April 9, 1929. A. MÜLLER 1,708,451

PERCUSSIVE TOOL

Filed Aug. 8, 1925

Fig. 1.

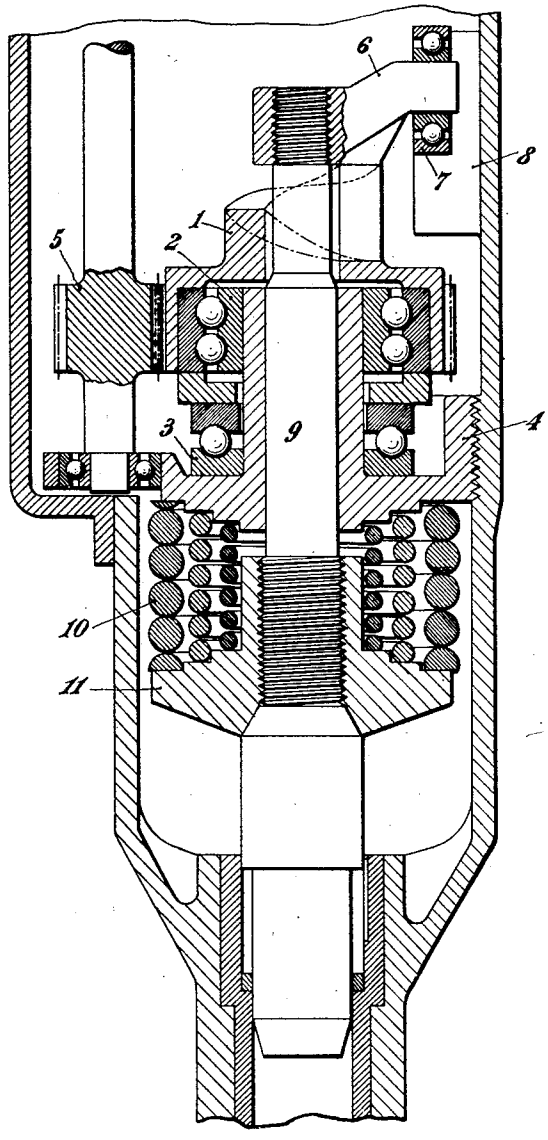


Fig. 2.



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Patented Apr. 9, 1929. 1,708,451

UNITED STATES PATENT OFFICE.

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PERCUSSIVE TOOL.

Application filed August 8, 1925, Serial No. 49,118, and in Switzerland March 23, 1925.

This invention relates to improvements in percussive tools of the type in which a spring is periodically engaged and released by a curved member.

The hitherto known tools of this type were so constructed, that the angle of inclination of the curved member was always constant at every moment. The torque on the curved member which is required to put the spring under tension is:

$$T = Q \cdot r \cdot \tan(\alpha + \sigma)$$

where: T is the torque measured at the mean radius of the lifting surface,

Q the variable resistance of the spring,

r the mean radius of the cam member,

α the angle of inclination, and

σ the angle of friction.

The graph of a spring is a straight line, passing through the point of origin. If the angle of inclination is kept constant, then, in accordance with the above equation, the torque T must vary with the resistance Q of the spring. It is evident therefore, that the driving torque can be utilized completely only at the moment when the spring is under maximum tension.

The present invention aims at overcoming this drawback and provides a percussive tool of the aforesaid type in which the curved member adapted to engage and release the spring, is constructed in such a manner that the product of the resistance of the spring (or springs) and the distance through which the striker has been lifted (taking into account the efficiency corresponding to the ideal inclined plane for the time being), viz, $\tan(\alpha+\sigma)$ always remains a constant. It is obvious that instead of a single spring, a plurality of springs may be employed to produce the same effect. With an angle of friction σ assumed for definite conditions, it is possible to determine from the above equation, the corresponding angle of inclination α for the torque T at every moment.

Percussive tools which are constructed in this manner, will, with the same driving force, yield nearly twice the output of other tools.

By thus uniformly loading the source of driving energy during the compression of the spring or springs not only is said source of energy, but also the entire mechanism carefully preserved; moreover the efficiency of the e tire tool from the source of power to the blow becomes about twice that of the aforesaid known apparatus, that is to say it is possible to produce the same percussive output with only half the driving energy of a percussive tool having a spring-tensioning cam member exhibiting a constant angle of inclination.

In order to more clearly understand the invention, reference is made to the accompanying drawings which illustrate by way of example one embodiment thereof, and in which:

Fig. 1 is a longitudinal section, and

Fig. 2 a tension curve.

In Fig. 1, 1 indicates a cam member, which is mounted upon the fixed spring support 4 by means of the ball bearings 2 and 3 and is driven by the pinion shaft 5. The driver 6, fixed on the striper bar 9, which glides upon the cam member 1 is guided by means of the guide 8 with the aid of the ball bearings and collar 7 held in guide 8. The striker bar 9, which is actuated by the driver 6 and the curved member 1, transmits the percussion energy of the springs 10 through the support 11.

The shaft 5 may be driven from a distance by any suitable means through a flexible shaft, for example by an electric motor which can be connected to a direct or alternating current electric lighting network.

The shaft 5 may be driven from a distance by any suitable means through a flexible shaft, for example by an electric motor which can be connected to a direct or alternating current electric lighting network.

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:

In a percussive tool embodying a reciprocating percussive member and a compression spring adapted to normally lower the percussive member, a curved operable member adapted to periodically elevate and abruptly release the percussive member having an angle of slope varying according to the formula:—

$$\alpha = \text{arc tan } \frac{T}{Qr} - \sigma.$$

AUGUST MÜLLER.