Nov. 8, 1927. 1,648,034

F. UNGERER

INDEX PLATE

Filed Feb. 18, 1927 2 Sheets-Sheet 1

Fig. 1.

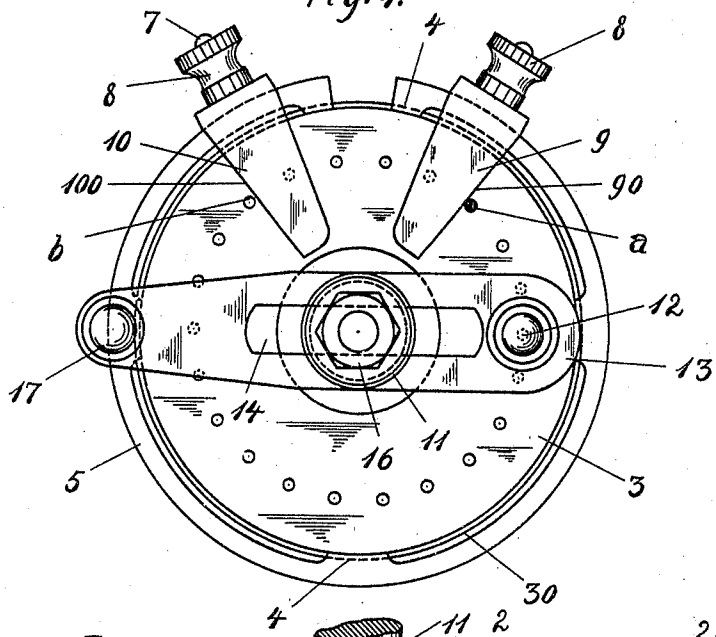

Fig. 2.

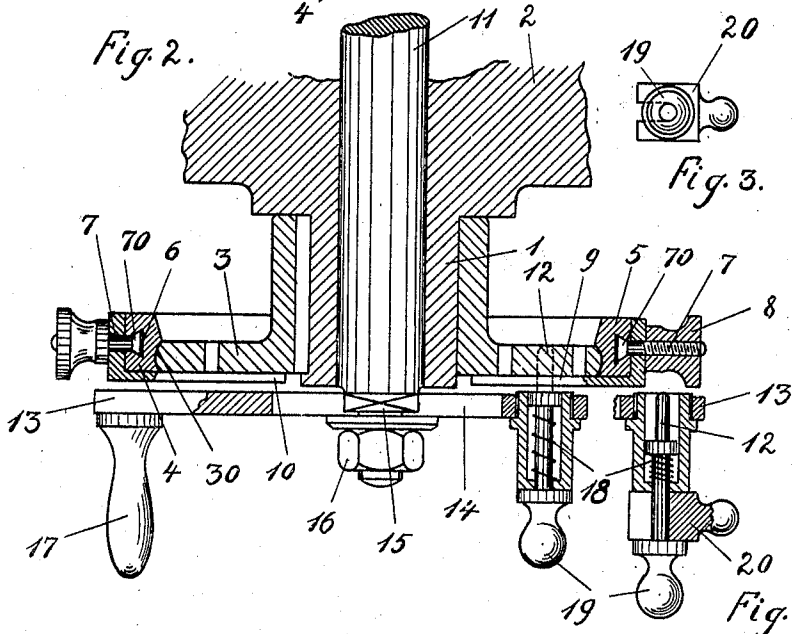

Fig. 3.

Fig. 4.

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Nov. 8, 1927. 1,648,034

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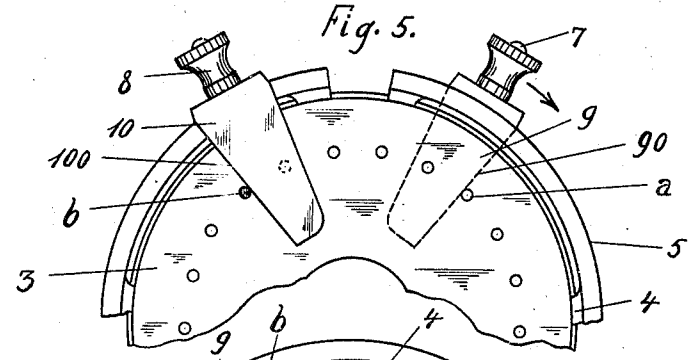
Filed Feb. 18, 1927 2 Sheets-Sheet 2

Fig. 5.



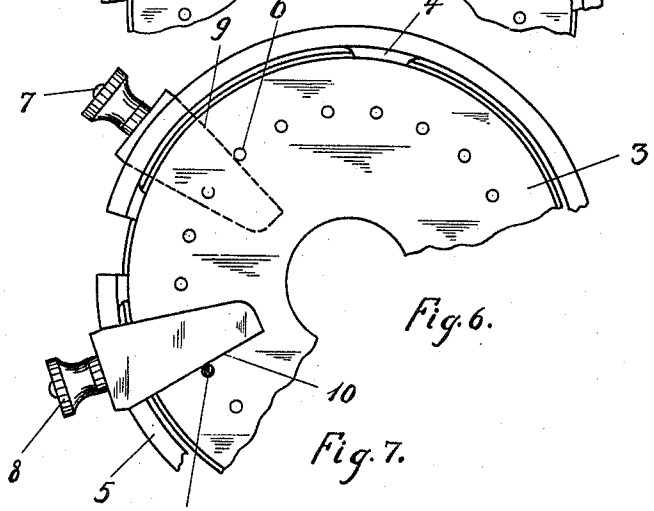


Fig. 6.

Fig. 7.

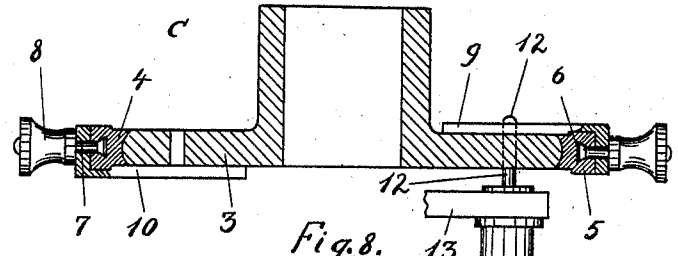
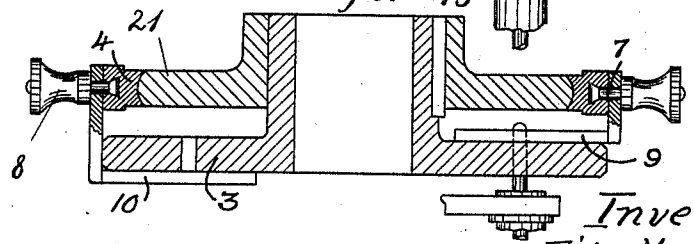


Fig. 8.



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Patented Nov. 8, 1927. 1,648,034

UNITED STATES PATENT OFFICE.

FRITZ UNGERER, OF PFORZHEIM, GERMANY.

INDEX PLATE.

Application filed February 18, 1927, Serial No. 169,261, and in Germany November 23, 1925.

The present invention has reference to improvements in dividing or index plates or heads and relates more particularly to improved means for adjusting and locking the indexing members thereof.

The worm wheel mounted on the work shaft or arbor of the index heads in the known art generally will be found provided with forty teeth and meshes with a single-thread worm upon the shaft of which latter is mounted the crank member supporting the index pin. Upon the worm being rotated by the crank through a single complete revolution, the worm wheel with its shaft, obviously, will make one-fortieth of a revolution. If, for instance, a wheel of ten teeth is to be milled out, the worm must be rotated four times for each tooth. It is immaterial which annular row of graduation holes in the fixed index member is used. The index pin is inserted again into the starting hole after the four revolutions of the crank. If, however, for instance a wheel is to be milled presenting fourteen teeth, then each time

$$40:14=2\ 12/14=2\ 6/7$$

revolutions of the crank are required. This is possible in the following manner: The crank is turned twice around, whereupon a partial revolution is made corresponding to the fraction 6/7. For this purpose the index pin is adjusted on the circle of holes, whose hole number is a multiple of 7, for instance 28. After conclusion of the two complete revolutions the operator counts from the starting hole $28/7 \times 6=4 \times 4=24$ divisions, and then inserts the pin into the 25th hole. For avoiding the bothersome counting of the graduation holes on turning the crank there are generally provided two pointers or stops in concentric relation with the worm shaft, the angular interspacing of which stops can be adjusted in accordance with the required partial rotation of the crank. These stops present radially directed contact edges representing the legs of the respective operative angle. In the present example the angular spacing of these two stop members, or more precisely stop edges, would have to be 24/28 of a complete revolution. If then one of these stop edges tangentially extends as starting edge along the starting hole, the contact edge of the other stop, serving as contact edge for the index pin, will tangentially cooperate with that hole of the 28-hole circle which is 24 divisions away from the starting hole. For setting a division the index pin is moved from the starting edge to the contact edge of the second stop member, and is then moved twice around and finally inserted into the hole on the near edge of this second stop. The milling operation is now started, during which the stops are adjusted on the plate in the sense of the crank rotation, until the starting edge again contacts with the locked index pin.

The known plate stops are provided with bushings riding on the worm shaft, which bushings are pressed against one another and the index plate by means of a spring-controlled friction plate for preventing inadvertent displacement of these stops. Since, however, the stops must be adjusted after each crank movement, their relative fixation merely by friction is insufficient for proper operation. If the operator during the adjusting movement fails to withdraw the index pin completely out of the domain of the stops, the pin is apt to contact with the latter, which would cause disturbing relative displacement of the stops, which an attentive operator may notice and correct by careful re-adjustment. If, however, he fails to notice this undesired displacement of the stop or stops, then the work piece will have to be discarded in the end as waste.

It is the object of the present invention to do away with these just recited drawbacks attaching to the use of the dividing devices of prior design, and the invention resides essentially in the feature that both stop members are adjustable and lockable on a common annular member which is concentrical with the index plate and relatively rotatable thereabout.

My invention will best be understood when described in connection with the accompanying drawings, in which Fig. 1 is a side view of the new arrangement; Fig. 2 is a cross-section therethrough; Fig. 3 is a top view, and Fig. 4 a section through a modified index pin; Figs. 5 and 6 show front and rear views of a modification, of which Fig. 7 is a cross-section; Fig. 8 is a fragmentary cross-section through still another modification.

Referring first to Figs. 1 and 2, the holed index plate 3 is fixed on the hollow boss 1 of the fixed index head 2. The circumferential face 30 of the plate 3 is of convex confirmation for seating the correspondingly concaved enlargements 4 of the collar 5, which latter is of spring character and is sprung onto

the part 30, being thus safeguarded against lateral slipping-off, but it can readily be rotated on and about the plate 3. Into the outer circumference of the collar 5 is sunk the dove-tail groove 6 for receiving the flared head 70 of the screw pins 7 of the bracket stops 9 and 10. The latter are secured to the collar 5 by these pins 7 and the thumb nuts 8. Within the boss 1 is journaled the worm shaft 11 which, in well known manner, is rotated by means of the crank member 13 from which extends inwardly near its one extremity the index pin 12. In order to adjust this pin to the radii of the several circles of holes, only one of which circles is shown here, there is provided in the member 13 the slot 14 into which extends the squarely contracted end 15 of the shaft 11. The nut 16 serves for locking the member 13, which latter may conveniently be provided with a handle 17, as shown. The index pin 12 can be moved out of the domain of the plate 3 and the stops 9 and 10, against the pressure of its spring 18, by a pull on its knob 19. The operator will generally rotate the crank member 13 by this knob, as the most convenient way, but if a separate handle 17 is provided, there is then preferably provided an intermediate member 20 (Fig. 4) for retaining the pin 12 in its temporarily retracted position.

The operation of the described mechanism is as follows:—Suppose a milling operation requires a crank member movement of 3 17/22 revolutions, and the index pin 12 is in hole *a* (Fig. 1); the starting edge 90 of stop 9 contacts with the index pin and forms between itself and the contact edge 100 of the stop 10 an angle of 17/22 of a complete revolution, that is to say, the edges 90 and 100 have initially been fixed on the collar 5 in such manner that they are spaced apart (in clockwise sense) the distance of 17 divisions, measured on the 22-hole circle, as shown in Fig. 1. If now the milling operation has been ended and there is required an adjustment to 3 17/22 revolutions, the index pin 12 is withdrawn from the hole *a*, is then swung around to the stop edge 100, and then still further through three complete revolutions, and finally dropped into the hole *b*. During the subsequent milling operation the stops 9 and 10 are adjusted. For this purpose provision is made to rotate the collar 5 about the plate 3 in clockwise direction without the angular distance between the stops being altered. The rotation of the collar 5 cannot take place by the nut 8 of stop 10, since by pulling or pressing on this nut 8 the elastic collar would only be pressed the harder onto its annular seat, but with the nut 8 of stop 9 as handle, the rotation of the collar can readily be effected in the direction of the arrow in Fig. 5, until the edge 90 contacts with the index pin 12 in the hole *b*, which then represents a partial revolution of 17/22. At the end of the operation the crank 13 is again relatively shifted, after pin 12 has been retracted, to the contact edge 100, and then a further three complete revolutions, when the pin is dropped into the hole *c* (Fig. 6), and so on.

An inadvertent relative displacement of the two stop members 9 and 10 cannot occur, since they are firmly locked on the collar 5 by their nuts 8. Also, an unintended displacement of the collar 5 with its stops 9 and 10 on the plate 3, by the index pin 12 striking the edge 100 during the setting of the parts need not be feared, since each such knock against the stop 10 tends to press the collar 5 all the harder onto its seat member. If by insufficient lift of the pin 12 the parts have contracted, the operator merely lifts the pin 12 out of contact with the stops 9 and 10 in its advance movement.

In order to make a collision between pin 12 and stop 9 impossible, an eventuality which might cause inadvertent displacement of the collar on its seat, I may arrange, according to the modified embodiment shown in Figs. 5, 6 and 7, the stop 9 upon the rear face of the plate 3 and extend the pin 12 so far through the latter that, on adjustment of the stops 9 and 10, the former makes contact with the pin at the rear of the plate 3 (Fig. 7). In this manner, also, the stops 9 and 10 cannot be confused.

On exchange of index plates and when adjusting the angular distance between the stops, the invention shows important advantages over prior constructions, as readily apparent. The collar 5 can easily be removed from its seat by a short jerk on one of the nuts 8 in lateral direction. In the known art the angular stop member distance can be adjusted only after the crank member has been removed, each stop being separately held by hand on the plate. In the present instance the crank member is not removed, so that the index pin can be used as contact member for one of the stops.

Instead of arranging the collar 5 with its stop members 9 and 10 for sliding movement upon the plate 3, it may also be slidably mounted, according to the modification shown in Fig. 8, on a separate member 21, or the like, arranged parallel of the plate 3 in the rear thereof, the stop members being so designed and lockable on the collar 5 that they can be adjusted and operate in the manner above described.

What I claim is:

1. In a dividing mechanism of the character set forth, in combination with a fixed machine head including a plate member presenting at least one circle of axially extending graduation holes and a worm shaft rotatable in said head and extending through said plate, a crank member fixed on said

shaft for rotation therewith in front of said holed plate, a snap index pin on said crank member for selective cooperation with said plate holes, a collar mounted for frictional circumferential rotation on said holed plate, stop members on said collar for cooperation with said index pin, and means associated with said stop members for allowing their individual adjustment on said collar.

2. In a dividing mechanism of the character set forth, in combination with a fixed machine head including a holed plate and a worm shaft rotatably extending therethrough, a crank member lockable on said shaft for throw alteration and for rotation therewith in front of said holed plate, a snap pin at the operative crank end for selective cooperation with the holes in said plate, and means for temporarily holding said snap pin in retracted position, an elastic collar clampingly mounted on said holed plate for relative circumferential displacement thereon, stop members adjustable on said collar, and means for individually locking said stop members on said collar, and said locking means also designed for increasing the clamping pressure between collar and supporting plate on contra-directed movement of said stop members.

3. In a dividing mechanism of the character set forth, in combination with a fixed machine head including a holed plate and a worm shaft rotatably extending therethrough, a crank member on said shaft for rotation therewith in front of said holed plate, a snap pin on said crank member for selective cooperation with the holes in said plate, a carrier member mounted on said holed plate for circumferential displacement thereon, and a rear and a front stop member independently adjustably lockable on said carrier member and respectively extending radially across the front and rear faces of said plate, the holes of the latter extending clear through for allowing said snap pin to extend therethrough beyond the rear face of the plate for cooperation with the respective rear stop.

4. In a dividing mechanism of the character set forth, in combination with a fixed machine head including a holed plate and a worm shaft rotatably extending therethrough, a crank member lockable on said shaft, an index pin on said crank member, relatively adjustable stop members for alternate cooperation with said index pin, a carrier for said stop members, and fixed supporting means independent of said holed plate for said carrier, for allowing concentric displacement of the latter relative to said holed plate.

In testimony whereof I affix my signature.

FRITZ UNGERER.