S. LARSSON.

MACHINE APPLICABLE AS PUMP, COMPRESSOR, OR MOTOR.

APPLICATION FILED DEC. 23, 1919.

1,348,814. **Patented Aug. 3, 1920.**

Fig. 1

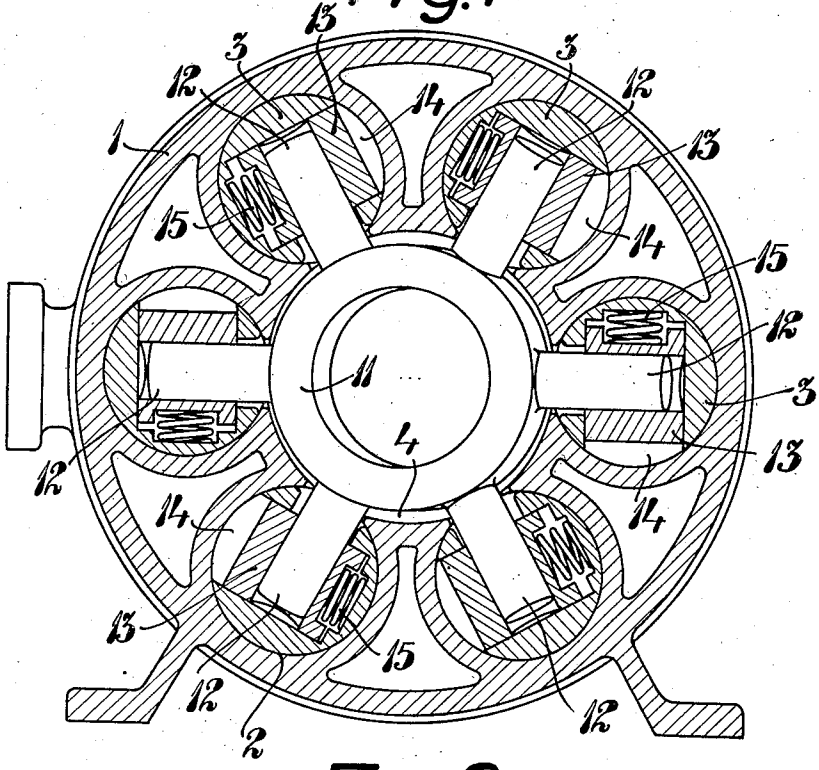
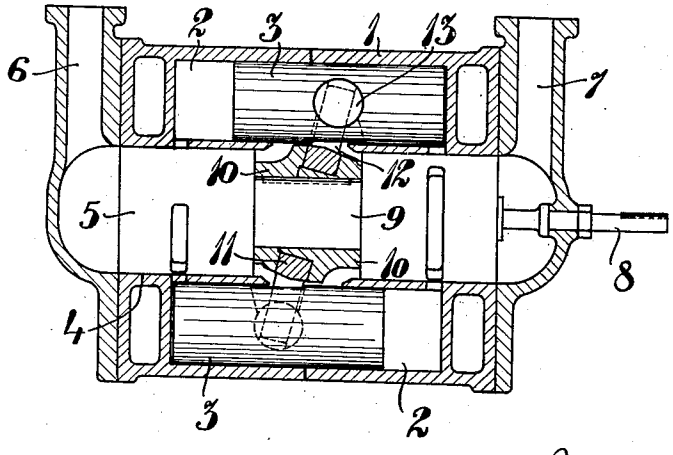


Fig. 2



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UNITED STATES PATENT OFFICE.

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MACHINE APPLICABLE AS PUMP, COMPRESSOR, OR MOTOR.

1,348,814. Specification of Letters Patent. Patented Aug. 3, 1920.

Application filed December 23, 1919. Serial No. 346,998.

To all whom it may concern:

Be it known that I, SVEN LARSSON, a citizen of the Kingdom of Sweden, residing at Stockholm, Sweden, have invented new and useful Improved Machines Applicable as Pumps, Compressors, or Motors, of which the following is a specification.

This invention relates to machines of the kind including a drum having a plurality of axially extending cylinder chambers for double acting pistons arranged concentrically around the axis of the drum, and a driving shaft extending through a central opening in the drum and carrying obliquely-acting driving means for the pistons. Said driving means consists of arms each of which engages one of the pistons, and said arms may either be directly attached to a part of the shaft which is inclined to the axis of the drum, or supported by a ring obliquely mounted on the shaft and not rotating therewith. In the said first-mentioned case, the drum must rotate with the shaft, in the latter case the drum is stationary.

The swinging movement of the said arms relatively to the drum derived from the rotation of the shaft has its greatest length in axial direction but is not completely rectilinear, as it is composed of one axial and one tangential component. Accordingly, the resulting action of each arm on its corresponding piston is not directed axially but is inclined to the axis of the drum and may be divided in one axial and one tangential component.

In machines of the said kind as heretofore known, this fact has been attended to by such an arrangement of the connection between each arm and its corresponding piston that the piston is caused to move axially with the arm while being unaffected by the circumferential or tangential movement thereof. To this end, the arm engages a tangentially movable member in the piston, the latter being provided with a stop for limiting the movement of said member in the direction of the tangential component power. In such case, the said members are successively brought into engagement with said stops so that in machines having an odd number of arms, one arm only, and in machines having an equal number of arms, two opposite arms will at a time engage with their corresponding arms. Due to this operation shocks will be caused, and, furthermore, the tangential power transmission from the whole arm system and to the drum will be effected at one or two arms only, which results in the need of constructing the arms and the pistons as well as the drum walls very strong to resist said power.

The object of this invention is to overcome said inconvenience. To this end, the connection between the arms and the pistons comprises springs so proportioned as to effect a uniform distribution of the tangential power transmission on all or substantially all of the pistons.

In the accompanying drawing, Figure 1 is a cross section, and Fig. 2 is a horizontal section of a machine embodying this invention.

The machine illustrated comprises a stationary, cylindrical drum 1 having, near its circumference, a plurality of axially extending cylinder chambers 2 to receive double acting pistons 3. The drum 3 is further formed with a centrally extending opening 4. Mounted in said opening is a rotary slide-valve 5. The drum 1 and the slide-valve 5 are formed in parts to facilitate assembling, and the parts thereof are secured together in any suitable manner.

The slide-valve 5 is formed with separate channels, not shown, to alternately put the cylinder chambers into communication with a suction connection, as 6, and a discharge connection, as 7. The slide-valve 5 is securely attached to a driving shaft 8. Attached to a reduced portion 9 of the slide-valve 5 is a member 10, consisting of two parts and forming a bearing having an inclined axis relatively to the axis of the drum said bearing being adapted to receive an annular member 11 having a plurality of radial arms 12, each of which corresponds to one of the pistons 3. The arms 12 are shaped as pins and engage plugs 13 slidably and rotatably mounted in transverse borings 14 formed in the pistons 3. The borings 14 do not extend completely through the pistons but are formed with bottoms near one side of the pistons. Inserted between the said bottoms and the corresponding plugs 13 are pressure springs 15.

Upon the rotation of the shaft 8 and of the slide-valve 5, the arms 12 will in the known way be caused to perform a swinging movement composed of one axial and one tangential component. To utilize said

movement for reciprocating the pistons 3 it is necessary, as stated above, that precautions be made to permit relative lateral movement of the arms 12 and the pistons 3, while at the same time assuring that one of said arms 12 at least is supported laterally to transmit the lateral or tangential pressure from the arm system and to the stationary drum. By properly proportioning the springs 15, the lateral or tangential pressure may at all times be transmitted at all of the pistons thereby securing a uniform distribution of the said pressure on all of the pistons with the exclusion of shocks. As a result, the dimensions of the arms, the pistons and the drum to resist the lateral pressure may be considerably reduced relatively to those of machines already known.

It should be noted that the invention may also be applied to machines having a rotary drum instead of a stationary one, as well as to machines having cylinder chambers on one side of the pistons only.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. In a machine of the kind described, the combination of a drum having a central boring and axially disposed cylinder chambers, reciprocating pistons in said cylinder chambers, means in said central boring operatively connected with said pistons to reciprocate the same, and springs interposed between said means and said pistons.

2. In a machine of the kind described, the combination of a drum having a central boring and axially disposed cylinder chambers, reciprocating pistons in said cylinder chambers said pistons having transverse borings, plugs slidably and rotatably mounted in said transverse borings, springs interposed between the bottom of said borings and said plugs, arms engaging in said plugs, and means in said central boring of the drum for operating the arms to cause the same to reciprocate the pistons.

In testimony whereof I have signed my name.

SVEN LARSSON.