C. NEUMANN.

AIR COMPRESSOR.

APPLICATION FILED OCT. 11, 1906.

907,859.

Patented Dec. 29, 1908.

4 SHEETS—SHEET 1.

Fig. 1.

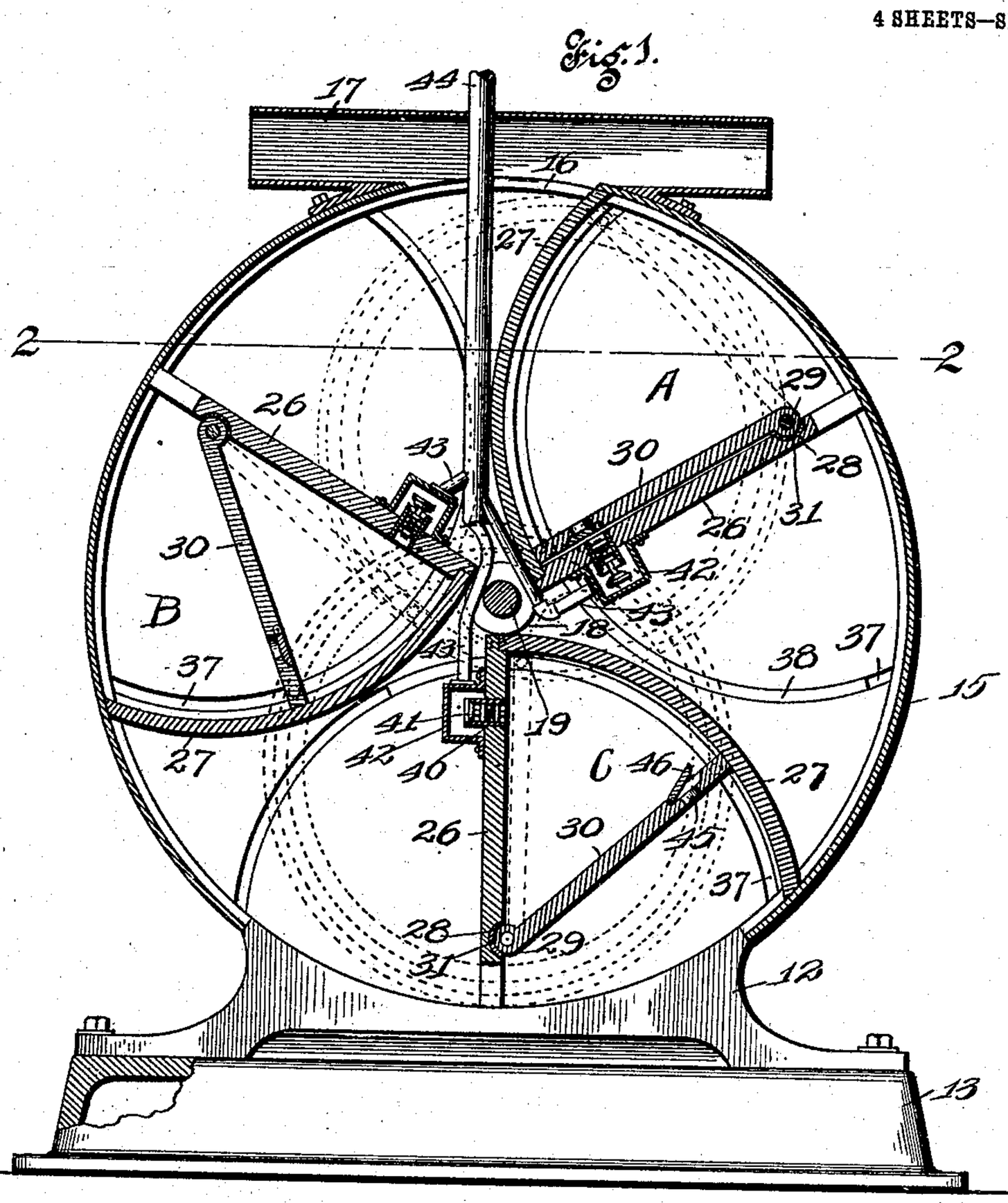
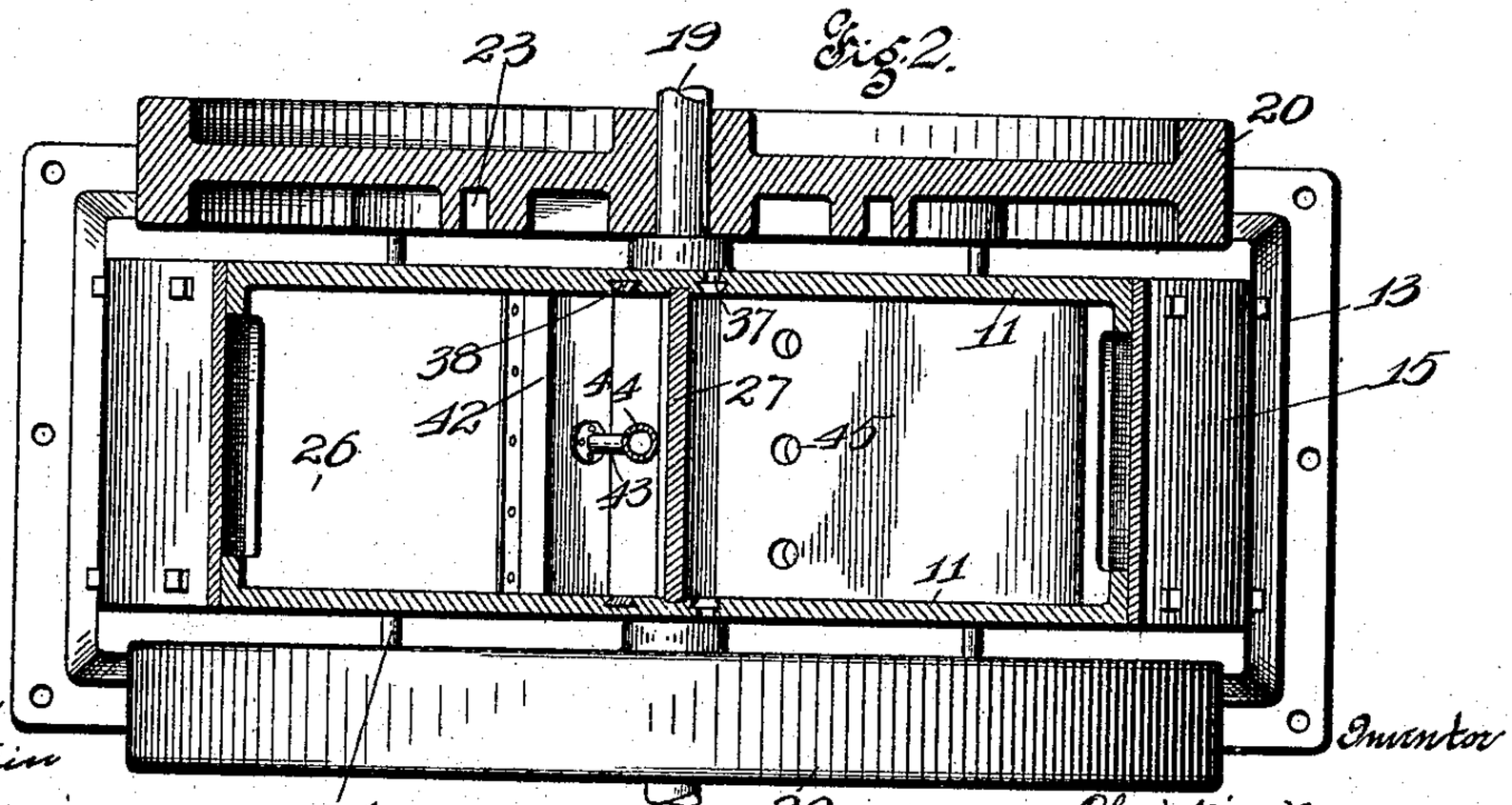



Fig. 2.

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4 SHEETS—SHEET 2.

Fig. 3.

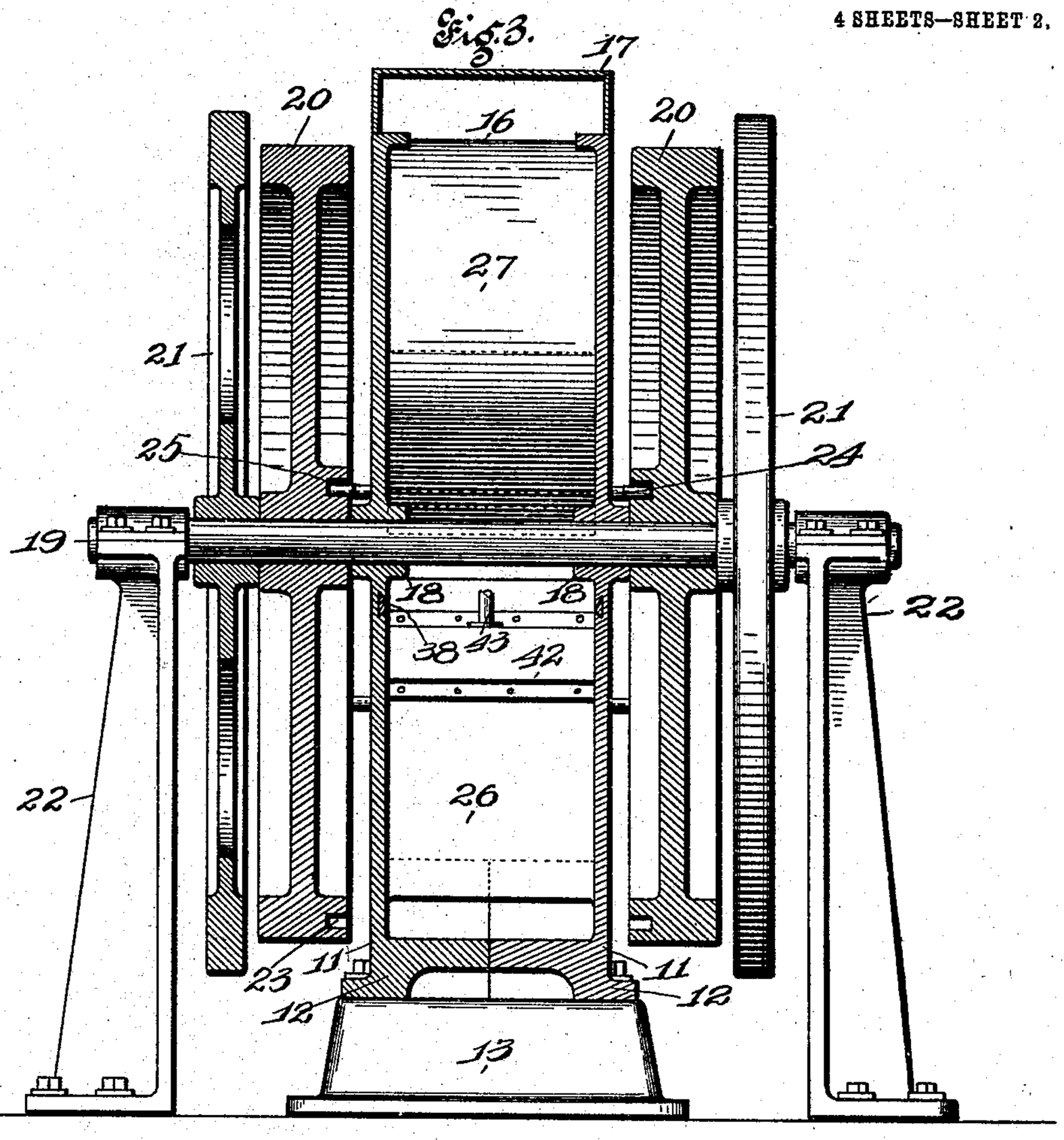
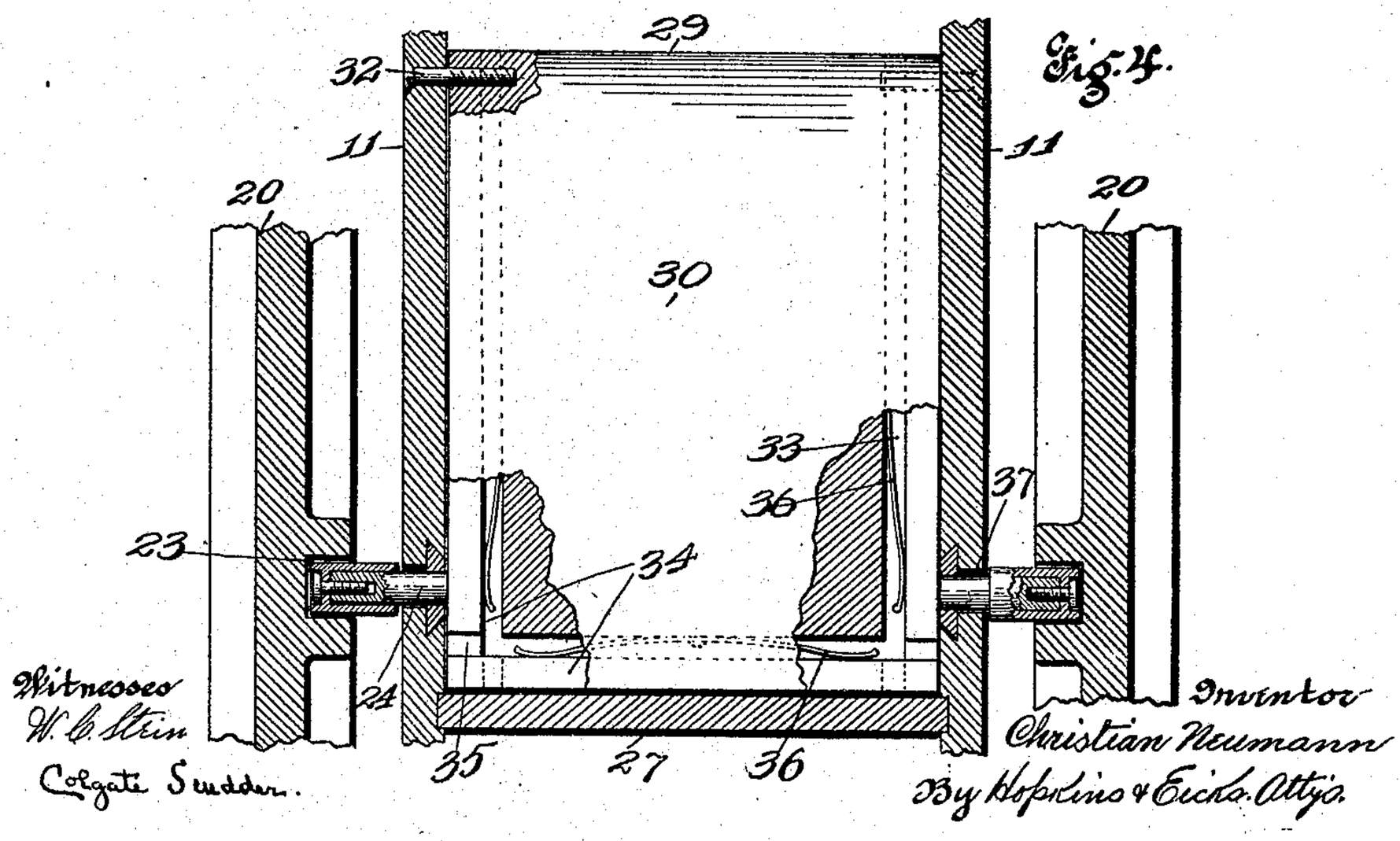



Fig. 4.

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4 SHEETS—SHEET 3.

Fig. 5.

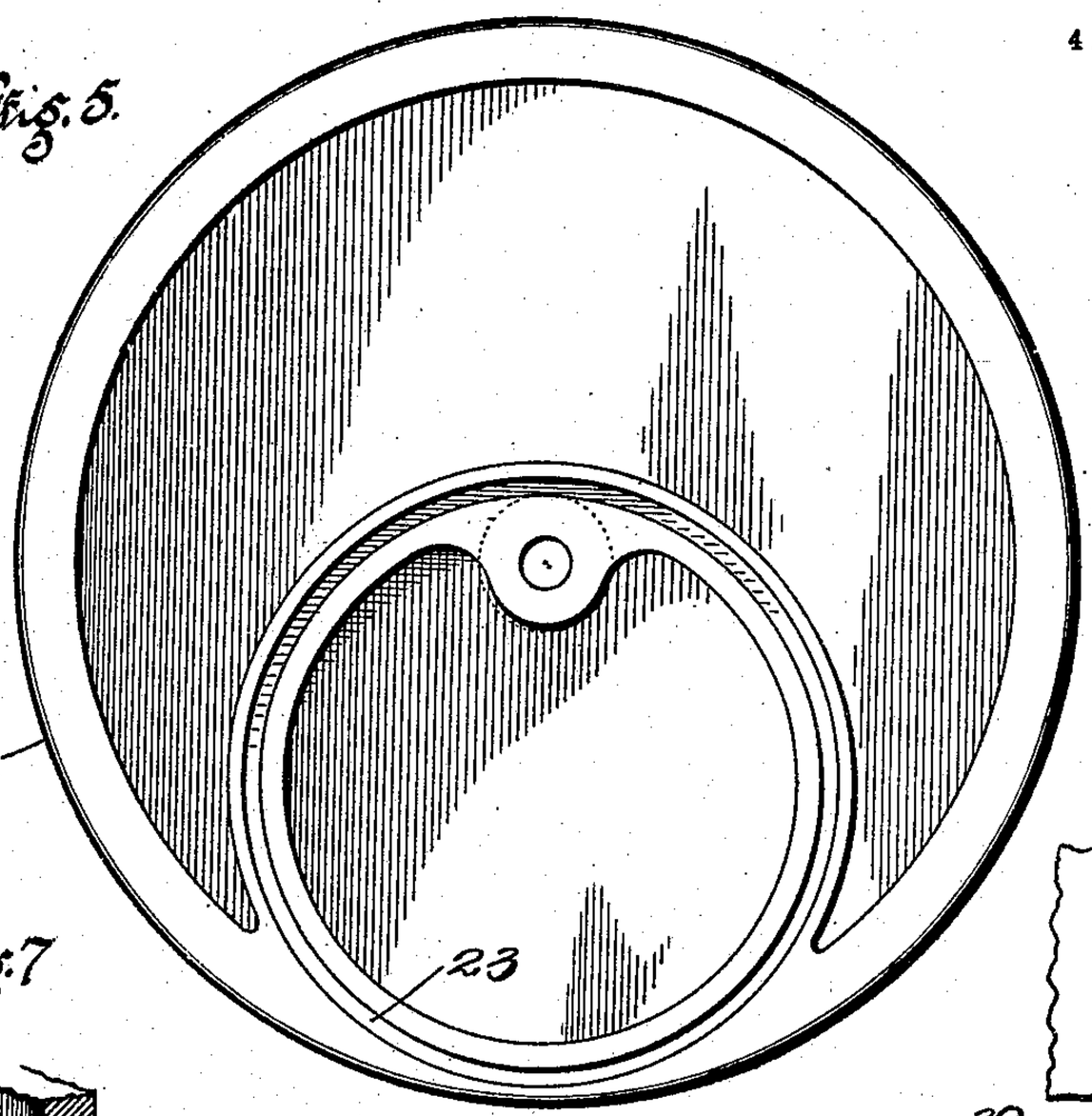


Fig. 8

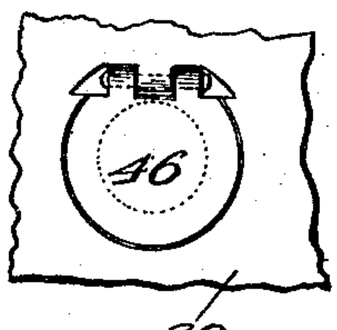


Fig. 7

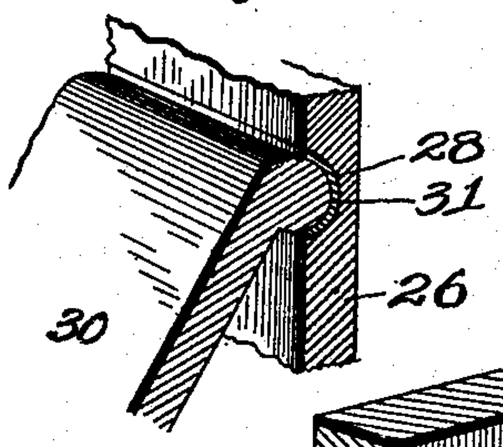


Fig. 6




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4 SHEETS—SHEET 4.

Fig. 9.

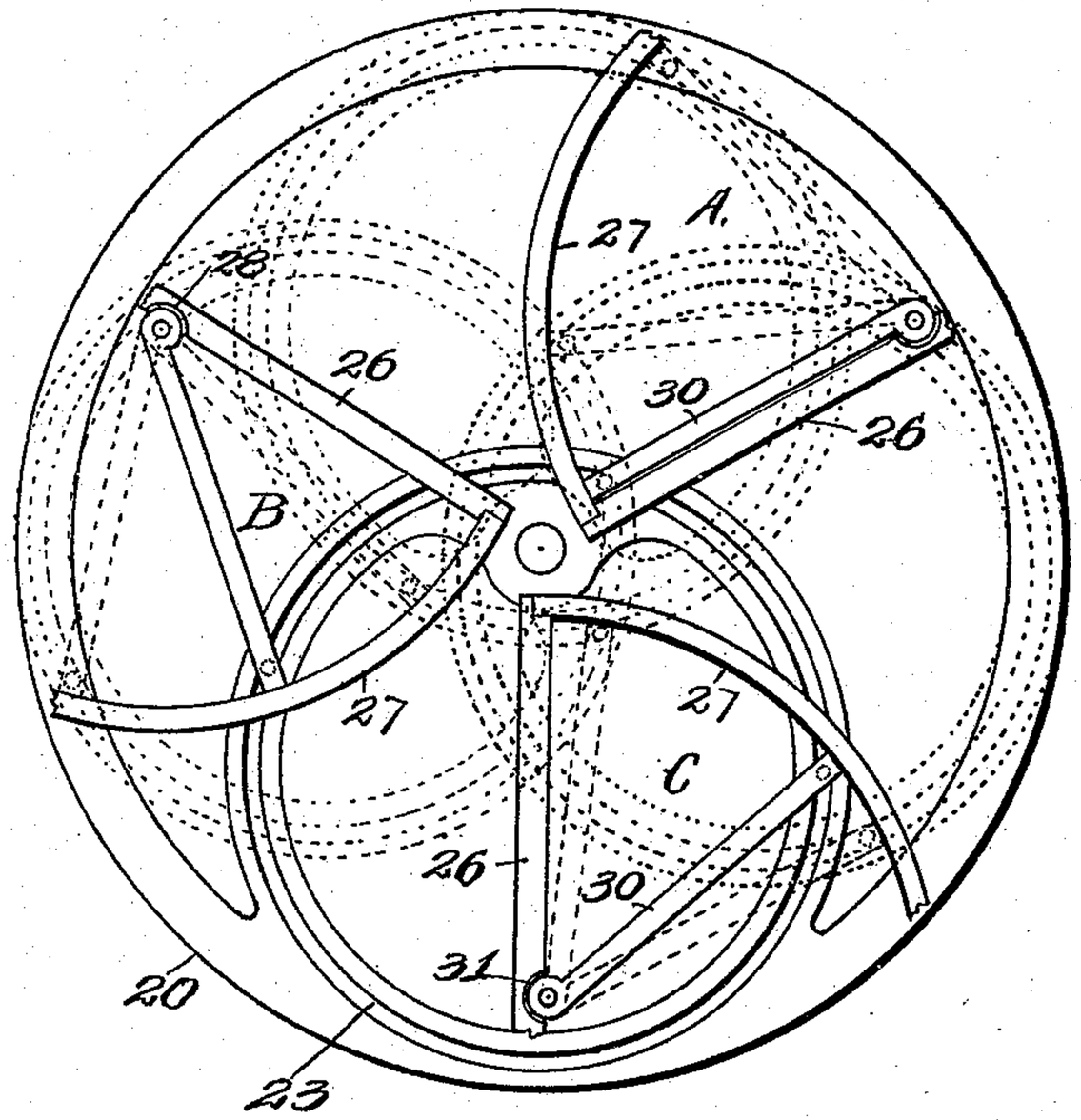
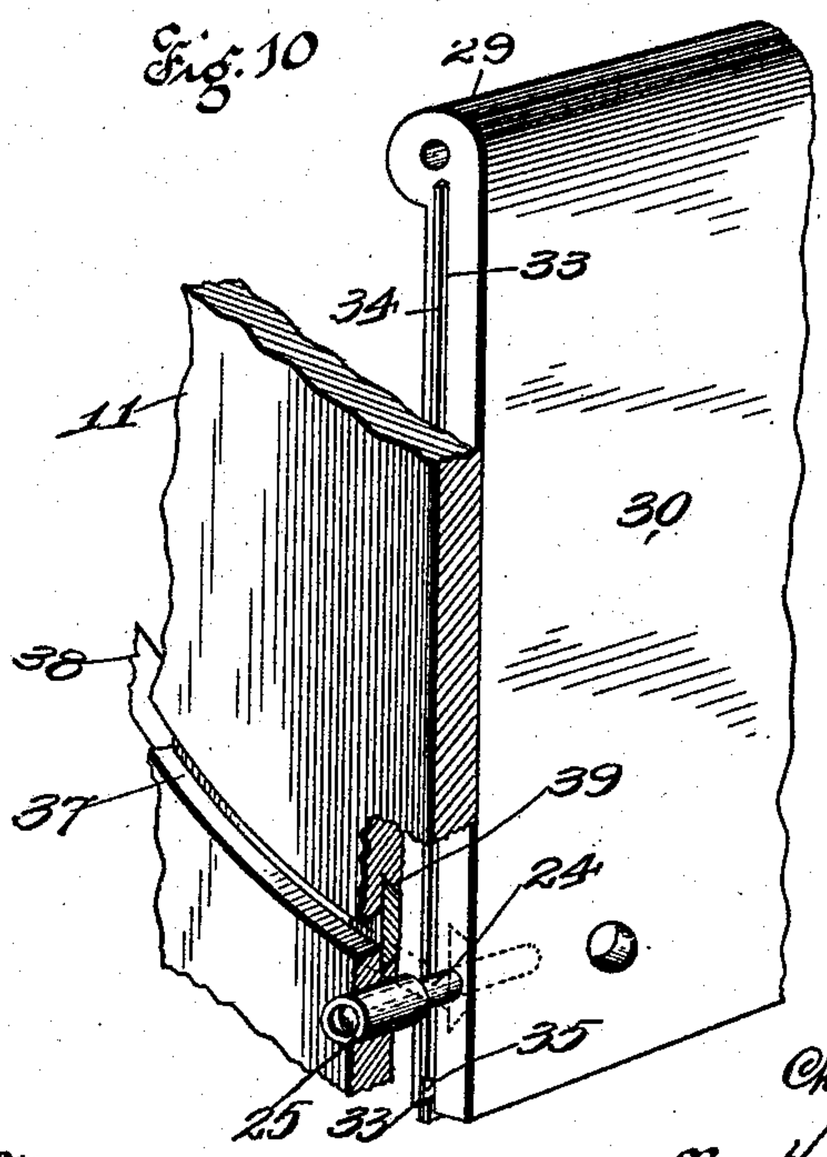



Fig. 10

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# UNITED STATES PATENT OFFICE.

CHRISTIAN NEUMANN, OF ST. LOUIS, MISSOURI, ASSIGNOR, BY MESNE ASSIGNMENTS, TO NEUMANN AIR POWER COMPANY, A CORPORATION OF MISSOURI.

## AIR-COMPRESSOR.

No. 907,859. Specification of Letters Patent. Patented Dec. 29, 1908.

Application filed October 11, 1906. Serial No. 338,490.

*To all whom it may concern:*

Be it known that I, CHRISTIAN NEUMANN, a citizen of the United States, and resident of St. Louis, Missouri, have invented certain new and useful Improvements in Air-Compressors, of which the following is a specification.

My invention relates to improvements in air compressors, and consists in the novel arrangement, construction and combination of parts as will be fully hereinafter described and claimed.

The object of my invention is to construct a device whereby air is compressed and delivered at a continuous pressure by a plurality of pistons operating alternately by the movement of a revolving cam.

A further object of my invention is to construct a device having a plurality of pistons arranged to be operated by a revolving cam, each being continuously operated to produce a steady flow of compressed air.

In the drawings: Figure 1 is a vertical, central, sectional view of my complete invention. Fig. 2 is a horizontal, sectional view taken on the line 2—2 of Fig. 1. Fig. 3 is a vertical, central cross-sectional view. Fig. 4 is an enlarged detail sectional view of a portion of the casing and cam mechanism and the arrangement of one of the pistons. Fig. 5 is a detail side elevation of the cam made use of in carrying out my invention. Fig. 6 is an enlarged detail sectional perspective view of one of the pistons and piston chamber showing their position and construction. Fig. 7 is a detail sectional view of a portion of the piston and retarder head showing the air tight knuckle joint. Fig. 8 is a detail view of the flap valve used on the piston. Fig. 9 is a diagrammatic view showing the cam and pistons in their various positions during the revolution of the cam. Fig. 10 is a detail, perspective view of a portion of the piston and side wall of the casing with parts broken away and in section.

In the construction of my invention I provide a casing composed of two side walls 11, each provided with a support 12 which are mounted upon a base frame 13. The outer peripheries of the side walls 11 are suitably flanged to support a sheet covering 15 which is held thereon by bolts or the like. The sheet covering 15 is cut away at the top to provide an air inlet 16 and over this inlet and upon the casing is mounted a hood 17, its ends being open to permit the influx of air.

The center of the side walls 11 are provided with hubs 18 which act as a bearing for a center shaft 19 upon which are mounted a combination cam and drive wheel 20, one located on each side of the casing. Upon said shaft are also provided fly wheels 21, and the ends of said shaft are additionally supported in bearings 22.

The drive wheel 20 is provided with a cam slot 23 in which extend piston operating pins 24 provided with rollers 25.

In the casing I provide a plurality of compression chambers each of which is formed by a stationary wall 26 and a stationary curvilinear wall 27. The said walls are held in position against the side walls of the casing by being embedded in grooves and tightly clamped to provide air-tight joints. In the inner surface of the wall 26 I provide a socket 28 in which operates the knuckle joint 29 of the piston 30, and in order to provide a perfect air-tight joint between the knuckle and the socket I provide a suitable packing 31 such as Babbitt metal or the like, and the said knuckle is held in hinged position by the bolts or screws 32. In both sides and lower edge of the piston 30 I provide elongated slots 33 in which are inserted strips of packing material 34, the ends so arranged as to overlap each other as indicated by the numeral 35, and in the slots are placed springs 36, the tendency of which is to keep the packing in contact with the inner surface of the compression chamber so as to prevent the escape of air.

Near the free end of the piston and to each side I secure in any desirable manner piston pins 24 which project through slots 37 formed in the side walls 11. The said slots 37 are curvilinear in form and extend from the stationary wall 26 to the flange formed on the outer periphery of said side walls permitting the piston 30 to have full swing, and in order to prevent leakage through the said slots 37 I provide a dove-tailed follower 38 operating in a dove-tailed groove 39 formed in the inner surface of each wall, and attached to the piston so that during the operation of the piston the followers 38 will keep the slots 37 closed.

Each stationary wall 26 is provided with a plurality of discharge openings 40 in which are set valves 41 so arranged as to open

when the piston 30 operates inwardly, compressing the air within the compression chamber and discharging it through the valves and into the hood 42 and out through the pipe 43 into a delivery pipe 44 which may be connected to a suitable reservoir for retaining the compressed air.

In each piston 30 I also provide a plurality of openings 45 in which are located valves 46 which operate during the outward movement of the piston so as to permit air to pass within the compression chamber.

In Figs. 1 and 9 I show the cams in their lowest position and when in this position the piston in the compression chamber A has finished its compression, the piston in the compression chamber B is in the act of compressing and the piston in the compression chamber C is in its outward movement to allow a fresh supply of air to enter into the compression chamber through the valve openings 45. By referring to Fig. 9 the various positions of the pistons in relation with the several positions of the cam are indicated by solid and dotted lines

The principle involved in my foregoing invention is the same as that involved in my contemporaneously pending application for Letters Patent for improvements in pumps, Serial No. 340,221, filed October 23, 1906; and the mechanism here involved differs from the mechanism in my said other invention to the extent of the arrangement and location of the valves to which such difference is made necessary by the differences between the functions of an air compressor and a pump.

It will be observed from the drawings and the foregoing description that the series of compression chambers is arranged about a common center and that the piston in each chamber is hinged at such a point within the chamber that the movement of the pistons for the purpose of compressing air is toward that common center. This grouping of the compression chambers and arrangement of the pistons is such as to utilize the power exerted by the cam with the greatest possible efficiency; the force exerted by the cam upon the piston increasing as the piston is forced nearest to the highest point of compression within the compression chamber.

The cam mechanism shown and described is substantially a single mechanism, and the same result can be attained by the use of a single cam as is attained by the simultaneous employment of corresponding cams located upon opposite sides of the machine; but in practice, the double form shown and described is preferable as affording a safeguard against breakage.

It is obvious that other mechanism might be employed to accomplish the result of driving the pistons successively toward the common center about which the compression chambers are grouped for the purpose of compressing air.

Having fully described my invention, what I claim is:

1. An air compressor comprising a casing, a plurality of compression chambers located in said casing, pistons hingedly mounted in said compression chambers, pins carried by said pistons and projecting through the walls of the casing, cams communicating with said pins and operating said pistons alternately during the revolution of said cams, substantially as specified.

2. An air compressor comprising a casing mounted on a base, a plurality of compression chambers located in said casing, pistons hingedly located in said compression chambers, pins located on said pistons and projecting through slots formed in the walls of said casing, rollers mounted upon said pins, cams communicating with the rollers on said pins and operating the pistons during their revolution, substantially as specified.

3. An air compressor comprising a casing, a shaft extending through said casing, drive wheels and fly wheels mounted upon said shaft, compression chambers located in said casing, a piston located in each of said compression chambers, roller pins carried by said pistons and projecting through slots formed in the walls of the casing, followers attached to said pistons and operating in the slots formed in said walls, said roller pins operating in cam grooves formed in the drive wheels for operating said pistons alternately compressing air in the compression chambers during the revolution of the drive wheels, and expelling the air through valves, substantially as specified.

4. An air compressor comprising a casing, a series of compression chambers located within the casing, and equidistant from the center of the casing, pistons hingedly mounted in said compression chambers, pins carried by said pistons and projecting through the walls of the casing, and a cam mechanism controlling the operations of said pins, whereby the free end of the piston is driven toward the center of the casing to effect a compression of the air within the compression chamber, substantially as described.

5. An air compressor comprising a plurality of compression chambers radially mounted about a common center, pistons hingedly mounted in each of the said chambers and operating toward a common center, inlet valves located on said pistons and discharge valves located in the walls of the chambers, and a cam mechanism whereby said pistons are successively actuated, substantially as described.

6. In an air compressor, the combination of a plurality of compression chambers radially disposed about a common center, a piston hingedly mounted in each of said com-

pression chambers so that its compressive movement shall be toward the common center of said compression chambers, a single cam mounted eccentrically with reference to said common center, and means whereby each of said pistons is slidably engaged with said cam, whereby said pistons are successively actuated, substantially as described.

7. In an air compressor, the combination of a plurality of compression chambers radially disposed about a common center, a piston hingedly mounted in each of said compression chambers so that its compressive movement shall be toward said common center, a single cam mounted eccentrically with reference to said center, and slidable engaging means between said cam and each of said pistons, whereby said pistons are successively and continuously actuated to produce a continuous flow of compressed air of substantially uniform pressure, substantially as described.

8. An air compressor comprising a casing, a plurality of compression chambers located in said casing, pistons hingedly mounted in said compression chambers, pins carried by said pistons and projecting through the walls of the casing, and a single cam mounted without the wall of the casing and engaging with said pins to operate the said pistons, substantially as described.

9. An air compressor comprising a casing mounted on a base, a plurality of compression chambers located in said casing, pistons hingedly located in said compression chambers, pins located on said pistons and projecting through slots formed in the walls of said casing, rollers mounted upon said pins, and a single cam engaging with the rollers on said pins to operate the pistons, substantially as described.

10. An air compressor comprising a plurality of compression chambers diverging from a common center, a piston hingedly mounted in each of said chambers and at the outward end thereof, inlet valves located on said pistons and discharge valves located in the wall of the chamber, cams operating said pistons compressing air and expelling it in a flow by the alternate operation of the pistons, substantially as specified.

11. An air compressor, comprising a casing, a plurality of compression chambers located in the casing and diverging from a common center, pistons hingedly mounted at the outermost end of each of the compression chambers, a center shaft, a cam operating on the center shaft to operate the pistons toward a common center for compressing air within the chambers, substantially as specified.

In testimony whereof, I have signed my name to this specification, in presence of two subscribing witnesses.

CHRISTIAN NEUMANN.

Witnesses:
ALFRED A. EICKS,
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