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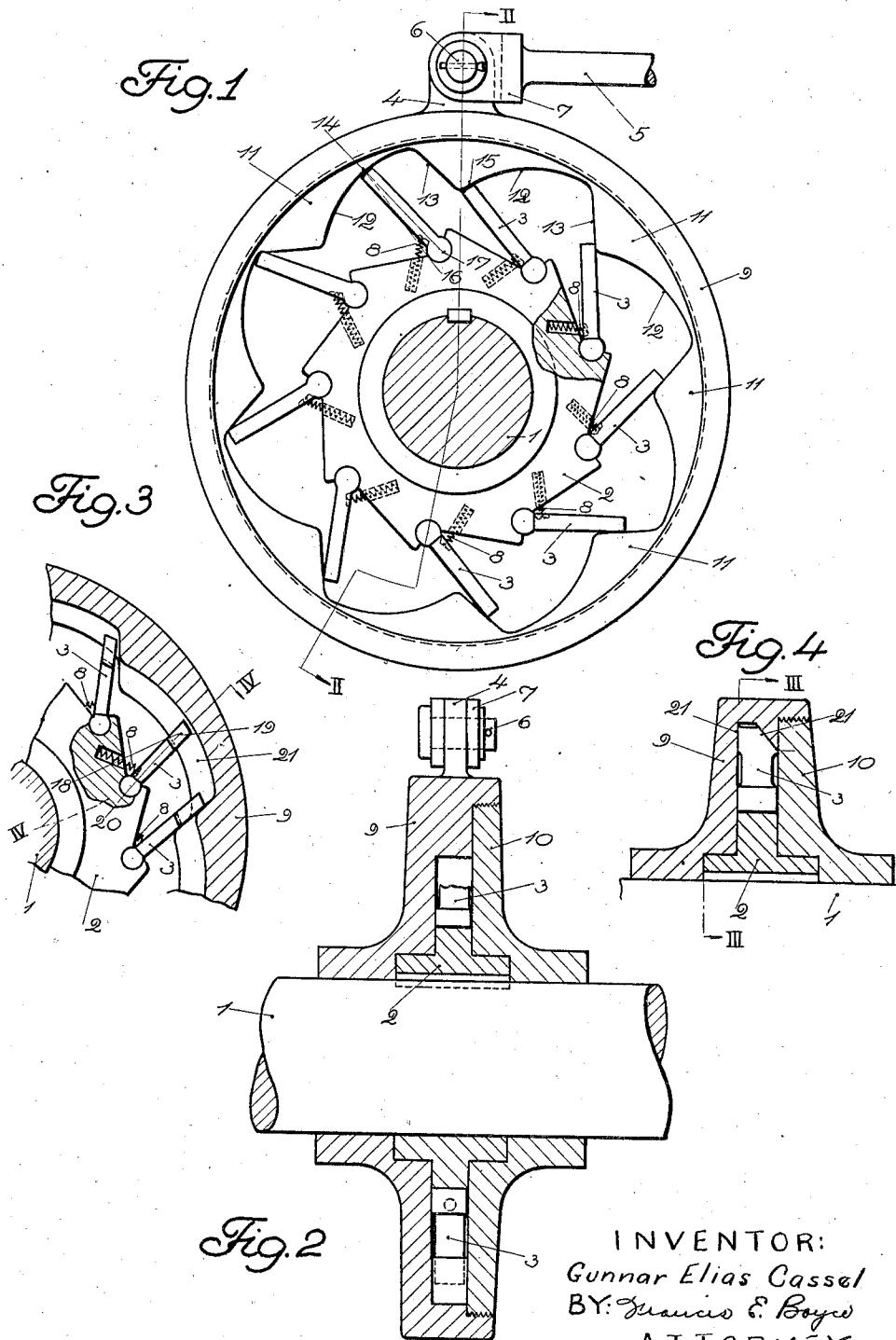
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1,615,534

RATCHET FEED MECHANISM

Filed March 6, 1925

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Fig. 5.

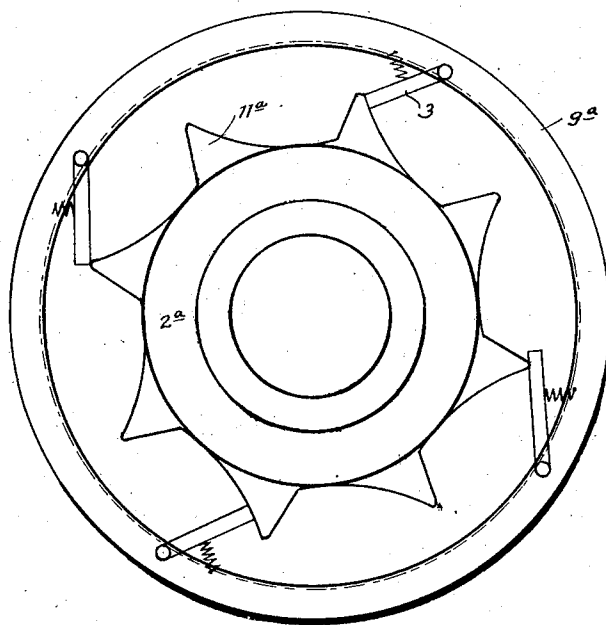


Fig. 6.

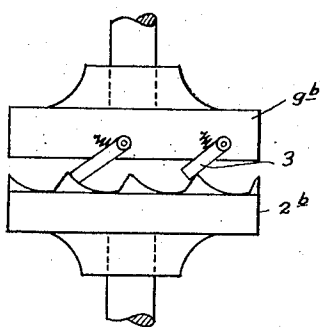
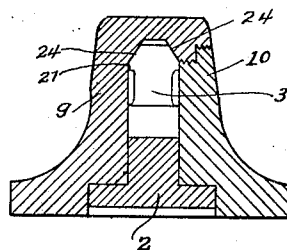


Fig. 7.



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RATCHET FEED MECHANISM.

Application filed March 6, 1925, Serial No. 13,556, and in Sweden March 29, 1924.

This invention relates to improvements in ratchet feed mechanism of a type that is provided with pawls engaging ratchet teeth.

Hitherto, in order to attain an effective grip for transmitting the power, the pawl between two working strokes has to be moved back from one tooth to another, this return movement being completed without any transmission of power.

In order to overcome this drawback the present invention provides a ratchet feed mechanism, by means of which it is gained that the pawl is able to transmit power when working against the same ratchet surface at peripherically different positions. By using a number of pawls of this design the feeding positions may be varied at will.

In the accompanying drawings,

Figure 1 is a side elevation of a form of the invention, the one side cover being removed.

Figure 2 shows a section of the same mechanism on the line II—II in Figure 1.

Figure 3 illustrates another form of the invention showing a sectional view taken on the line III—III in Figure 4.

Figure 4 is a cross section on the line IV—IV in Figure 3.

Fig. 5 is a view similar to Fig. 1, illustrating a modified form of the invention.

Fig. 6 is a side elevation illustrating still another modification.

Fig. 7 is a view similar to Fig. 4 illustrating a slightly modified form of the device shown in said figure.

In carrying out the invention according to the form shown in Figs. 1 and 2 a central ring or plate 2 is secured to the shaft 1. At the circumference of said ring or plate there are movably arranged the pawls 3 in such a manner that said pawls may turn in one direction against the action of springs 8. One end of each pawl carries a circular head, which turns in a recess at the circumference of the ring, the other end of the pawl resting against a surface of the ratchet 9. Said ratchet is provided with a projection 4 to which the link rod 5 is connected by means of a forked head 7 and a pin 6. The pawls, being inserted sideways into the recesses of the ring 2, are kept in place by means of the side cover 10, screwed on to the ratchet 9. As usual, the ratchet member 9 is provided with inwardly directed portions 11, each having a working surface 12 for the pawls

and a back surface 13. The surfaces 12, though, differ from the usual shape of spur tooth surfaces in that each of said surfaces 12 lies in an arc of a circle eccentric to the axis of the member 9, so that a pawl 3, owing to the special shape of the corresponding surface, will continue to be in co-acting contact with the surface after several peripheral removals along the same. By using a certain number of pawls 3, a feed motion will be completed for all turning angles of the central plate 2 with relation to the ratchet 9, this being due to the fact that, a certain number of the pawls being in working position and the others sliding against the back surfaces of the portions 11, the sliding pawls will reach the respective working surfaces in their proper turns. In the present case two of the pawls are in working position, as will be seen at 14 and 15 in Fig. 1, all the rest of the pawls sliding along the backs of their respective members 11. In order to obtain a working catch between the pawl and the working surface of one tooth at different positions, it is necessary that said surface be made to such a shape that the angle between the perpendicular 14—16 at the touching point of the pawl and the direction 14—17 of the force exerted by the pawl, this being a straight line drawn from the touching point to the turning centre of the pawl, does not exceed the resultant friction angle for the surfaces in question. The spring 8 may in this case have some influence. It is obvious that the pawls will attain new working positions during the return stroke.

As will be readily understood from the above, the friction constitutes a locking means for retaining the pawls in working position, the force being transmitted by means of the direct pressure of the pawls against the working surfaces at any point of said surfaces. On this account it is a matter of great importance that the surfaces 12 be not given such a shape that the frictional angle 16—14—17 will attain too great a value.

In Figures 3 and 4 there is illustrated a modified form of the invention. According to this form, the frictional angle 18—19—20 without drawback may attain a greater value than in the form shown in Figure 1. This is facilitated by the design of the working surfaces, said surfaces being provided with

grooves 21 of a wedge-shaped cross section, taken in the direction of the pressure. The ends of the pawls fitting into said grooves, the locking pressure will be taken up by the side surfaces of the grooves.

In order to avoid the trouble occurring from dead points of the motion, the number of pawls and the number of members 11 may be made unequal to each other, in which case the feeding action will not be interrupted in any position of the shaft 1 with relation to the ratchet wheel 9.

The driving power may be applied by shaft 1 and transmitted to the pawls by means of the ring or plate 2, or may be applied by the ratchet wheel 9 and transmitted in the opposite direction.

Instead of having inwardly directed pawl-engaging members as shown in Fig. 1, the ratchet wheel may be designed with external members, in which case the pawls must be located outside of said wheel, as illustrated for instance in Fig. 5 in which outer member 9^a is shown as the pawl carrying member while the inner member 2^a carries the pawl-engaging projections 11^a. Other forms may fall within the scope of this invention, for instance the pawl-engaging members may be arranged axially, the pawls also being correspondingly disposed, as shown in Fig. 6 wherein the rotatable members are disposed in coaxial relation longitudinally instead of one within the other as in the forms above described. In this form the pawl carrying member is designated 9^b, and the member carrying the pawl-engaging projections 2^b.

The wedge-shaped grooves 21, as shown in Figure 4, have one side extending radially the other side being given an oblique direction. It is obvious that both sides of the groove may be designed obliquely, as illustrated in Fig. 7.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. A device of the character described, comprising in combination, a pair of coaxially disposed members mounted for rotation relatively to each other, one of said members carrying a plurality of pivoted pawls, the pivotal points of said pawls ly-

ing in a circle concentric with the common axis of said rotatable members, the other of said members having a plurality of projecting portions each provided with a pawl-engaging surface lying in an arc of a circle, the pawls being so disposed with relation to said surfaces that at any angular position of said rotatable members relatively to each other the respective pawls will engage said surfaces at different points in the length of said surfaces.

2. A device of the character described, comprising in combination, a pair of coaxially disposed members mounted for rotation relatively to each other, one of said members carrying a plurality of pivoted pawls, the pivotal points of said pawls lying in a circle concentric with the common axis of the rotatable members, the other of said members having a plurality of projecting portions each provided with a pawl-engaging surface lying in an arc of a circle eccentric to the common axis of said members, the pawls being so disposed with relation to said surfaces that at any angular position of said rotatable members relatively to each other the respective pawls will engage said surfaces at different points in the length of the surfaces.

3. A device of the character described, comprising a pair of coaxially disposed members mounted for rotation relatively to each other, one of said members carrying a plurality of pivoted pawls, the pivotal points of said pawls lying in a circle concentric with the common axis of said rotatable members, the other of said members having a plurality of projecting portions each provided with a pawl-engaging surface lying in an arc of a circle eccentric to the common axis of said members, the pawls being numerically different from the pawl-engaging surfaces and so disposed with relation to said surfaces that at any angular position of said rotatable members relatively to each other the respective pawls will engage said surfaces at different points in the length of said surfaces.

In testimony whereof I have signed my name to this specification.

GUNNAR ELIAS CASSEL.