(No Model.) 2 Sheets—Sheet 1.

P. L. WEIMER.

COMPOUND AIR COMPRESSOR.

No. 345,752. Patented July 20, 1886.

Fig. 1.

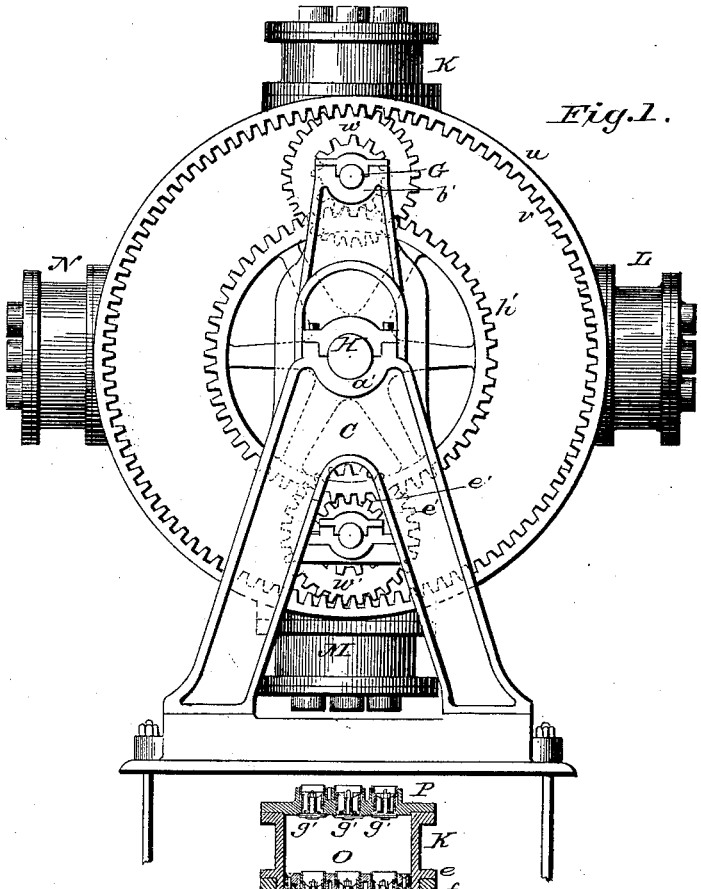
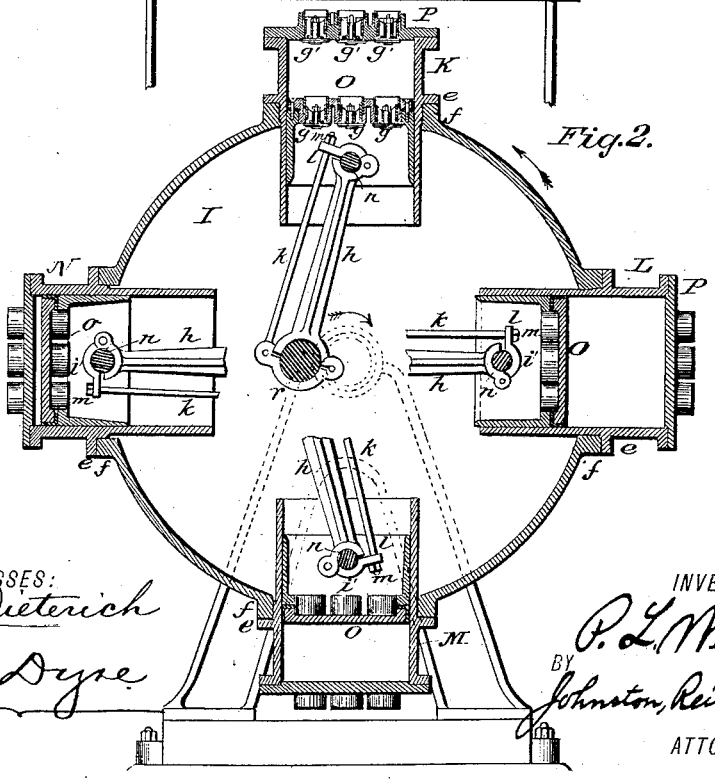


Fig. 2.



WITNESSES:
Fred. J. Dieterich
Wm. E. Dyer

INVENTOR
P. L. Weimer
BY
Johnston, Reinohl & Dyer
ATTORNEYS

N. PETERS, Photo-Lithographer, Washington, D. C.

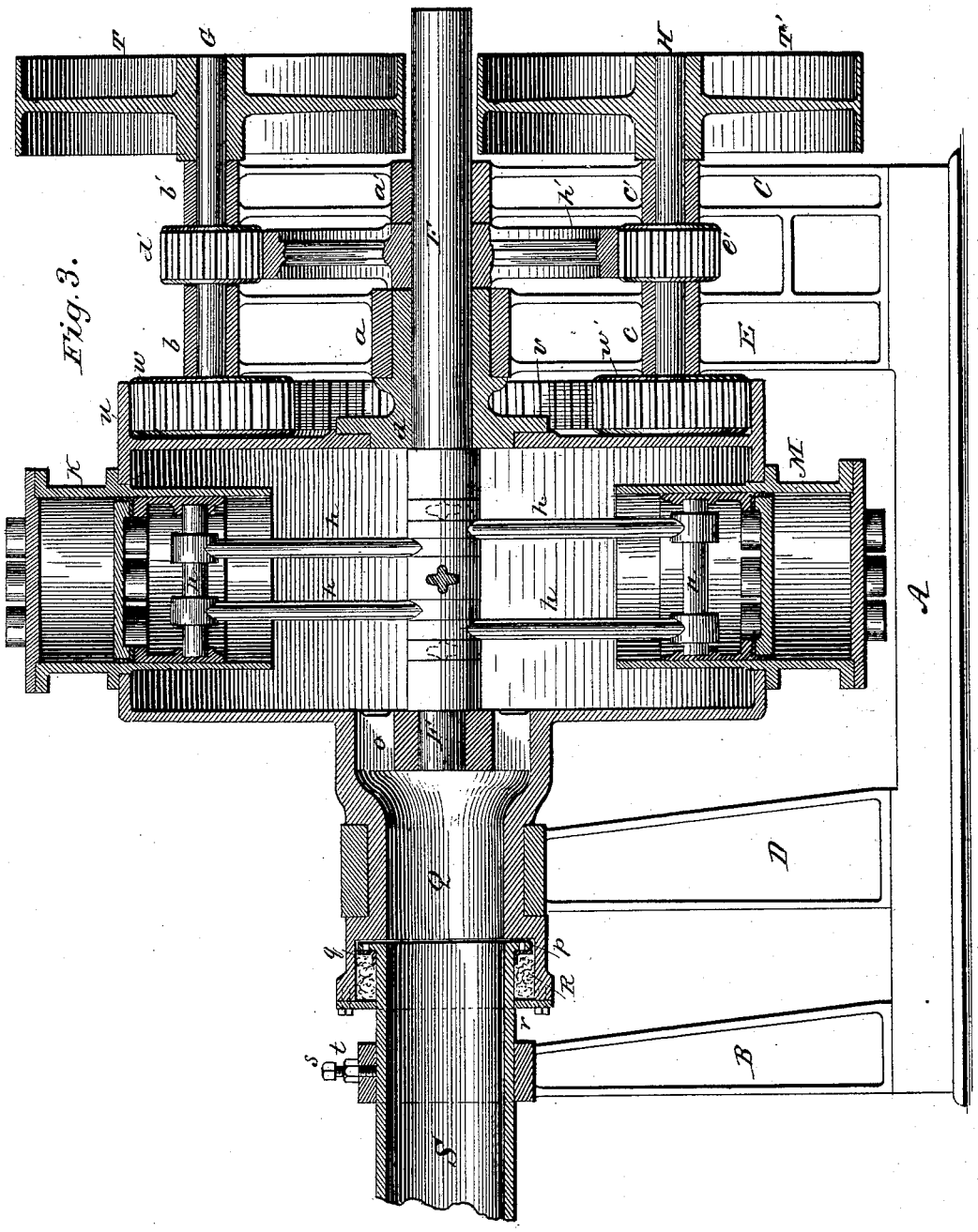
(No Model.) 2 Sheets—Sheet 2.

P. L. WEIMER.

COMPOUND AIR COMPRESSOR.

No. 345,752. Patented July 20, 1886.

Fig. 3.



WITNESSES:
Fred. G. Dieterich
Wm. E. Dyre.

INVENTOR
P L Weimer
BY
Johnston Reinohl & Dyre
ATTORNEYS

UNITED STATES PATENT OFFICE.

PETER L. WEIMER, OF LEBANON, PENNSYLVANIA.

COMPOUND AIR-COMPRESSOR.

SPECIFICATION forming part of Letters Patent No. 345,752, dated July 20, 1886.

Application filed March 17, 1886. Serial No. 195,588. (No model.)

To all whom it may concern:

Be it known that I, PETER L. WEIMER, a citizen of the United States, residing at Lebanon, in the county of Lebanon and State of Pennsylvania, have invented certain new and useful Improvements in Compound Air-Compressors; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The invention relates to air-compressors adapted for blowing high pressure from one pound to fifteen pounds per square inch for general use, but is especially designed to take the place of the expensive blowing-engines in common use for supplying blast to furnaces, cupolas, and other smelting devices in which blast is used.

The invention consists in the constructions hereinafter described, and particularly pointed out in the claims.

In the accompanying drawings, which form a part of this specification, Figure 1 represents an end view showing the gearing applied for rotating the shaft and drum; Fig. 2, a cross-section through the drum and the trunk-cylinder, and Fig. 3 a longitudinal section of the same.

By the construction shown in the drawings, it will be observed that the drum carrying the trunk-cylinder and the shaft to which the pistons are connected revolve in opposite directions, as indicated by the arrows in Fig. 2, the result of which is that each piston will make one complete stroke while the drum and the crank-shaft each make but one-fourth (¼) of a revolution, and double the number of strokes of each piston is obtained as compared with a device in which only the drum of the crank-shaft revolves.

Reference being had to the drawings and the letters of reference marked thereon, A represents a bed-frame, to which are secured two outer stand-bearings, B C, and two inner similar bearings, D E. The stands C and E are connected at their bases, as shown, and are provided with three shaft-bearings, *a a'*, *b b'*, and *c c'*. The former, *a*, supports the trunnion *d*; *a'*, the crank-shaft F; *b* and *b'*, the driving-shaft G, and *c* and *c'*, a similar shaft, H.

I represents a drum, which is provided with a series of trunk-cylinders, K, L, M, and N; but the number may be varied, as desired. The cylinders are inserted in the drum I from the outside, and are detachably secured thereto in the usual manner by the flanges *e*, which rest upon the projection *f* of the drum. Each cylinder is provided with a piston, O, packed in the usual manner, and having a series of inwardly-opening metallic check-valves, *g*, and a head, P, also provided with similar check-valves, *g'*. The several pistons O are connected to the crank-shaft F by means of a pitman or connecting rod or rods, *h*, in the order shown in Fig. 3, the piston of cylinder L having one rod and each of the other pistons two rods, as is common to multiple-cylinder engines. The rods or pitmen in this instance are, however, of peculiar construction, each having a hinged half-box, *i i'*, at opposite ends, and a bolt, *k*, hinged to the half-journal box *i*, which passes through the projection *l* on the half-journal box *i'*, and upon which a nut, *m*, has its bearing. By this construction the journal-bearing upon the rod *n* of each piston and the journal-bearing on the crank of the shaft F' of each of the pitmen *h*, respectively, can be adjusted together by applying a wrench to the nut *m*, by removing the head P of the cylinders and the follower of the pistons O, thus greatly simplifying the work of adjusting the journal-bearings, which is a matter of great importance in high-speed machinery.

The drum I is supported at one end by a hollow trunnion, Q, which is formed integral with the drum and has a bearing in the stand D. On the inner end of said trunnion is formed a spider, *o*, in which the inner end of the crank-shaft F is supported. This hollow trunnion Q forms the discharge-passage for the air compressed by the pistons, and has a recess, R, formed in its outer end, into which is inserted an air conduit, S, secured to and supported by the stand B. The inner end of the conduit S is provided with a flange, *p*, perforated as shown, and against which bears an angular packing-ring, *q*, of suitable flexible material—such as leather—and the remainder of the space in the recess R between the flexible packing-ring *q* and the cover *r* of said recess is filled with ordinary fibrous packing material.

Air from the case I, passing through the trunnions, enters the perforations in the flange *p*, and presses the ring *q* against the fibrous packing material and prevents the escape of air around the conduit S. The conduit S is secured in the stand B by means of the screw-bolt *s* and nut *t*. The opposite end of the drum is provided with a removable trunnion, *d*, which is secured to the head of the drum by bolts, (not shown,) and is supported by the stand E, and the trunnion forms a support for the shaft F. It will thus be observed that the shaft is supported by said trunnion *d*, the bearing *a'* in the stand C, and the spider *o* in the trunnion Q.

Upon the interior surface of the projecting flange *u* of the drum I is formed gearing *v*, with which pinions *w w'*, located upon the opposite sides of the shaft F, engage. These pinions are placed upon opposite sides of the shaft in order to secure the journal *d* of the revolving drum against any side-thrust, and upon the shafts G and H, which carry the pinions *w w'*, are secured pinions *d' e'*, which engage with a gear-wheel, *h'*, secured to the shaft F.

T T represent driving-pulleys mounted upon the shafts G and H, to which power is applied. The gearing of the drum I and the shaft F is so proportioned that they each make the same number of revolutions, but in opposite directions, and by this compound motion of the drum in one direction and the crank-shaft in the opposite direction each piston O makes a complete stroke while the drum and the crank-shaft are making one-fourth of a revolution, or each piston makes four complete strokes while the drum and the shaft complete one revolution.

It is obvious that instead of applying power to the pulleys T, mounted upon the shafts G and H, a pulley may be secured to the shafts F and the pulleys T dispensed with. In the latter instance the pinions *d'* and *e'* would communicate the motion of the shaft F to the revolving drum I through the medium of the pinions *w w'* and the internal gear, *v*.

To lubricate the cylinders and journals of the pitmen, a quantity of oil is poured into the case, and is dashed about by its revolution and all of the parts freely lubricated.

The several parts being constructed substantially as described, the operation is as follows: Power from an ordinary motor—such as a steam-engine—is applied to the driving-pulleys, and the drum I rotated in one direction and the crank-shaft F in the opposite direction, which causes the pistons O in the several cylinders to reciprocate and compress the air admitted through the valved heads P between said heads and pistons, and delivers it into the interior of the drum I, from which it is discharged through the hollow trunnions Q and the conduit S, and conducted to the place of consumption.

Having thus fully described my invention, what I claim is—

1. An air-compressor consisting of a case or drum adapted to revolve in a given direction, and a series of cylinders communicating with the atmosphere, and having valved pistons connected to a shaft adapted to revolve in a direction opposite to that of the drum, and suitable gear for imparting motion to the drum and shaft, substantially as described.

2. An air-compressor consisting of a case or drum provided with a series of fixed detachable trunk-cylinders having valved heads, and pistons, and hollow trunnions, in combination with a crank-shaft supported by the trunnions on both sides of the case and connected to the pistons, substantially as described.

3. An air-compressor consisting of a revolving case or drum provided with a series of valved cylinders, and pistons communicating with the atmosphere and the interior of the drum, and a hollow trunnion having a recess or chamber formed in its outer end, in combination with a fixed conduit having a perforated flange on its inner end and packing surrounding said conduit, substantially as described.

4. A revolving case or drum having a hollow trunnion provided with a recess in its outer end, in combination with a fixed conduit having a perforated flange on its inner end, a flexible packing-ring bearing against said flange, and suitable fibrous packing between the flexible ring and the cover to said packing-chamber, substantially as described.

5. An air-compressor consisting of a drum having a series of cylinders, and pistons connected to a crank-shaft, and provided with a master-gear, in combination with a master-wheel on the crank-shaft and pinions adapted to mesh with said master gear and wheel and impart motion thereto in opposite directions, substantially as described.

6. An air-compressor consisting of a drum provided with a series of cylinders and pistons communicating with the atmosphere and the interior of the drum, a crank-shaft connected to the pistons of the cylinders, and provided with a gear-wheel secured thereon, in combination with a suitable pinion mounted upon a driving-shaft, substantially as described.

7. The means for connecting the pistons to the crank-shaft, which consists of a pitman having hinged caps or half-boxes attached to each end thereof, and a rod hinged to one of said caps and adapted to pass through the cap at the opposite end, and suitable means for adjusting the parts, substantially as described.

8. A cylinder and piston having removable heads, in combination with a pitman connecting the piston with the crank-shaft and provided with an adjusting mechanism for both journal-boxes, arranged at the outer end of said pitman, substantially as described.

9. A case or drum provided with a series of detachable trunk-cylinders and pistons

connected to a crank-shaft, and having a fixed hollow trunnion forming a discharge-passage on one side, a removable trunnion and a geared flange on the opposite side, in combination with pinions mounted upon suitable shafts and engaging with said geared flange on opposite sides of the axis of the drum, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

PETER L. WEIMER.

Witnesses:
Z. M. KAUFMAN,
J. WEIDMAN MURRAY.