Aligned piston rods Q for the pistons K² and L² of the opposite pairs of cylinders K and L are connected to the cross-heads F of one frame in any suitable manner. The pistons K² and L² may be either single or double acting in this instance being shown single acting. The cylinders O and P are preferably provided with plungers Q² and Q³ respectively connected to the cross-head F by means of the spacer Q⁴ and the distance piece Q⁵. A partition plate Q⁶ forming a guide may be provided between the yoke K' and the frame A, and partition plates Q⁷ may be provided between the cylinders O and P and the frame B.

An intake pipe R is connected to the first or low pressure cylinder K and a discharge pipe S is connected to the last or high pressure cylinder P.

Any suitable heads and inlet and discharge valves may be provided for the cylinders and in this instance, the low pressure cylinder K is provided with the head T having the inlet and discharge valves U and V while the intermediate pressure cylinder L is provided with the head W having the inlet and discharge valve X and Y, only the outer covers of these valves being shown except in section. The intermediate pressure cylinder O may be provided with a removable head *a* and inlet and discharge valves of the poppet type indicated at Z and Z' in the cylinder. The high pressure cylinder P is provided with the cover plate *b* within which the valves are adapted to be located, inside of the cylinder, the discharge valve Z² only being shown.

A first intercooler *c* is mounted on the supporting posts or frames *d* over one frame section A and these posts extend vertically and are provided with the saddles *e* to which the intercooler is strapped by means of the straps *f*. The intercooler *c* extends longitudinally between the cylinders and is supported above the cylinders.

The second intercooler *g* is hung transversely beneath the intermediate pressure cylinders L and O as by means of the strap *h* connected to the cylinder O and supporting the intercooler at one end, the other end of the intercooler being connected and supported by the pipe *j* which is connected to the cylinder L.

A third intercooler and aftercooler *k* is supported on the vertical posts *o* carried by the frame section B and having the saddles *e* to which the straps *p* are connected.

The low pressure cylinder K is connected by a pipe *q* to the first intercooler *c* and a pipe *r* connects this intercooler with the first intermediate pressure cylinder L. The fluid passes from the cylinder L through the connecting pipe *j* to and through the intercooler *g* which is connected by a pipe *s* to the second intermediate pressure cylinder O. A pipe *t* connects the cylinder O to the third intercooler and aftercooler *k*. Another pipe *u* connects the intercooler *k* to the high pressure cylinder P. From thence the fluid is discharged through the discharge pipe *s*.

The compressor unit is driven in any suitable manner as by means of an engine or motor which may be belted to the belt wheel D, or if desired the motor could be directly connected to the main crank shaft E. Owing to the four cornered construction of the machine, with a compressor cylinder at each corner and the arrangement and construction of intercoolers and piping illustrated and described, any one cylinder and its associated parts may be readily assembled or disassembled without disturbing any of the other cylinders or their associated parts. By locating the

cylinders at the four corners of the frame, longer intercoolers may be provided extending substantially from one cylinder to the other cylinder in longitudinal alignment therewith and this is a material advantage. Fewer stuffing glands are necessary in my construction than heretofore and the piping is simplified and less length of piping is required, which is in more accessible position than usually provided. The weight of the parts forming the machine is equally distributed and the machine is well balanced without consuming additional floor space.

I claim:

1. A high pressure multi-stage motor driven compressor unit, consisting of bed plates formed on a plurality of parallel horizontally lying frame sections arranged side by side and forming a substantially rectangular four cornered frame with sufficient space between the sections for a driving member, a main crank shaft for said driving member having bearings in said frame sections, cross-heads operatively connected to said crank shaft and reciprocating on guides in said frame sections, compressor cylinders mounted at the four corners of the rectangular frame and extending outwardly from the frame, said cylinders comprising a low pressure and an intermediate pressure cylinder in longitudinal alignment on one frame section, and another intermediate pressure cylinder and a high pressure cylinder in longitudinal alignment on the other frame section, and aligned piston rods for the opposite pairs of cylinders connected to said cross-heads, whereby any one cylinder and its associated parts may readily be assembled and disassembled without disturbing any of the other cylinders or their associated parts.

2. A high pressure multi-stage motor driven compressor unit, consisting of bed plates formed on a plurality of parallel horizontally lying frame sections arranged side by side and forming a substantially rectangular frame with sufficient space between the sections for a driving member, a main crank shaft for said driving member having bearings in said frame sections, crossheads having off-set pins operatively connected to said crank shaft and reciprocating on guides in said frame sections, compressor cylinders mounted upon an extending outwardly from each of the four ends of the two frame sections, the two cylinders on each frame section being in longitudinal alignment, aligned piston rods for the opposite pairs of cylinders connected to said cross-heads, an intake pipe connected to the first or low pressure cylinder, a discharge pipe connected to the last or high pressure cylinder, and pipes and connections between the cylinders of the said compressor unit, whereby any one cylinder and its associated

parts may be readily assembled and disassembled without disturbing any of the other cylinders or their associated parts.

3. A high pressure multi-stage motor driven compressor unit, consisting of bed plates formed on a plurality of parallel horizontally lying frame sections arranged side by side and forming a substantially rectangular frame with sufficient space between the sections for a driving member, a main crank shaft for said driving member having bearings in said frame sections, cross-heads having offset pins operatively connected to said crank shaft and reciprocating on guides in said frame sections, compressor cylinders mounted upon and extending outwardly from each of the four ends of the two frame sections, the two cylinders on each frame section being in longitudinal alignment, aligned piston rods for the opposite pairs of cylinders connected to said cross-heads, a first intercooler mounted over one frame section and extending longitudinally between the cylinders on that section, a second intercooler mounted transversely beneath the intermediate pressure cylinders at one end of the frame sections, a third intercooler and aftercooler mounted over the other frame section and extending longitudinally between the cylinders of that section, an intake pipe connected to the first or low pressure cylinder, a discharge pipe connected to the last or high pressure cylinder, the pipes and connections between the cylinders and inter-coolers of the said compressor unit, whereby one cylinder and its associated parts may be readily assembled or disassembled without disturbing any of the other cylinders or their associated parts.

4. A high pressure multi-stage motor driven compressor unit, consisting of bed plates formed on a plurality of parallel horizontally lying frame sections arranged side by side and forming a substantially rectangular frame with sufficient space between the sections for a driving member, a main crank shaft for said driving member having bearings in said frame sections, cross-heads having offset pins operatively connected to said crank shaft and reciprocating on guides in said frame sections, compressor cylinders mounted upon and extending outwardly from each of the four ends of the two frame sections, the two cylinders on each frame section being in longitudinal alignment, aligned piston rods for the opposite pairs of cylinders connected to said cross-heads, supporting posts extending vertically from the end portions of the frame sections, inter-coolers mounted longitudinally on said posts over the frame sections and extending between the cylinders on said frame sections respectively, an intercooler hung transversely beneath the intermediate pressure cylinders at one end of the frame sections, an intake pipe connected to the first or low pressure cylinder, a discharge pipe connected to the last or high pressure cylinder, and pipes and connections between the cylinders of the said compressor unit, whereby any one cylinder and its associated parts may be readily assembled and disassembled without disturbing any of the other cylinders or their associated parts.

In testimony whereof I have signed this specification.

FREDERICK W. PARSONS.