April 15, 1924. 1,490,876

J. K. WERNER

SCREW PUMP GEARING

Filed Aug. 29, 1921

Fig. 1

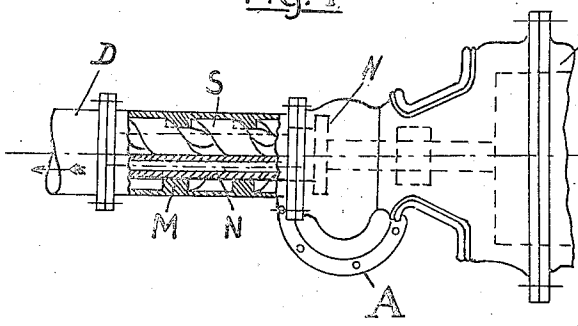



Fig. 2.

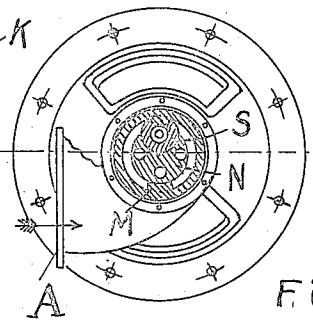



Fig. 3.

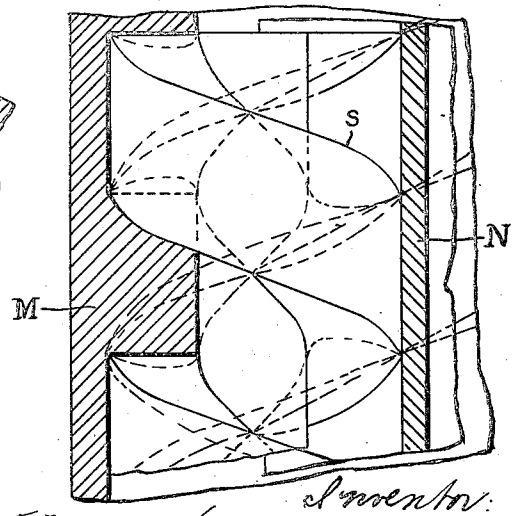
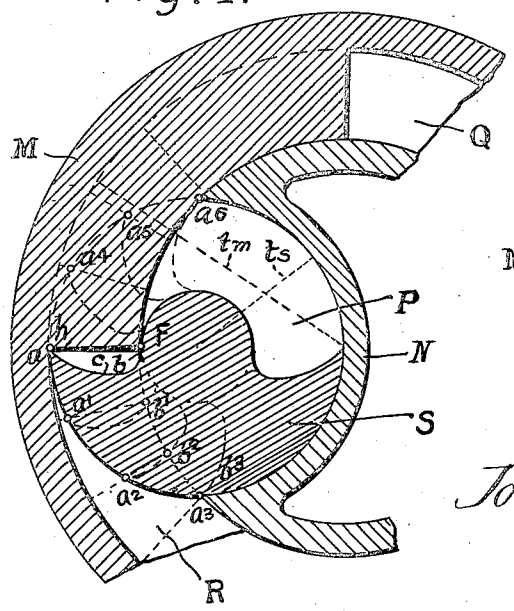



Fig. 4.




Inventor:

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Atty.

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# UNITED STATES PATENT OFFICE.

JOHANN KARL WERNER, OF NUREMBERG, GERMANY.

## SCREW-PUMP GEARING.

Application filed August 29, 1921. Serial No. 496,364.

(GRANTED UNDER THE PROVISIONS OF THE ACT OF MARCH 3, 1921, 41 STAT. L., 1313.)

*To all whom it may concern:*

Be it known that I, JOHANN KARL WERNER, residing at Nuremberg, Sperberstrasse 17a, Bavaria, Germany, have invented certain new and useful Improvements in Screw-Pump Gearing (for which I have filed applications in Germany, Jan. 17, 1917, Patent No. 317,981; Austria, June 30, 1920, Patent No. 87,681; Belgium, June 30, 1920, Patent No. 288,127; Hungary, Aug. 19, 1920, Patent No. 82,766; Italy, June 28, 1920, Patent No. 292/2229; Great Britain, July 9, 1920, Patent No. 148,337; Switzerland, May 16, 1919, Patent No. 83,945; France, July 1, 1920, Patent No. 518,698; Spain, July 13, 1920, Patent No. 74,714; Sweden, June 26, 1920; and Poland, Mar. 29, 1921), of which the following is a specification.

The invention relates to screw pump gearing of that special kind, wherein an internally threaded member cooperates with a screw of smaller diameter arranged eccentrically within said member and having the same grooving, the free space remaining between these two elements being closed by means of a suitably formed concave member, which is rotated so as to cause the said screw to gyrate within the internally threaded member.

In machines of such kind, good and sure operation depends principally on the losses due to leakage along the faces which engage in comb-like manner being reduced to a practically negligible minimum even with large pressures and heads as well as for deep working. On the other hand complicated profiling should be avoided, in order to facilitate as simple and accurate manufacture of screw and inner thread as possible. Starting with the consideration, that with increase of the roll cylinder the leakage becomes less, the object of the invention is to satisfy this practical requirement in the construction of screw pump gearing in the following way: The ratio of the outer diameters of screw and of the grooving of the internally threaded member is equal to about 1:2 and the screw profile bearing fluid-tightly against the internally threaded member is determined by the path of movement, with respect to the screw, of the inner edge of the profile of the internally threaded member, there being so obtained on the one hand a completely fluid-tight pair of profiles and on the other hand, the simplest of all possible profiles viz, the rectilineal one, for the internally threaded member.

The accompanying drawings show in the way of example one embodiment of the invention. Figures 1 and 2 represent in longitudinal and transversal section respectively the whole arrangement of a screw pump supposed in the case of the invention whilst Figures 3 and 4 show in detail the form of execution of the elements of such a pump according to the invention in longitudinal and transversal section.

According to Figures 1 and 2 there is arranged eccentrically in the interior of the internally threaded member M a screw S of smaller diameter and a concave member N filling the space between these two elements. If the concave member N is driven by any suitable external power, for instance an electric motor K, the screw rotates in the stationary internally threaded member M, the ratio of transmission and speed being determined by the partial circles and the inclination angles of the screw S and member M. A liquid introduced through the pipe A will be transported by the screw S through the grooves of the member M and the screw S to the pressure pipe D. The machine is enabled to work also as a motor instead of a pump, when a suitable driving fluid is introduced under pressure. Instead of the concave member N, the member M may be driven by an external power, the concave member N being stationary in this case.

As shown from Figures 3 and 4, which represent the member M, S and N in an enlarged scale, according to the invention the diameters $t_m$, $t_s$, of the outer member M and the screw S respectively have the ratio of 2:1, and the screw S rolls with its outer circumference against the largest inside diameter of the member M, in such manner that, when the arc of the circle $t_s$ rolls on the circle $t_m$, the edge $a$ describes the straight line $h\ f$. The curve $b\ c\ a$ of the screw results as the track of the edge $f$ with respect to the screw during the rotary movement of the screw and outer member. The dotted places of engagement indicate that the line of contact extends over $a_3$, $a_5$, $a_4$, $a$, $a_1$, $a_2$,

$a_3$, and $b_3$, $b_2$, $b_1$, and $b$. The various grooves of the screw are rendered fluid-tight from one another in the following manner: the space P from the space R by the contact area indicated by $a$, $a_1$, $a_2$, $a_3$, and $b_3$, $b_2$, $b_1$, $b$ and the space R from the space Q by the contact area indicated by $a_6$, $a_5$, $a_4$, $a$, $a_1$, $a_2$, $a_3$.

What I claim is:

In a pump in combination, an internally threaded member, a screw arranged eccentrically within said member and having like grooving to that of the internally threaded member, a concave member filling the space between said screw and said internally threaded member, the ratio of the outer diameters of the grooving of the internally threaded member and of the thread of the screw being equal to 2:1, the profile of the screw which bears fluid-tightly against the flatly grooved outer member being ascertained by means of the track of the innermost edge of the profile of the outer member relative to the screw.

In testimony whereof I affix my signature in presence of two witnesses.

JOHANN KARL WERNER.

Witnesses:

CLEMENS CLEMENTE,

FRIEDA CLEMENTE.