H. W. N. COLE.

COMPRESSOR.

APPLICATION FILED AUG. 23, 1909.

983,605.

Patented Feb. 7, 1911.

3 SHEETS—SHEET 1.

Fig. 2,

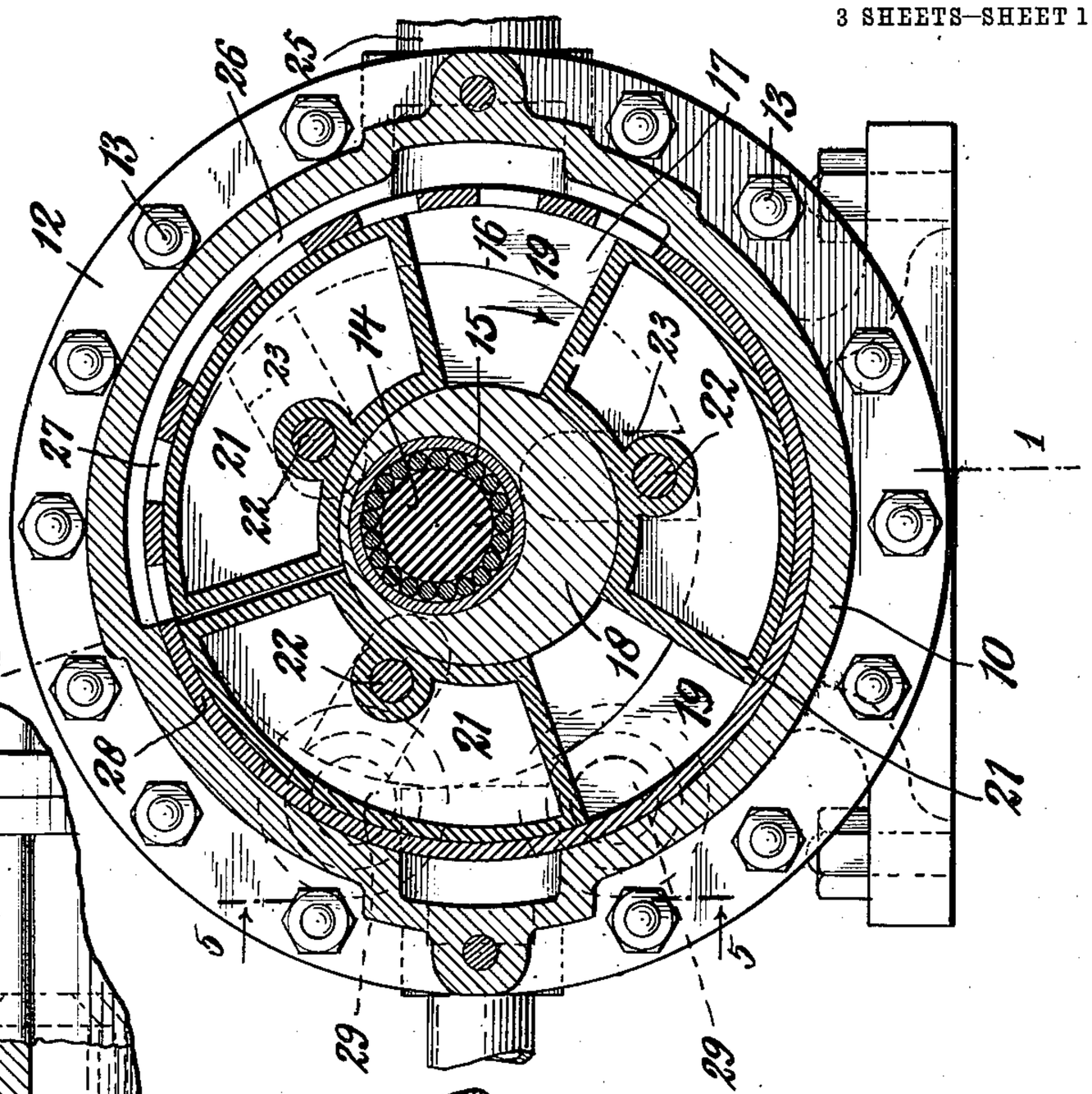


Fig. 3,

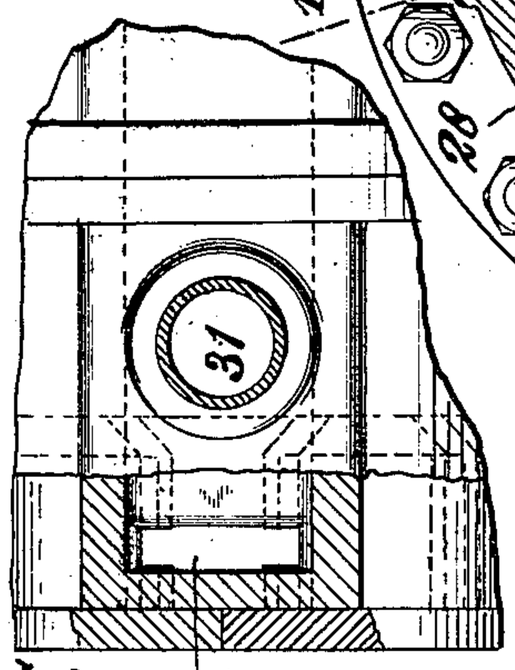
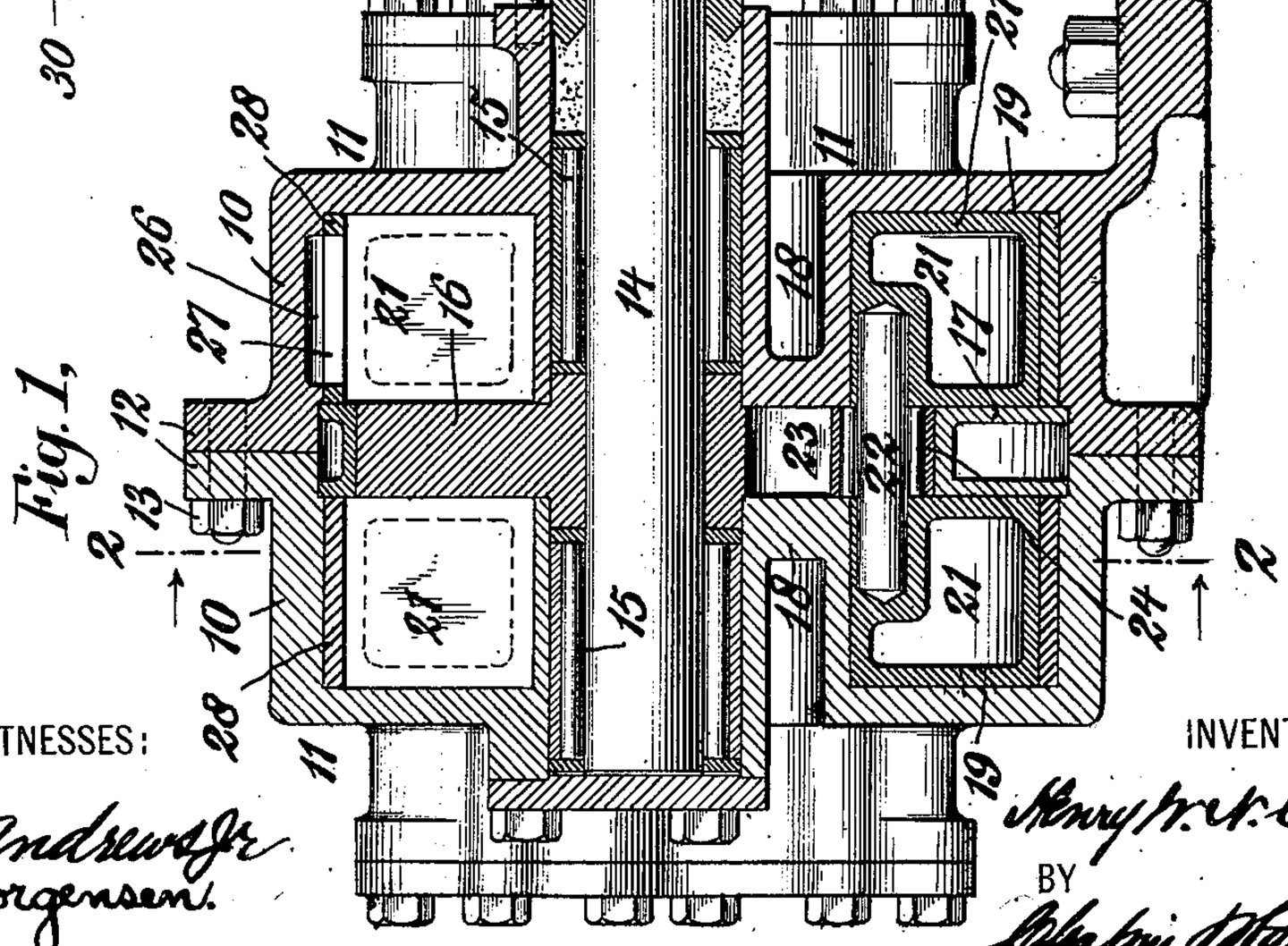


Fig. 1,



WITNESSES:

H. S. Andrews Jr.

B. Jorgensen.

INVENTOR

Henry W. N. Cole

BY

his ATTORNEYS

983,605.

H. W. N. COLE.

COMPRESSOR.

APPLICATION FILED AUG. 23, 1909.

Patented Feb. 7, 1911.

3 SHEETS—SHEET 2.

Fig. 3,

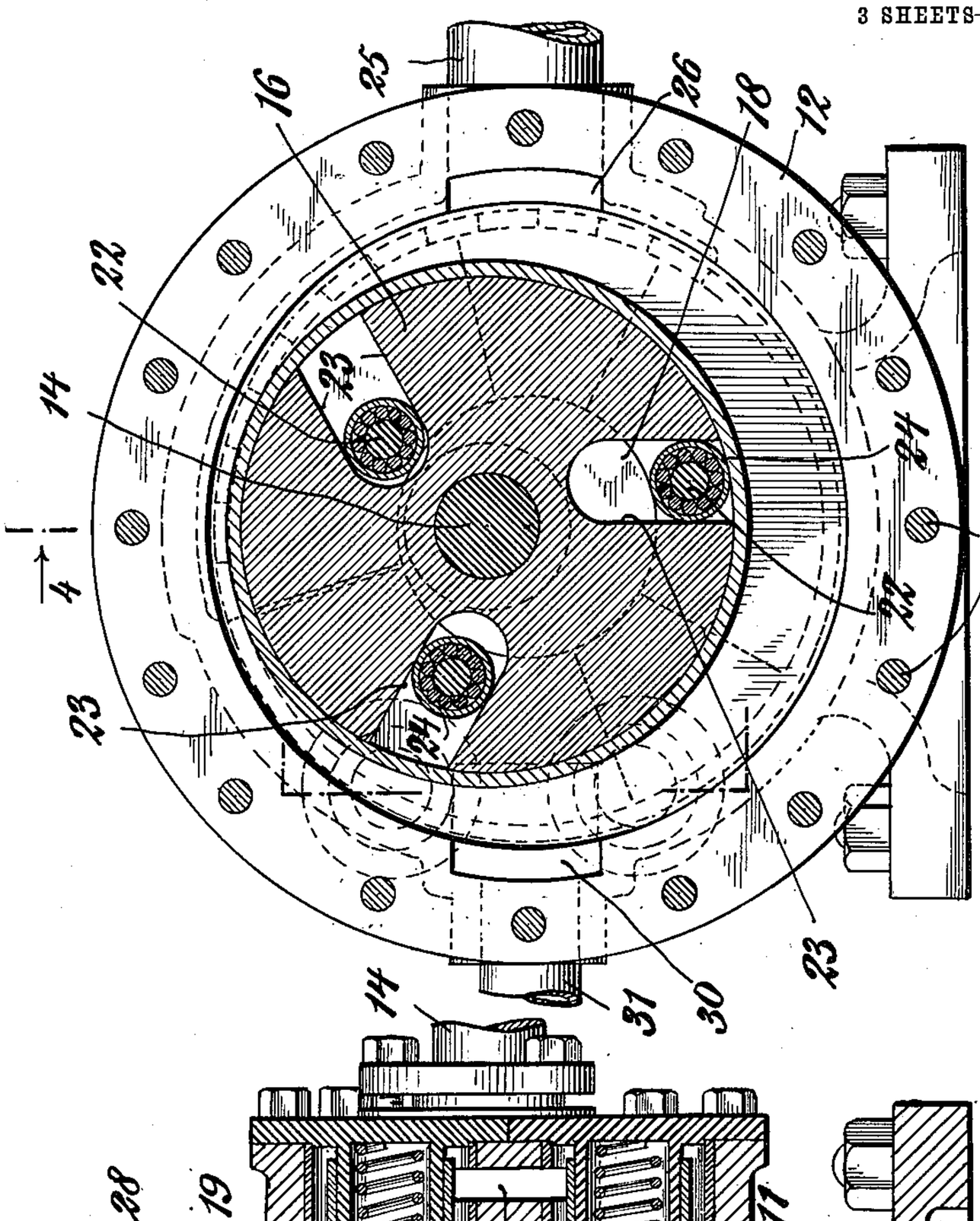
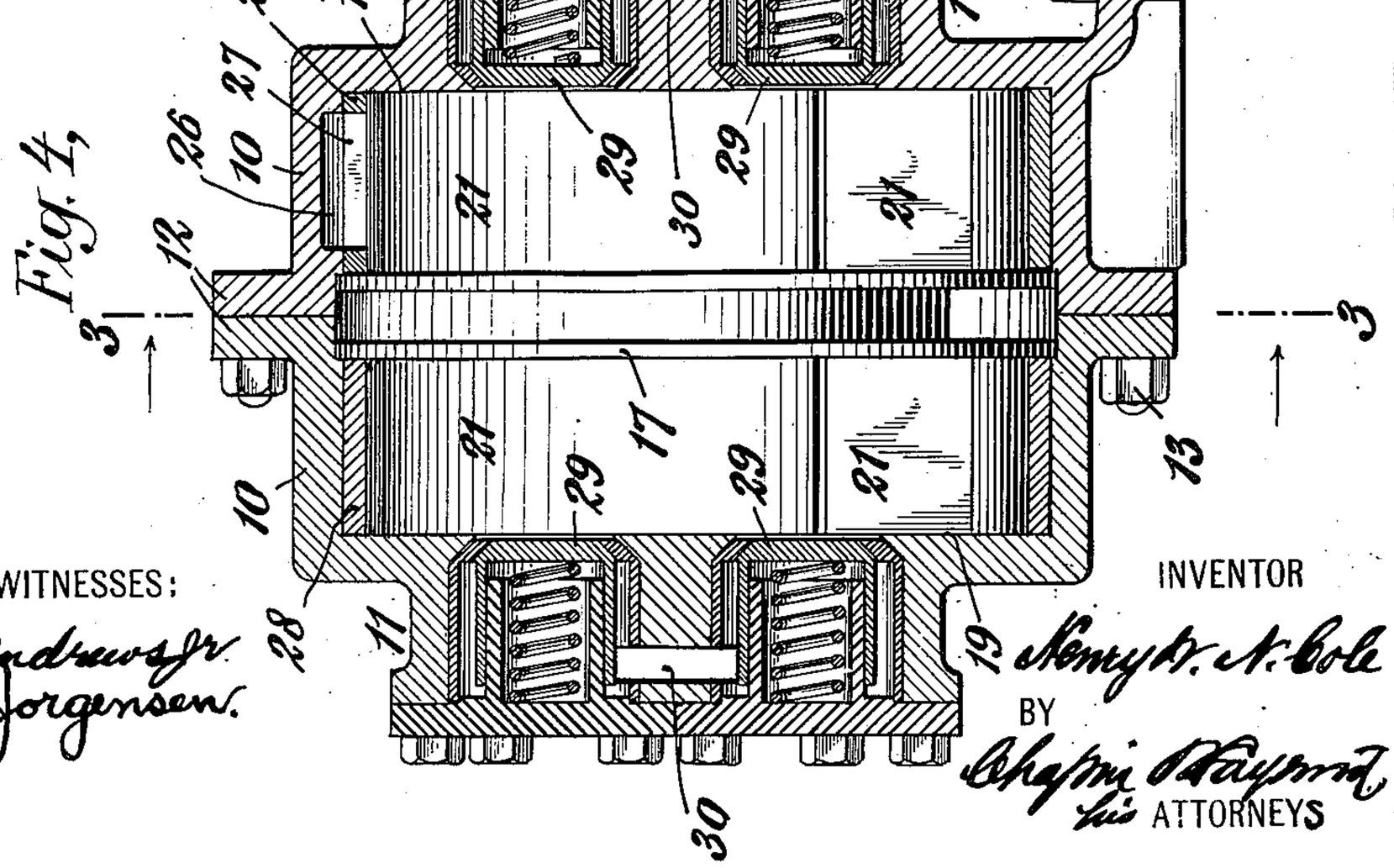


Fig. 4,



WITNESSES:

L. Landrews Jr.
B. Jorgensen.

INVENTOR

Henry W. N. Cole

BY

Church Kayward

his ATTORNEYS

H. W. N. COLE.

COMPRESSOR.

APPLICATION FILED AUG. 23, 1909.

983,605.

Patented Feb. 7, 1911.

3 SHEETS—SHEET 3.

Fig. 7.

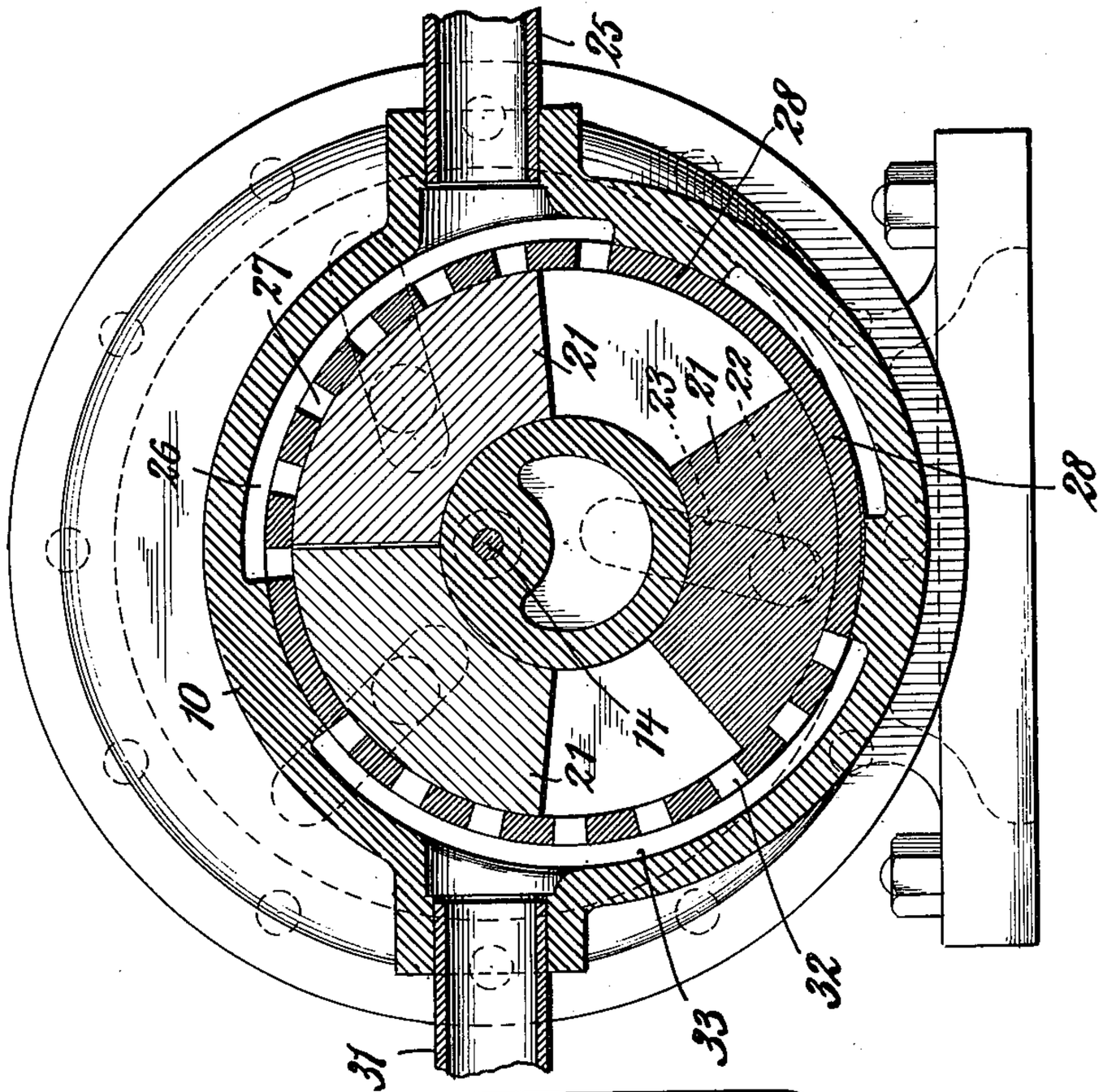
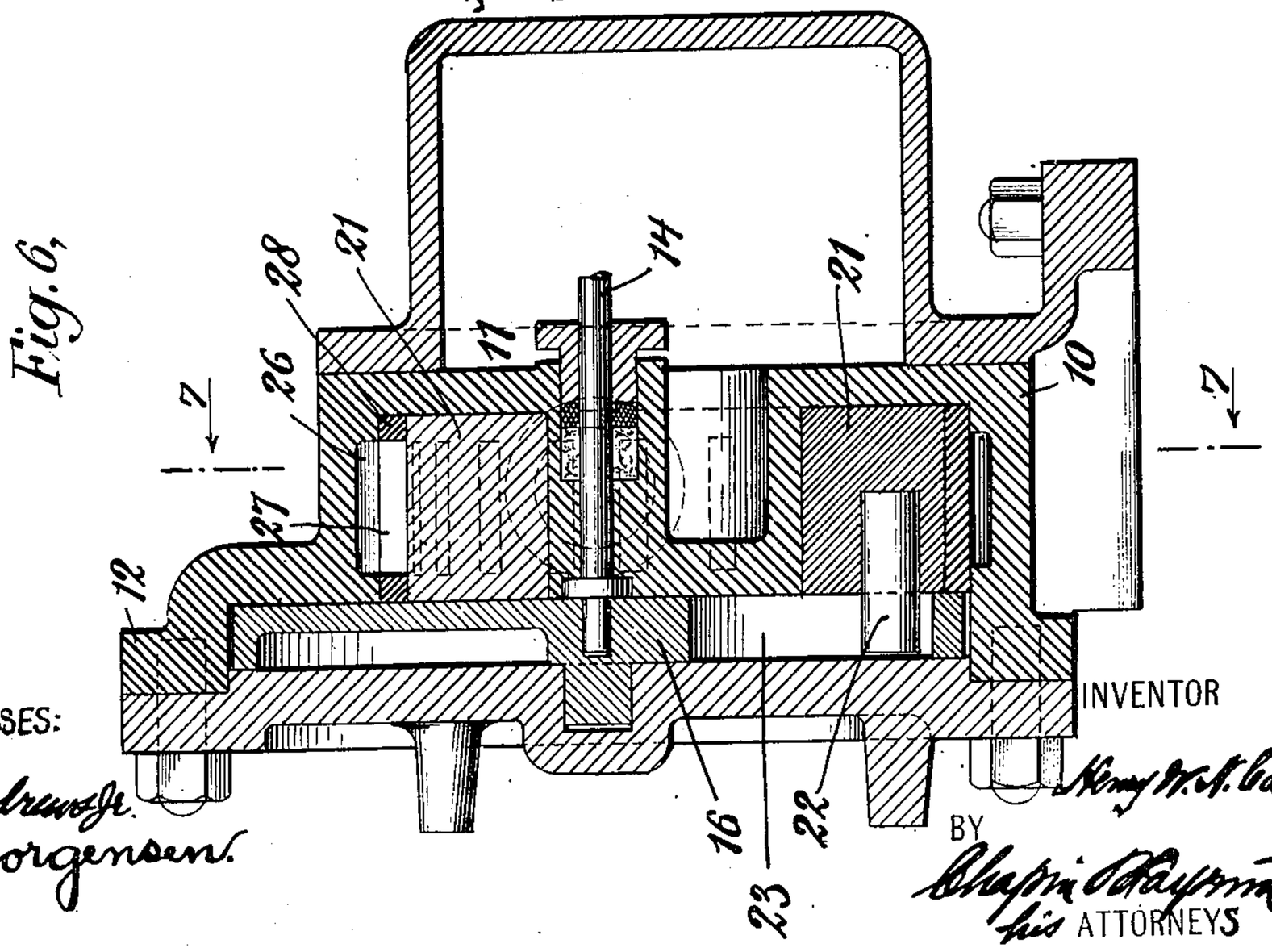


Fig. 6.



WITNESSES:

L. Sandrock Jr.

B. Jorgensen.

INVENTOR

Henry W. N. Cole

BY

Chapin & Chapin

his ATTORNEYS

UNITED STATES PATENT OFFICE

HENRY W. N. COLE, OF BROOKLYN, NEW YORK.

COMPRESSOR.

983,605. Specification of Letters Patent. Patented Feb. 7, 1911.

Application filed August 23, 1909. Serial No. 514,085.

To all whom it may concern:

Be it known that I, HENRY W. N. COLE, a citizen of the United States of America, and a resident of Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Compressors, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

My invention relates to compressors, and particularly to rotary compressors.

The object of my invention is to provide a simple form of rotary compressor which will compress fluid to a comparatively high degree without requiring the expenditure of an excessive amount of power; to reduce to a minimum the clearance spaces so as to permit of a high degree of compression; to so construct and arrange the working parts as to substantially balance the resistance during the revolution of the machine; to provide long bearing surfaces for the moving parts so as to reduce wear to a minimum; and to provide a structure which is easy and inexpensive to manufacture.

To these ends my invention consists in a compressor having an annular chamber therein, and provided with a plurality of segmental pistons mounted to travel orbitally in the chamber, together with means for imparting such orbital movements to the pistons and at the same time to move adjacent pistons toward and away from each other endwise so as to alternately increase and decrease the area between them.

My invention also consists in many novel details of construction and combinations of parts such as will be fully pointed out hereinafter.

In order that my invention may be fully understood, I will now proceed to describe an embodiment thereof, having reference to the accompanying drawings illustrating the same, and will then point out the novel features in claims.

In the drawings: Figure 1 is a view in vertical longitudinal section, the section being taken upon the plane of the line 1—1 of Fig. 2. Fig. 2 is a view in vertical transverse section, taken substantially upon the plane of the line 2—2 of Fig. 1. Fig. 3 is a view in central vertical transverse section through the compressor. Fig. 4 is a longitudinal section substantially upon the plane of the line 4—4 of Fig. 3. Fig. 5 is a detail sectional view upon the line 5—5 of Fig. 2. Fig. 6 is a view in central longitudinal section through a modified form of the compressor. Fig. 7 is a transverse sectional view thereof, taken upon the plane of the line 7—7 of Fig. 6.

Referring first to the structure shown in Figs. 1 to 5 inclusive, the casing will be seen to be made in two parts, each part comprising a substantially cylindrical portion 10, an end head 11, and a flange 12; studs and nuts 13 engage the two flanges to unite the two members together. The shaft 14 of the compressor is mounted in suitable bearings 15 in the casing members, the axis of the said shaft being disposed eccentrically with respect to the cylindrical portions 10 of the casing.

Secured fast to the shaft 14 is a central head or disk 16, the periphery whereof is concentric with the axis of the said shaft. The eccentric space between the periphery of this head or disk and the inner bore of the cylindrical portions of the casing is filled up by an eccentric spacing piece 17, the spacing piece 17 and the head or disk 16 serving to divide the space inclosed by the casing members into two chambers 19. These two chambers are of true annular form concentric with the axis of the casing, and hence, of course, eccentric with respect to the axis of the shaft 14, a central hub 18 projecting inward from each of the end head portions 11 of the casing, such hubs being concentric with the casing but eccentric with respect to the shaft 14.

Mounted within the chambers 19 are two sets of segmental piston members 21,—one set of three in the present instance being mounted in each said chamber. The segmental members of the two sets are connected together in pairs by means of pins 22, each pair including corresponding members of the two sets, the pins thereof extending across from one to the other and passing through slots 23 in the head or disk 16 upon the shaft 14. Anti-friction bearings 24 are conveniently provided around the pins 22 for the purpose of engaging the walls of the slots 23. The said slots 23 are arranged at an angle with respect to lines radial of the disk or head, or, in other words, are tangential with respect thereto, the walls thereof constituting cam surfaces which act to advance and retard the segmental heads or

pistons in the revolution of the machine. This connection of the piston members with the head or disk 16 compels the said segmental pistons to rotate with the disk or head—that is to say, it compels an orbital movement of the said pistons around the chambers 19 as the head or disk 16 rotates, but the axis of rotation of the disk or head being eccentric with the path of movement of the said segmental pistons, the said segmental pistons move away from and toward the axis of rotation of the head or disk in the revolution thereof, and in so doing are compelled to follow the path prescribed by the walls of the slots 23;—this, as previously stated, compels the segmental piston members successively to advance and retreat with respect to the head or disk in its revolution. The relative advance and retardation of these piston members causes openings of varying sizes to be formed between the ends thereof, the parts being so designed as to cause the ends of two pairs of the segments to come substantially together at one point in the revolution of the machine, this space to be gradually enlarged to a maximum, and then gradually reduced until it is finally closed up again at the end of a full revolution. I utilize this varying area for compression purposes by introducing fluid to be compressed between the piston heads as they are drawing apart to increase the area, and discharge the same as the heads are drawing together to reduce the area. Fluid to be compressed is admitted through an inlet pipe 25, thence through channels 26 formed as recesses in the inner walls of the cylinder portions 10 of the casing members, and thence through openings 27 in lining shells 28 with which the said cylindrical portions 10 are preferably provided, into the chambers 19.

In the position in which the parts are shown in Fig. 2 of the drawings a practically full charge has just been received between the adjacent ends of two of the segmental pistons, while another charge is about to be received between the rear end of one of the said segmental pistons and the forward end of the next one (the direction of rotation of the compressor is in the direction of the arrow of Fig. 2). As the pistons move around and the fluid is compressed such compressed fluid is discharged through valves 29 disposed in the end heads 11 of the casing members. These valves permit the fluid to pass from the chambers 19 into passages 30 whence it passes through a discharge pipe into a suitable receiver. (Not shown). The valves 29 may be of any convenient form, being here shown as of the usual puppet construction, spring closed against return of the fluid.

In Figs. 6 and 7 I have shown a slightly modified structure in that but a single set of segmental pistons is employed in lieu of the two sets employed in the construction shown in the other figures. Moreover, I have dispensed with the discharge valves and instead of discharging the compressed fluid through the end heads, I have provided openings 32 therefor in the lining shell 28 similar to the inlet openings 27, the said openings communicating with a channel 33 formed as a recess in the cylindrical portion of the casing, said channel communicating with the discharge pipe 31. In this case the compressor may be said to be "valveless," or, in other words, the pistons themselves act as valves, the said pistons completing their discharge after the area between the adjacent heads thereof has been reduced to a minimum, just prior to the drawing in of a fresh charge as the area between the said heads commences to increase.

The form of compressor shown in Fig. 7 is particularly adapted for small-size machines, and I have therefore simplified the structure by employing plain bearings instead of anti-friction bearings, and have made many of the parts solid instead of hollow.

It will, of course, be understood that in both cases the compressor is driven by power applied to the shaft 14. It will also be understood that by reversing the operation above set forth and employing motive fluid under initial pressure, the compressor may be operated as a rotary engine instead of as a compressor; this, of course, is a mere inversion which is common to rotary compressors and engines.

What I claim is:

1. A rotary compressor comprising a casing having a cylindrical bore and provided with a stationary end head, a rotary head in the said bore opposite the said stationary end head, the axis of rotation of the said head being eccentric with respect to the axis of the said bore, and a plurality of segmental pistons mounted in the said bore between the said heads, the said rotary head being provided with tangential slots and the said pistons with abutments for coengagement therewith, for the purpose set forth.

2. A rotary compressor comprising a cylinder, a plurality of segmental pistons mounted concentrically within the cylinder, and a head mounted to rotate eccentrically with respect to the cylinder and pistons, the said head and pistons being provided the one with tangential slots and the other with pins for coengagement therewith, for the purpose set forth.

3. A rotary compressor comprising a cylinder, a plurality of segmental pistons mounted concentrically within the cylinder, a head mounted to rotate eccentrically with respect to the cylinder and the pistons, and having tangential slots therein, and pins

carried by the said segmental pistons, arranged to enter the said slots and to be guided thereby.

4. A rotary compressor comprising a casing, a central diaphragm, and an eccentrically mounted rotating web or disk which divides the space inclosed by the cylinder into two annular chambers, two sets of segmental pistons,—one set in each said annular chamber,—means connecting the said pistons of the two sets together in pairs, said means extending through tangential slots in the said web or disk.

HENRY W. N. COLE.

Witnesses:
D. HOWARD HAYWOOD,
LYMAN S. ANDREWS, JR.