No. 745,898. PATENTED DEC. 1, 1903.

A. PATSCHKE.

ROTARY MOTOR.

APPLICATION FILED NOV. 3, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

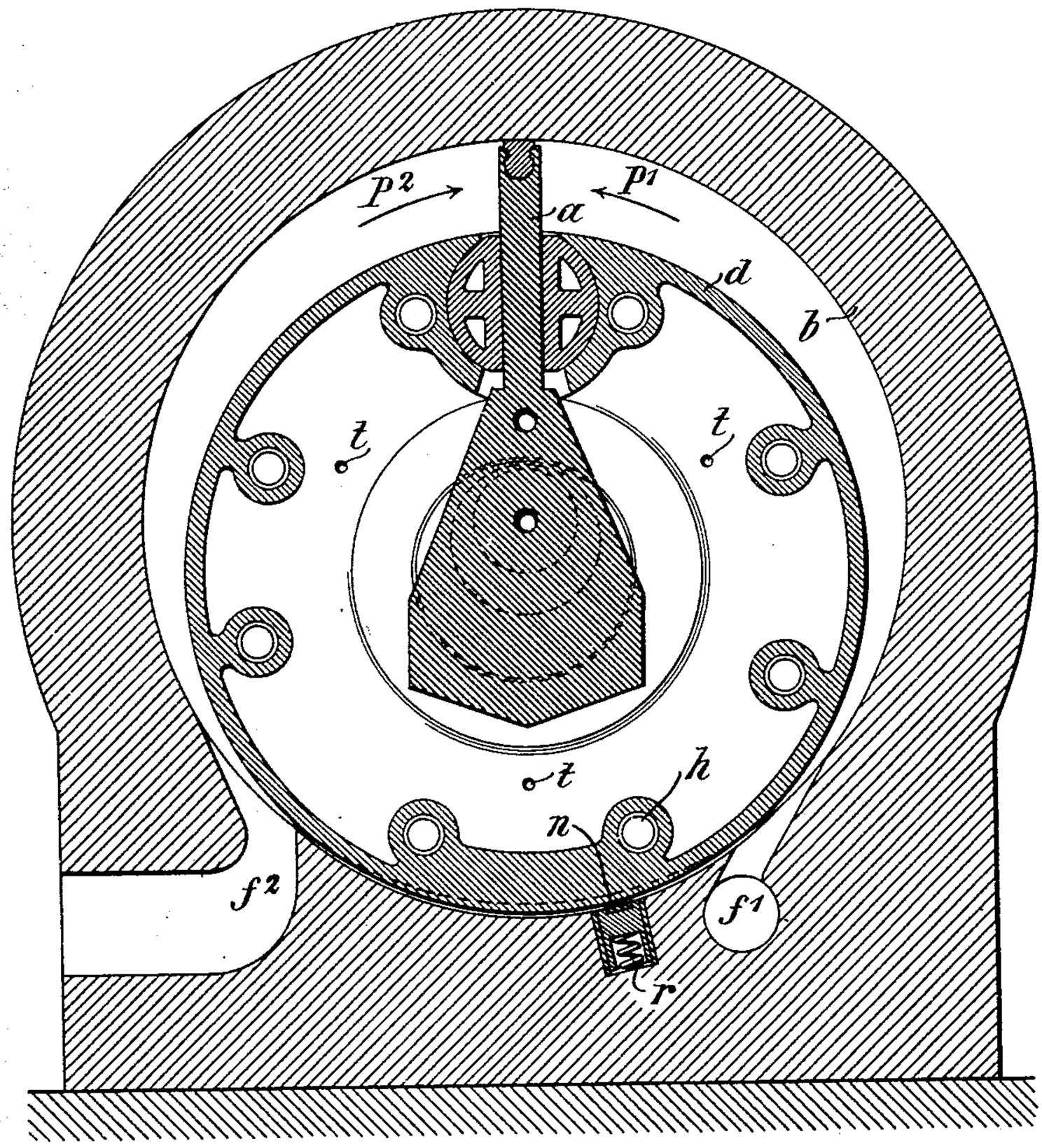
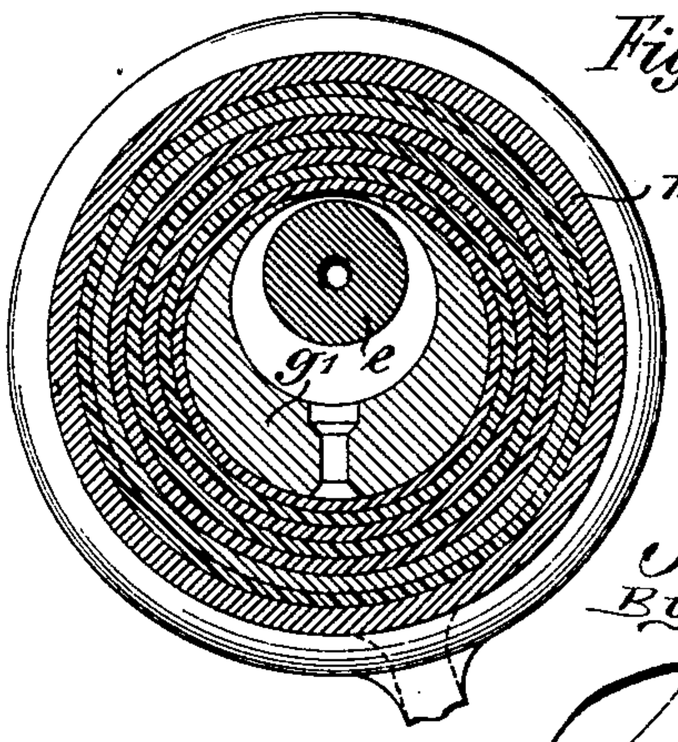


Fig. 3.



Witnesses:

J. B. Keller

Z. O. Parker

Inventor:

Arthur Patschke

By James L. Norris,

Atty.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 745,898. PATENTED DEC. 1, 1903.

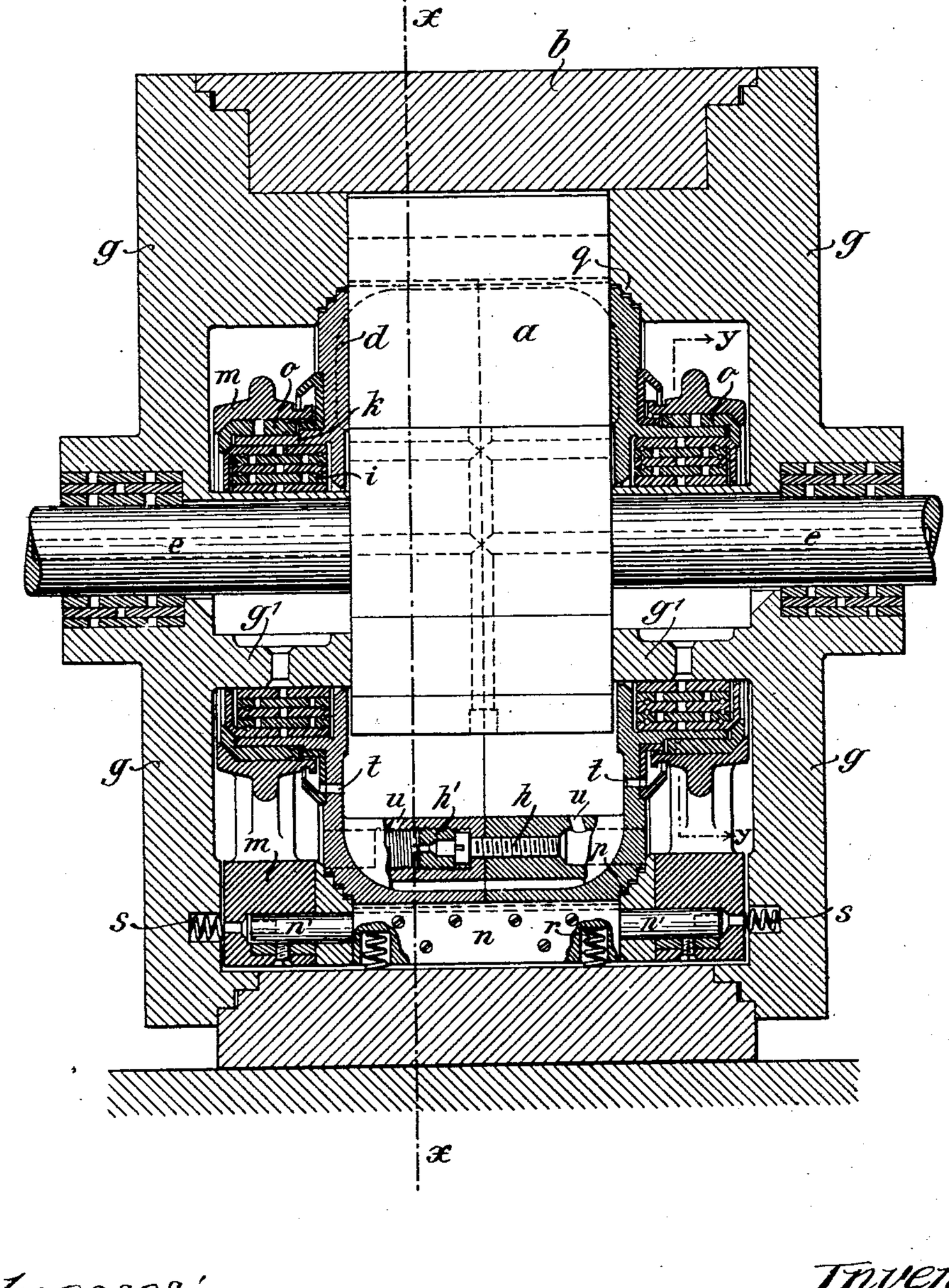
A. PATSCHKE.

ROTARY MOTOR.

APPLICATION FILED NOV. 3, 1902.

NO MODEL. 2 SHEETS—SHEET 2.

Fig. 2.



Witnesses:
J. B. Keedy
E. O. Parker

Inventor
Arthur Patschke
By James L. Norris
Atty

No. 745,898. Patented December 1, 1903.

UNITED STATES PATENT OFFICE.

ARTHUR PATSCHKE, OF MÜLHEIM-ON-THE-RUHR, GERMANY.

ROTARY MOTOR.

SPECIFICATION forming part of Letters Patent No. 745,898, dated December 1, 1903.

Application filed November 3, 1902. Serial No. 129,931. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR PATSCHKE, mechanical engineer, a subject of the Emperor of Germany, residing at Mülheim-on-the-Ruhr, Rhenish Prussia, in the Empire of Germany, have invented certain new and useful Improvements in Rotary Motors, of which the following is a specification.

This invention has reference to rotary motors, and has for its object improvements in the construction of that class of rotary motor the pistons of which are directly driven by a motor medium—steam or air in most cases.

The invention has more particularly reference to the special form and method of mounting the rotary drum by means of special lamelliform bearing-rings. These latter permit of reducing friction to a minimum, while at the same time the arrangement and construction of the bearings are extremely simple. An improved method of packing is employed, and means are provided for readily and efficiently oiling the parts. The special form of packing between the drum and its casing consists of step-like surfaces, which also permit of play in the mounting of the drum.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 is a vertical section through the motor on the line $x\,x$ of Fig. 2. Fig. 2 is a vertical longitudinal section through the middle of the motor, and Fig. 3 is a vertical cross-section through the bearings of the drum on the line $y\,y$ of Fig. 2.

a is the piston of the motor. It rotates in the cylinder b and carries with it in its rotation the drum d, the pivots k of which are mounted in the cylinder-covers g'. The steam is admitted at f' and discharged at f^2 when the machine works as a motor. In this case the piston rotates in the direction indicated by the arrow P'. When the machine acts as a pump, the direction of rotation is of course reversed, and is that indicated by the arrow P^2.

In order that the two cylinder-chambers before and behind the piston may be rendered steam-tight with as little friction as possible at the points at which the drum d and the cylinder-wall are in close proximity, a bar n is provided, which is caused to bear against the drum in the manner hereinafter described.

The drum d is mounted in the cylinder-covers g' in a special manner, by means of which the friction produced by the rapid and irregular rotation of the drum is reduced to a minimum and rendered as uniform as possible. With this object the drum is constructed in two symmetrical halves, which are rigidly connected one with the other by means of screw-bolts h, distributed around the periphery. In order to prevent these bolts from working loose under all circumstances, a part h', provided with a left-handed screw-thread, may be advantageously mounted upon the head of the bolts h, the screw-thread upon which is the usual right-handed thread. Obviously, however, other means may be adopted for securing these bolts.

The drum d is provided with hollow pivots k for the reception of the lamelliform bearing-rings. These rings, of which five, fitting one within the other, are shown in Figs. 2 and 3, are capable of perfectly independent rotation. They should be well fitted one upon the other. The pressure exerted is therefore the same for each ring; but the sliding velocity is smaller for each succeeding ring, so that the wear and the coefficient of friction are reduced. As by the distribution of the pressure upon a frictional surface multiplied fivefold the sliding velocity is rendered uniform and very small, owing to the *vis viva* of the rings, (as hereinafter more particularly explained,) the friction is small and the wear very slight, so the drum will run very easily and certainly. The innermost of the rings is passed upon and carried by the projections g' of the cover.

The lubrication of the lamelliform rings is effected by means of lubricating grooves and holes, the arrangement being such that the lubricant is prevented from flowing toward the edges as much as possible. The oil flows from the shaft-bearings $i\,l$, which are lubricated in the usual manner and which direct the oil through the hollow pivots of the cylinder-cover toward the lamelliform rings.

The hollow pivots for the drum carry, by means of the rings o, the guide-rings m for the packing-bar n. These rings are connected to the trough-like receptacle, in which the bar

n lies by means of pins n'. Between the rings m and this trough-like receptacle are inserted the intermediate parts p, the step-like packing-surfaces of which fit against the outer edge of the drum. For these packing-surfaces, which are required for the drum not only upon the parts p, but also upon the cylinder-covers, step-like projections are provided in accordance with this invention. As shown in Fig. 2, three stepped surfaces q are provided, the vertical faces of which fit tightly against the corresponding faces of the cylinder-covers, while their horizontal faces, on the contrary, leave a certain amount of play in order not to impede the rotation of the drum. These step-shaped packing parts prevent any considerable quantity of steam from passing from one chamber to the other, so that loss of steam and pressure is obviated to the greatest possible extent.

It should be stated that the guide-rings m, the bar n, and its trough are balanced by means of springs and also that springs press the rings m against the parts p and the trough for the bar. The lubrication of all these parts is effected through the holes t. The oil becomes distributed within the drum and is conducted by it through the passages u to the step-shaped surfaces.

The hollow pivots of the drum carry the closed bearing-rings with them when the machine is first started. When, however, the machine has attained its proper speed of rotation, the drum (as it is eccentrically mounted upon its shaft) will move with its greatest velocity when the piston occupies its lowermost position and with considerably-reduced velocity when the piston occupies its highest position. The bearing-rings gradually compensate for this varying velocity, owing to their own *vis viva* and correct distribution of the weight, so that finally the innermost bearing-ring rotates with an approximately uniform and comparatively small velocity, so that the wear of all the rings and of the pivots is exceedingly small.

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

1. In a rotary motor, a rotatable drum provided with a pair of hollow pivots, a cylinder inclosing said drum and provided with a pair of covers, and a plurality of superposed concentric rings interposed between said pivots and a portion of said covers for supporting said rings, said rings further adapted to take up the pressure upon their surfaces and gradually distribute the rapid irregular movement of the drum so that said movement becomes a slow uniform one as the drum rotates.

2. In a rotary motor, a rotatable drum having each side provided with a plurality of plane laterally-extending surfaces arranged step by step and further provided with a pair of hollow pivots, a cylinder inclosing said drum and provided with a pair of covers having step-by-step plane surfaces corresponding to the step-by-step surfaces of the drum, and a plurality of superposed concentric rings interposed between said pivots and a portion of said covers for supporting said drum, said rings further adapted to take up the pressure upon their surfaces and gradually distribute the rapid irregular movement of the drum so that said movement becomes a slow uniform one as the drum rotates.

3. In a rotary motor, a rotatable drum consisting of two symmetrical sections suitably connected together, each of said sections having its outer face provided with a hollow pivot and a plurality of plane surfaces extending laterally and arranged step by step, a casing inclosing said drum and having a pair of covers, each of said covers provided with a plurality of plane surfaces corresponding to the surfaces of the sections of the drum, said surfaces forming a packing between the drum and the covers and adapted to permit of lateral play under all conditions, and a plurality of superposed concentric rings interposed between said pivots and a portion of said covers for supporting said drum, said rings further adapted to take up the pressure upon their surfaces and gradually distribute the rapid irregular movement of the drum so that said movement becomes a slow uniform one as the drum rotates.

4. In a rotary motor, a rotatable drum provided with a pair of hollow pivots, a cylinder inclosing said drum and provided with a pair of covers, a plurality of superposed concentric rings interposed between said pivots and a portion of said covers for supporting said drum, said rings further adapted to take up the pressure upon their surfaces and gradually distribute the rapid irregular movement of the drum so that said movement becomes a slow uniform one as the drum rotates, a spring-pressed packing-bar arranged within the casing and adapted to engage the drum, and a pivot of guide-rings for said packing-bar, said guide-rings arranged at the sides of the drum.

5. In a rotary motor, a rotatable drum having each side provided with a plurality of plane laterally-extending surfaces arranged step by step and further provided with a pair of hollow pivots, a cylinder inclosing said drum and provided with a pair of covers having step-by-step plane surfaces corresponding to the step-by-step surfaces of the drum, a plurality of superposed concentric rings interposed between said pivots and a portion of said covers for supporting said drum, said rings further adapted to take up the pressure upon their surfaces and gradually distributing the rapid irregular movement of the drum so that said movement becomes a slow uniform one as the drum rotates, a spring-pressed packing-bar arranged within the casing and adapted to engage the drum, and a pair of guide-rings for said packing-bar, said guide-rings arranged at the sides of the drum.

6. In a rotary motor, a rotatable drum consisting of two symmetrical sections suitably

connected together, each of said sections having its outer face provided with a hollow pivot and a plurality of plane surfaces extending laterally and arranged step by step, a casing inclosing said drum and having a pair of covers, each of said covers provided with a plurality of plane surfaces corresponding to the surfaces of the sections of the drum, said surfaces forming a packing between the drum and the covers and adapted to permit of lateral play under all conditions, a plurality of superposed concentric rings interposed between said drum, said rings further adapted to take up the pressure upon their surfaces and gradually distribute the rapid irregular movement of the drum so that said movement becomes a slow uniform one as the drum rotates, a spring-pressed packing-bar arranged within the casing and adapted to engage the drum, and a pair of guide-rings for said packing-bar, said guide-rings arranged at the sides of the drum.

In testimony whereof I have hereunto set my hand, in presence of two subscribing witnesses, this 18th day of October, 1902.

ARTHUR PATSCHKE.

Witnesses:
WILLIAM ESSENWEIN,
PETER LIEBER.