No. 850,208. PATENTED APR. 16, 1907.

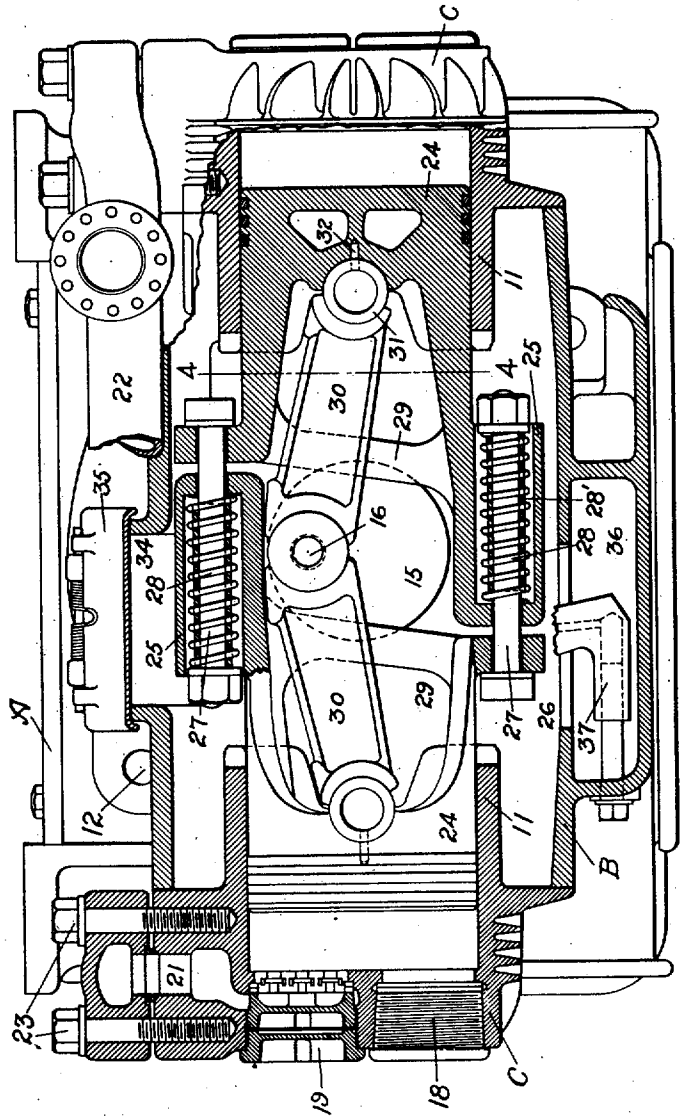
E. J. BRING.

AIR COMPRESSOR.

APPLICATION FILED MAY 7, 1904.

2 SHEETS—SHEET 1.

Fig. 1.



WITNESSES:

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INVENTOR:

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2 SHEETS—SHEET 2.

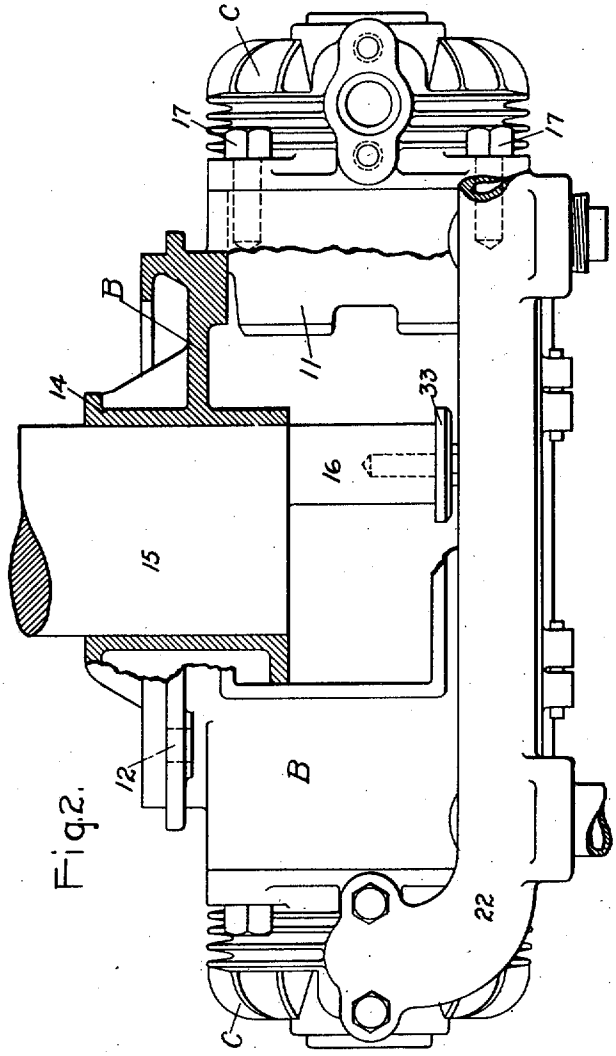


Fig. 2.

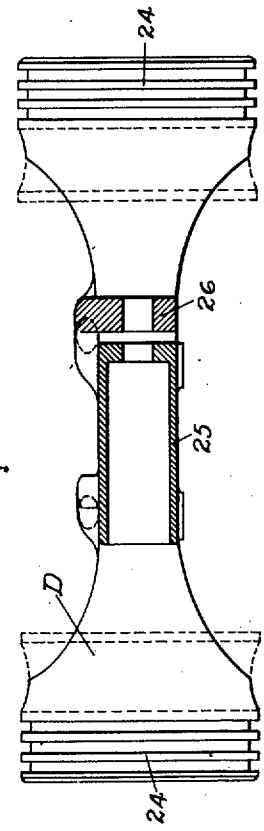


Fig. 3.

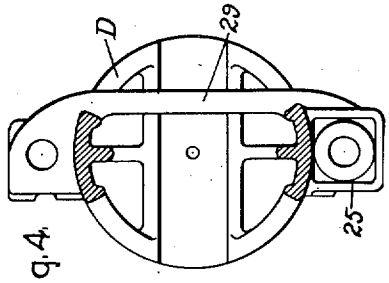


Fig. 4.

WITNESSES:

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UNITED STATES PATENT OFFICE.

EINAR J. BRING, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

AIR-COMPRESSOR.

No. 850,208. Specification of Letters Patent. Patented April 16, 1907.

Application filed May 7, 1904. Serial No. 206,913.

To all whom it may concern:

Be it known that I, EINAR J. BRING, a subject of the King of Norway and Sweden, residing at Schenectady, county of Schenectady, State of New York, 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 has for its object to provide means for automatically taking up the wear of the parts and in other respects improving the arrangement and construction of the compressor.

It is well known that in the employment of electrically-driven air-compressors in railway work a disagreeable vibration and noise is often caused by the operation of the compressor. Much of this vibration is due to lost motion caused by wear upon the bearings of the connecting-rod and the plunger and crank-pin to which it is connected. Various means have been proposed for taking up this wear, so as to improve the operation of the compressor.

My invention comprises novel means for doing this.

In carrying out the invention in connection with the double-acting compresor I employ a piston having two heads arranged on opposite sides of the driving-crank, to which the heads are connected by two connecting-rods. Means are also provided for yieldingly drawing the heads toward each other, so that at all times the connecting-rods are firmly held in place, and any wear that may occur between them and the crank-pin or the bearing-pins on the piston-heads is automatically taken up.

My invention also comprises other features and advantages, which will more fully appear upon reference to the following detailed description, taken in connection with the accompanying drawings, and the scope of the invention will be particularly pointed out in the appended claims.

In said drawings, Figure 1 is a longitudinal vertical section of a compressor embodying the features of my invention. Fig. 2 is a plan view of the compressor, illustrating the manner of connecting the heads of the compressor, parts being removed and parts shown in section. Fig. 3 is a plan view of the compressor-piston; and Fig. 4 is a sectional elevation of said piston, the plane of section being indicated by the line 4 4 of Fig. 1.

Throughout these several figures like characters refer to like parts.

The driving-motor, which is preferably an electric motor, is inclosed within a suitable casing A, adapted to be secured to the under side of the car-body. The compressor, which is of the double-acting type, comprises a frame head or casing B, ends or heads C for said casing, alined cylinders 11, cast integral with said heads, and a double-headed piston D. The frame-head B is removably secured to the end of the motor-casing A by bolts passing through the flange 12 and is provided with a bearing 14 for one end of the driving-shaft 15. This shaft is provided with a crank-pin 16, which extends beyond the bearing 14 into the interior of the casing B. The compressor-heads C are removably secured to the casing B by bolts 17 and are provided with inlet-valves 18, outlet-valves 19, and outlet-passages 21, which communicate with the common delivery-pipe 22, the ends of which are secured to the heads C by bolts 23. Thus it will be apparent that at any time either head C may be readily removed by simply removing bolts 23 and 17, thereby permitting access to the interior of the compressor.

The piston D comprises two heads 24 24, which are adapted to reciprocate in the cylinders 11 and to compress the air which is admitted through the inlet-valves 18 and force it through the outlet-valves 19 and the passage 21 to the delivery-pipe 22. Each piston-head is part of a casting which includes a spring-case 25, a projection 26, and a strengthening-brace 29. The spring-case of each casting lies adjacent to the projection of the other casting, and a yielding connection, which tends to draw the piston-heads toward each other, is provided by bolts 27 and compression-springs 28. The bolts pass freely through openings in the projections 26 through spring-cases 25 and are surrounded by the coiled springs 28 in the spring-cases. The head of each bolt bears against the projection 26, and a nut at the other end receives the thrust of the spring 28, which bears at its opposite end against the interior of the spring-case, as clearly illustrated. The crank-pin 16 of the driving-shaft extends into the space between the braces 29

and through the connecting-rods 30 transmits its motion to the piston. These connecting-rods are provided at opposite ends with bearings which at their inner ends abut against the crank-pin 16 and at their outer ends similarly bear upon hollow wrist-pins 31, removably secured by pins 32 to the interior of the piston-heads 24. The inner ends of the connecting-rods 30 are held against undue lateral movement on the crank-pin 16 by a washer 33.

The upper side of the frame-head B is provided with an opening 34 and a cover 35 therefor. Through this opening access may be had to the interior of the compressor for the purpose of adjustment and renewal of the parts therein. The lower side of this casing B is also provided with the basin 36, designed to hold lubricating-oil, which is distributed to the wearing parts of the compressor by means of a pump 37. This pump constitutes the subject-matter of a separate application filed by me, and its operation not being necessary to an understanding of the present invention need not be described herein.

In the operation of the compressor it will be apparent that any wear which may occur between the bearings of the connecting-rods and the crank-pin or the wrist-pins will be automatically taken up by the springs 28, which by drawing the piston-heads toward each other always hold the connecting-rods in place, and thereby prevent pounding. In order to prevent the heads 24 striking the end of the cylinders 11 in case any of the springs should break, I provide each of the bolts 27 of the spring connection between the piston-heads with a bushing 28', which is of such length that when the connecting-rods are horizontal it will just engage the interior of the spring-casing 25, and thereby prevent further separation of the piston-heads. Further, it will be apparent that a broken spring will not be wholly useless, but that the broken parts will expand into engagement and will ordinarily still possess enough power to practically perform their function. The springs are at no time subjected to the strain due to the compression of the air; but these strains are taken up by the connecting-rods. The maximum load on the springs occurs when the compressor is pumping against no pressure, since at that time there is nothing but the springs to resist the momentum of the piston at the ends of its stroke. It will also be noted that at the end of each stroke, which is the point where the greatest power is required to hold the piston-heads together, the springs are at their maximum compression, while at the middle of the stroke when the minimum restraining power is required the springs are at their minimum compression. This arrangement thus permits a most efficient operation, since the spring-pressure conforms throughout to the operative conditions, and springs of minimum size may be employed.

It will be apparent to those skilled in the art that many alterations and modifications may be made in the construction herein disclosed without departing from the spirit and scope of my invention. I therefore do not desire to limit myself to the particular construction shown, but aim to cover by the terms of the appended claims all such alterations and modifications.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. The combination of two piston-heads, elastic means connecting said piston-heads and tending to draw them together, a bearing in each head, a crank-pin between said bearings, and a connecting-rod located between each of said bearings and the crank-pin and held in position by said elastic means.

2. The combination of two piston-heads, a bearing in each head, a crank-pin between said bearings, a pair of connecting-rods each loosely engaging one of said bearings and said crank-pin, and an elastic connection between said piston-heads for holding the parts together.

3. The combination of two piston-heads, elastic means connecting said heads together and tending to draw said heads toward each other, a driving-shaft located between said heads, and transmitting means between said shaft and heads including a pair of connecting-rods connected so that the wear of the parts is automatically taken up by the said elastic means.

4. The combination of two piston-heads, elastic means connecting said heads together and tending to draw said heads toward each other, a driving-crank located between said heads, and connecting-rods compressed between said crank and said piston-heads by said elastic means.

5. The combination of two piston-heads, a spring connecting said heads and tending to draw them together, a driving-crank located between said heads, and two connecting-rods bearing at their inner ends against the crank-pin and at their outer ends against said heads.

6. The combination with an electric motor and a crank driven thereby, of an air-compressor comprising a double-acting piston having two heads, a spring connecting said heads and tending to draw them together, and connecting-rods between said crank and piston located so as to have the wear of their parts taken up automatically by said springs.

7. The combination of a double piston made up of two castings each comprising one piston-head and a spring-case formed inte-

gral therewith, springs located in said cases and arranged to draw the parts of the piston toward each other, and driving means connected with said piston so that the wear of the parts is automatically taken up by said springs.

8. The combination of a double-headed piston, a driving-crank located between the piston-heads, bearings on said heads, connecting-rods extending between said crank and bearings, and springs extending between said bearings and elastically pressing said bearings into engagement with the connecting-rods so as to automatically take up wear.

9. The combination of two piston-heads, elastic means tending to draw said heads toward each other, driving means located between said heads and operating to separate said heads against the action of said elastic means during their reciprocation, and means for limiting the amount of separation.

10. The combination of two piston-heads, a spring connection between said heads tending to draw them together, a driving-crank and connecting-rods located between said heads, acting to separate said heads against the spring tension during the rotation of the crank, and stops arranged to prevent a separation in excess of that needed by the connecting-rods.

In witness whereof I have hereunto set my hand this 6th day of May, 1904.

EINAR J. BRING.

Witnesses:

BENJAMIN B. HULL,

HELEN ORFORD.