

No. 640,330.

Patented Jan. 2, 1900.

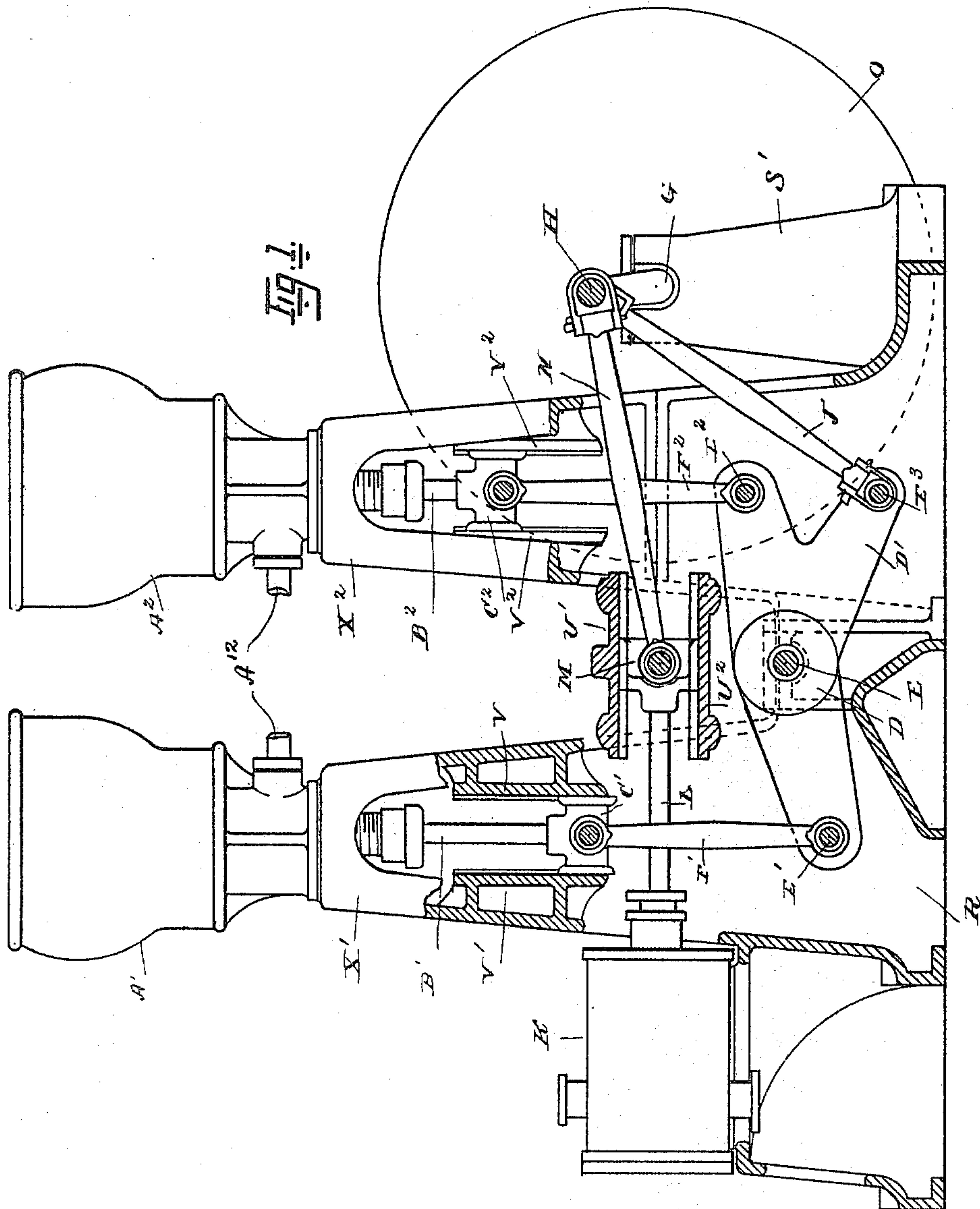
N. SELFE.

GAS PUMP FOR REFRIGERATING MACHINES.

(Application filed Mar. 20, 1897.)

(No Model.)

2 Sheets—Sheet 1.



WITNESSES:

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INVENTOR

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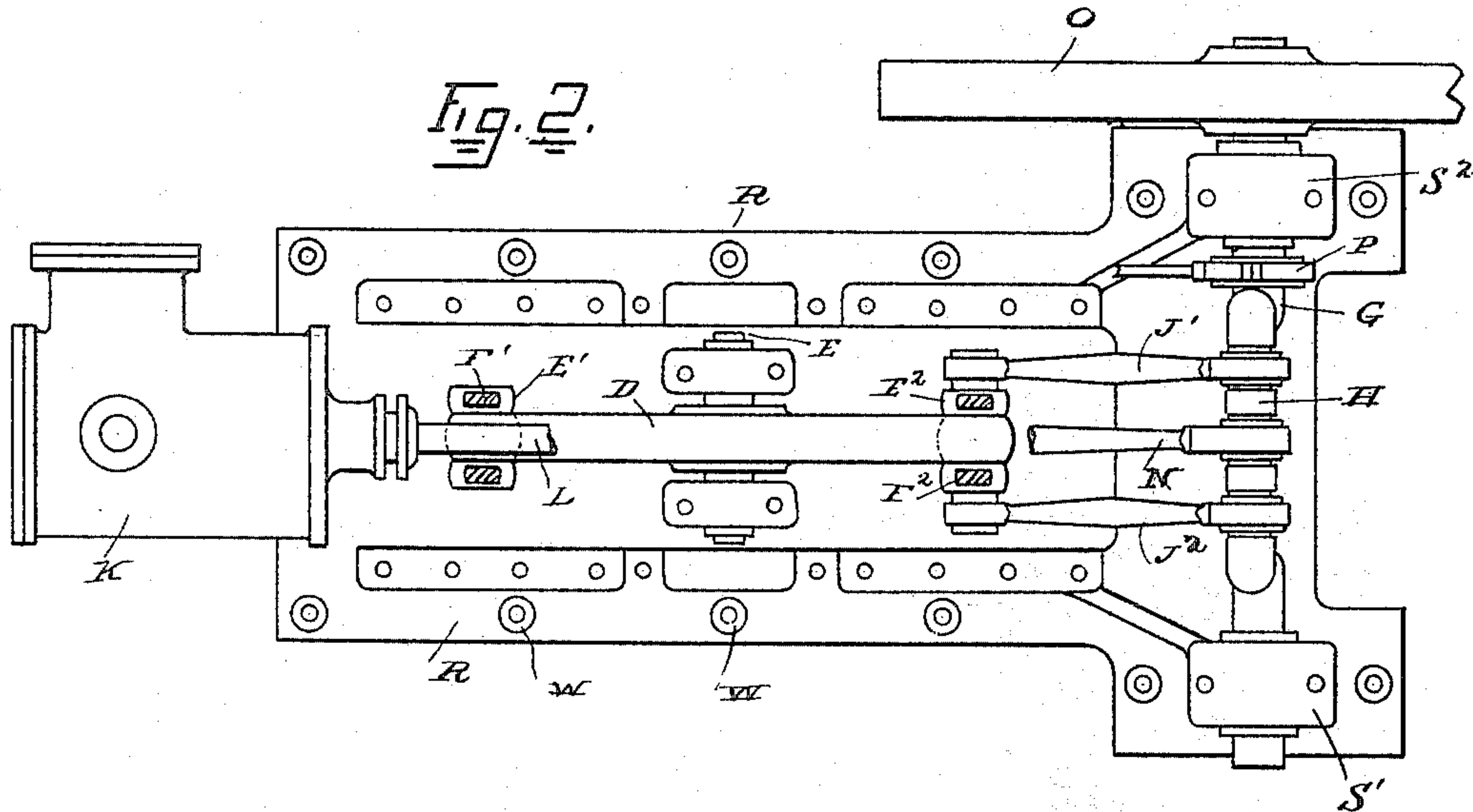
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UNITED STATES PATENT OFFICE.

NORMAN SELFE, OF SYDNEY, NEW SOUTH WALES.

GAS-PUMP FOR REFRIGERATING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 640,330, dated January 2, 1900.

Application filed March 20, 1897. Serial No. 628,522. (No model.)

To all whom it may concern:

Be it known that I, NORMAN SELFE, a citizen of Great Britain, residing at Sydney, New South Wales, have invented certain new and useful Improvements in Refrigerating Machinery; and I do hereby declare the following to be a full, clear, and exact description of said invention, such as will enable others skilled in the art to which it most nearly appertains to make, use, and practice the same.

This invention relates to improvements in compression-machines for gases and vapors, and more particularly to that class of machines used for the compression of ammoniacal gas after the same has been expanded in the ice-manufacturing process in which it is employed.

The objects which it is sought to accomplish by means of this invention are, first, to increase the efficiency of the compressors; second, to overcome the tendency to vibration to which this class of engines is subject; third, to obtain the greatest power at the time of greatest compression in the machines, and, fourth, to obtain simplicity, cheapness, and compactness of construction.

The drawings showing the mechanism embodying this invention are divided into views, as follows:

Figure 1 is a side elevation of a double compressor and steam-engine on single foundation, the frame cut away to show certain operative features of the mechanism. Fig. 2 is a plan view of the same, the compressors being removed to show the location of the driving-piston and rocking beam.

In the forms of compressors at present in use the greatest work on the compressor-piston occurs toward the latter end of the stroke, when the expansion of the steam-engine is decreasing in power. It is for this reason that the steam-engine and compressor are usually mounted or arranged on separate foundations to work on and from separate cranks on the same shaft.

My invention consists in the various matters hereinafter described and claimed.

To facilitate the description of the invention with reference to the drawings, I have provided each part with a distinguishing-letter.

A' A² are the compressor-cylinders, which

may be double or single acting or with the one high and the other low pressure.

B' B² are the piston-rods of the compressor-pistons.

C' C² are the cross-heads at the lower ends of the piston-rods B' B².

D is a triple-armed rocking beam mounted in suitable bearings E in the base of the machine.

E' E² are the gudgeons, to which the pitmen that connect the opposite ends of the rocking beam to the cross-heads C' C² are attached.

E³ is the gudgeon for the connecting-rods J' J², which connect the rocking beam with the crank-shaft of the engine.

F' F² are pitmen connecting the cross-heads C' C² with the gudgeons E' E².

G is the crank-shaft of the engine.

H is the crank-pin of the crank-shaft.

J' J² are rods connecting the crank-pin with the rocking beam.

K is a horizontal steam-engine cylinder, simple or compound.

L is the piston-rod of the engine.

M is the cross-head for the piston-rod. N is a pitman connecting the said cross-head M and the crank-shaft G.

O is the fly-wheel of the engine.

P is the eccentric for operating the valves of the engine.

R is the sole-plate or foundation-casting for the machine.

S' S² are the main bearings for the crank-shaft raised from the sole-plate R.

U' U² are the guide-bars for the cross-head M.

V' V² are the guide-bars for the cross-heads C' C².

W W are anchor-bolts for the sole-plate R.

X' X² are the columns of standard-castings raised from the sole-plate R to carry the cylinders A' A².

The above letters designate and point out the principal features or elements. Distinguishing characters will be supplied farther on in the description to the details of the operative features.

The operation of the invention is as follows: Rotation is given to the crank-shaft G by means of the steam-engine through its piston-rod L and pitman N in the usual manner.

The crank-pin H is connected to the lowermost arm D' of the rocking beam D by means of the pitmen J' J². The rocking beam D is mounted in the bearings E E between the crank G and the cylinder K and below the center line of the same. Two of the arms of the rocking beam, to which the pitmen F' F² are connected, extend in opposite directions from the center of the said rocking beam to practically a horizontal position when the cross-heads C' C² are at a level. Depended from the under side of the said beam is the arm D', which is at such an angle from the center of the bearings E that a line drawn through the center of the said bearing and center of the gudgeon E³ would be approximately at ninety degrees to a line drawn through the center of the crank-pin G and the center of the said gudgeon at the time when the opposite extended arms of the said beam are horizontal. By this arrangement the full leverage of the arm D' is taken advantage of. The arm D' may be extended or shortened, so that the greater or less force may be exerted on the compression-pistons for the same expenditure of force by the steam-engine K. The crank-pin is connected to the arm D' by means of the pitmen J' J², so that the dead-center taken on the line through the center of the crank-pin H and the gudgeon E³ will be reached in its upper and lower stroke out of time with the dead-centers between the crank-pin and the piston-rod L of the cylinder K. The dead-centers first mentioned mark the limit of the stroke of the pitmen J' J² and the limit of the stroke of the rocking beam D or the limits in the upward and downward stroke of the compression-pistons. This lack of coincidence in the dead-centers and one of the pitmen operating direct upon the compressors and the other operating direct with the steam-engine has the effect of obtaining the full force of the expansion of the steam in the engine at the time when in the action of the compressors the final stroke or greater strength is being given to the action, which is at the limit of the throw of the said pistons.

By this arrangement of the parts it is evident that there is a great economy in space, as well as an avoidance of the inertia at the limit of the throw in the operation of the steam-engine, which is generally the principal cause for the vibration in its operation. Also, it will be observed that as the crank turns over from right to left it follows that when the dead-centers between the crank-shaft and the steam-engine piston are reached the pistons of the compressors are so disposed that one is near the end of its compressing stroke while the other is about to admit fluid through the openings A'. The final portion of the compressing stroke is therefore accom-

plished during the early part of the stroke of the engine-piston and before the cut-off of steam takes place. Moreover, during this part of the revolution of the crank the pitmen J' J² are approaching and come to their dead-centers, so that the toggle action of the crank and the pitmen is added to that of the live steam. This gives a double advantage in effecting the final compression.

The sole-plate or foundation R carries the whole structure, consisting of the supports for the steam-engine cylinder K, the runway for the cross-head M, the towers X' X², and the bearings for the fly-wheel and the rocking beam, all bolted securely to the foundation or formed as a part of the casting of the same. By this means all strains are taken up in the same structure and disadjustment of the parts is thereby prevented.

Having thus described this invention, I claim—

1. In a machine of the character indicated, the combination with a bed-plate, of a steam-engine mounted thereon, two parallel compression-cylinders supported thereon with their axes at right angles to the center line of the engine and in the same plane, and at points between the steam-cylinder and the engine-shaft, a rocking beam journaled at its middle on bearings placed below the center line of the engine, and having an arm extending downward at an angle to the beam, pistons in the compression-cylinders, pitmen connecting the compression-pistons respectively with the two ends of the beam, and a pitman connecting a crank on the engine-shaft with the arm on the beam; substantially as described.

2. In a machine of the character indicated, the combination with a bed-plate, of a steam-engine mounted thereon, two parallel compression-cylinders supported thereon with their axes at right angles to the center line of the engine and in the same plane, and at points between the steam-cylinder and the engine-shaft, a rocking beam journaled at its middle on bearings placed below the center line of the engine, and having an arm extending downward at an angle to the beam, pistons in the compression-cylinders, double pitmen straddling the piston-rod and connecting-rod of the engine and connecting the compression-pistons respectively with the two ends of the beam, and pitmen connecting cranks on the engine-shaft at each side of the main crank with the arm on the beam, substantially as described.

In testimony whereof I have hereunto set my hand this 9th day of December, 1896.

NORMAN SELFE.

Witnesses:

W. H. DAWSON,
BENJ. ROURKE.