June 8, 1965 K. H. RHODES 3,187,993

COMPRESSOR

Filed June 13, 1962

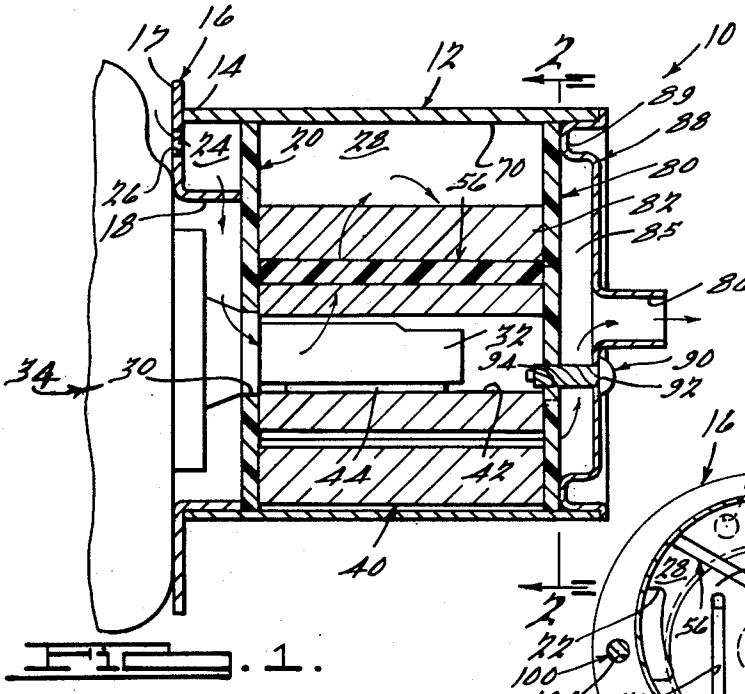


FIG. 1.

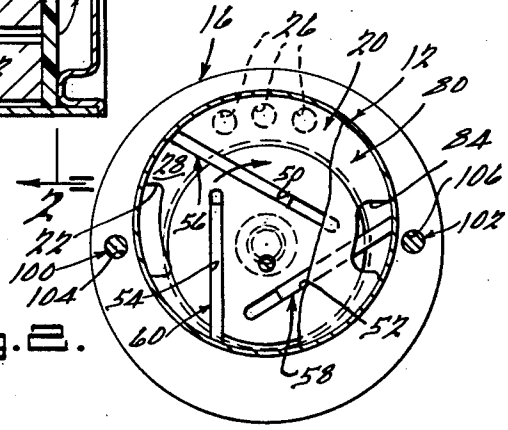


FIG. 2.

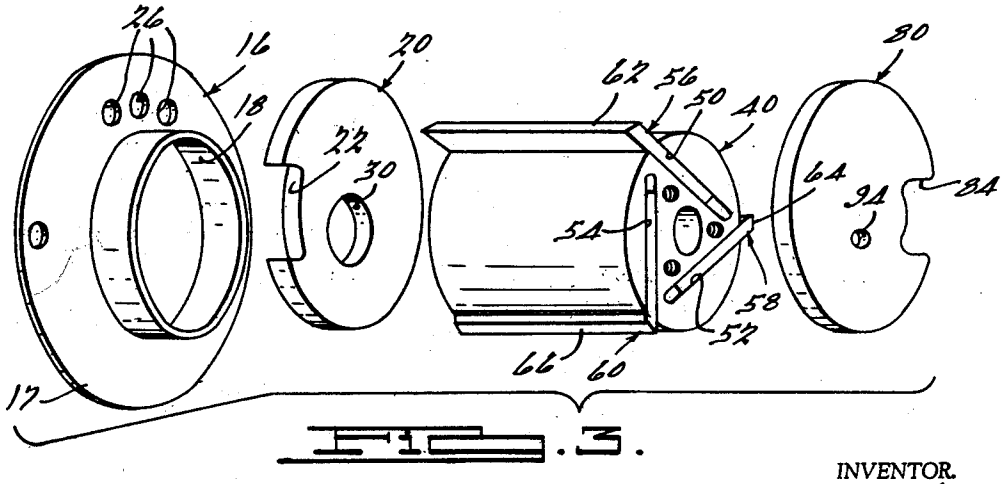


FIG. 3.

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COMPRESSOR

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1 Claim. (Cl. 230—152)

This invention relates generally to compressors, and more particularly to a novel air compressor of relatively simple and economical construction.

Commercially available air compressors are generally precision devices having a number of close tolerance components which inherently necessitate a high degree of care in manufacture and assembly. As a result, the manufacturing costs, and therefore the selling price of such known air compressors is relatively high.

The present invention is directed to a novel air compressor that can be produced at a minimum cost. The compressor consists of relatively inexpensive stampings, commercially available bar stock and tubing and plastic sheet material that is cut to a specific configuration.

Accordingly, one object of the present invention is an improved compressor.

Another object is an air compressor which is relatively inexpensive to manufacture and assemble.

Another object is an air compressor having a minimum number of components.

Other advantages of the instant invention will be apparent from the following specification, claim and drawings, wherein;

FIGURE 1 is a sectional view taken through the compressor of the instant invention shown in operative association with an electric motor;

FIG. 2 is a cross sectional view taken substantially along the line 2—2 of FIGURE 1; and

FIG. 3 is an exploded perspective view of the internal components of the air compressor with the housing thereof removed.

An air compressor **10**, in accordance with an exemplary constructed embodiment of the instant invention, comprises a housing **12** made from, for example, 16 gauge steel tubing. One end portion **14** of the housing **12** is secured to a rear end cap **16** comprising, for example, a steel stamping, as by brazing. The end cap **16** has a radial flange portion **17** and an axially extending flange **18** thereon, the flange **18** serving to position an inlet disc **20** axially of the housing **12**. The inlet disc **20** is made from, for example, nylon sheet material cut to a circular configuration complementary to the housing **12**, and is retained in the housing **12** in sealed relationship thereto.

The inlet disc **20** has an air inlet aperture **22** therein (FIG. 3) that communicates with an air inlet chamber **24** defined by the radial and axial flange portions **17** and **18**, respectively, on the cap **16**, the housing **12**, and the inlet disc **20**. Air entering through a plurality of air inlet apertures **26** in the radial portion **17** of the end cap **16** passes into the inlet chamber **24**, thence through the inlet aperture **22** in the inlet disc **20** into a compression chamber **28** internally of the housing **12**. The inlet disc **20** also has a circular aperture **30** therein for the acceptance of an output shaft **32** of an electric motor **34**.

A rotor **40** made from, for example, aluminum bar stock, has a central bore **42** therein for acceptance of the shaft **32** of the motor **34**. The rotor **40** is rotatable with the shaft **32**, torque being transmitted thereto as by a conventional key **44**.

The rotor **40** has three generally radially directed longitudinally extending slots **50**, **52** and **54** (FIG. 2) for the acceptance of a like plurality of vanes **56**, **58** and **60**, respectively. The vanes **56**, **58** and **60** are made from, for example, nylon sheet stock of suitable thickness so as to be freely slidable within the slots **50**, **52** and **54**, respectively. The vanes **56**, **58** and **60** move radially outwardly of the slots **50**, **52** and **54** in the rotor **40**, outer edge portions **62**, **64** and **66** of the vanes **56**, **58** and **60**, respectively, slidably engaging an inner peripheral surface **70** of the housing **12** thereby to define the compression chamber **28**. The vanes **56**, **58** and **60** are biased radially inwardly of the housing **12** due to engagement with the inner peripheral surface **70** thereof upon rotation and move radially outwardly relative to the rotor **40**, due to centrifugal force.

An outlet disc **80** made from, for example, nylon sheet material, is slidably juxtaposed against an outer end portion **82** of the rotor **40** to function as an end wall for the compression chamber **28**. The outlet disc **80** has a discharge aperture **84** therein (FIGS. 2 and 3) that communicates with a discharge chamber **85** and a discharge nipple **86** on an outer end cap **88**. The end cap **88** has an annular rib **89** therein that bears against and positions the outlet disc **80** axially of the housing **12**. The end cap **88** is secured to the housing **12** as by a press fit.

A drive pin **90** extends through a complementary aperture **92** in the end cap **88** and an aligned aperture **94** in the outlet disc **80** to position the disc **80** within the housing **12** and preclude rotation thereof. It is to be noted that the inner end portion of the drive pin **90** extends into the central bore **42** in the rotor **40** to avoid interference therewith.

As seen in FIG. 2, a pair of motor clamp bolts **100** and **102** extend through complementary apertures **104** and **106** in the end cap **16** to retain the compressor **10** in juxtaposed position against the motor **34**.

The housing **12** is so constructed so as to be eccentric to the drive shaft **32** of the motor **34**. This eccentricity is so designed that the inlet disc **20** is restrained from rotating, thereby locating the inlet aperture **22** and maintaining the outer diameter of the inlet disc **20** in sealed contact with the housing **12**. The drive pin **90** performs a similar function for the outlet disc **80**.

Air pressure in the chamber **85** between the outlet disc **80** and end cap **88** tends to bias the outlet disc **80** into intimate contact with the rotor **40**, thereby sealing the end faces of the rotor **40** and the blades or vanes **56**, **58** and **60**. Clockwise rotation of the rotor **40**, as shown in FIG. 2 of the drawings, is desirable.

Centrifugal force causes the blades or vanes **56**, **58** and **60** to move outwardly, as guided by the slots **50**, **52** and **54**, into sealing contact with the housing **12**, thereby forming the compression chambers **28** of varying volume as rotation causes the vanes to alternately extend and retract in the slots **50**, **52** and **54**. As the vanes **56**, **58** and **60** move radially outwardly, the volume of the chamber **28** increases and air is inducted into the compressor **10**. When the compression chamber **28** volume is at a maximum, the inlet aperture **22** is cut off and the outlet aperture **84** is uncovered. Upon continued rotation, the chamber **28** reduces its volume until, when volume is at a minimum, the outlet aperture **84** is cut off and the inlet aperture **22** is uncovered to induct additional air thereinto.

From the foregoing description, it should be apparent that the air compressor of the instant invention is of relatively simple construction, comprising a housing made from steel tube, end caps that are relatively simple stampings, inlet and outlet discs that are made of plastic sheet material with appropriate cutouts therein, a rotor made from aluminum bar stock by simply boring a central bore therein and cutting vane-accepting slots therein, and a plurality of centrifugally controlled vanes made from nylon sheet material that are slidable in the slots in the rotor.

It is to be understood that the specific construction of the improved compressor herein disclosed and described is presented for the purpose of explanation and illustration and is not intended to indicate limits of the invention, the scope of which is defined by the following claim.

What is claimed is:

An air compressor comprising

a cylindrical housing,

a pair of end caps at opposite ends of said housing having radially extending portions complementary to said housing and axially inwardly extending portions, respectively,

an inlet disc abutting the axially inwardly extending portion of the end cap at one end of said housing, said inlet disc and said end cap in conjunction with said housing defining a relatively large generally annular inlet chamber, said inlet disc having

an inlet aperture therein,

an outlet disc abutting the axially inwardly extending portion of the end cap at the other end of said housing, said outlet disc and the end cap at the other end of said housing in conjunction with said housing defining a relatively large generally cylindrical discharge chamber, substantially the entire area of said outlet disc being exposed to compressed air in said discharge chamber, said outlet disc having

an outlet aperture communicating with said discharge chamber

a generally cylindrical rotor between said inlet and outlet discs having

a central bore therein for the acceptance of a drive shaft and rotatable about an axis extending generally parallel to the central axis of said housing in radially spaced relation thereto, said rotor having

a plurality of generally axially extending slots extending relatively deeply into said rotor in spaced relation to and beyond the bore therein, and

a plurality of slidable nylon vanes in the slots in said rotor, said vanes slidably engaging the inner peripheral surface of said housing and said inlet and outlet discs to define a variable volume chamber to effect compression of the air therein upon rotation of said rotor relative to said housing, the bias of the compressed air in said discharge chamber on said outlet disc biasing said outlet disc against said rotor and said vanes which in turn are biased against said inlet disc thereby to effect a self energizing seal between said outlet disc, rotor, vanes and inlet disc.

References Cited by the Examiner

UNITED STATES PATENTS

1,496,222	6/24	Hill	230—141
1,660,563	2/28	Malbay	230—152
1,669,779	5/28	Reavell	230—152
1,728,321	9/29	Antonelli	103—136
1,861,706	6/32	McCracken	121—84
1,914,091	6/33	Hamilton	121—84
2,558,837	7/51	Frei	230—152
2,636,667	4/53	Frei	230—152
2,852,183	9/58	Breinig	230—152
3,057,304	10/62	Rohde	103—136
3,070,032	12/62	Rohde	103—136

FOREIGN PATENTS

136,385	10/47	Australia.

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