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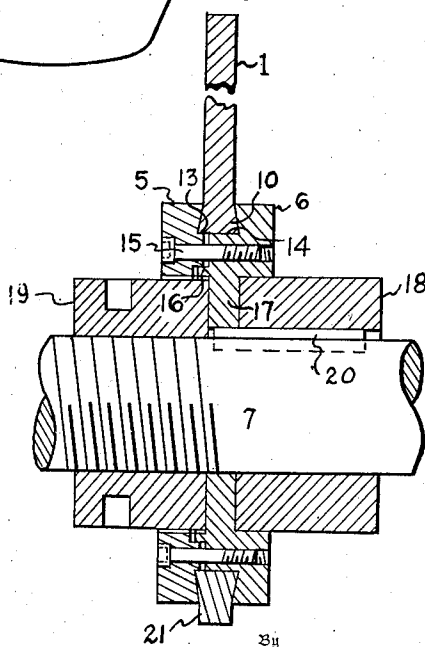
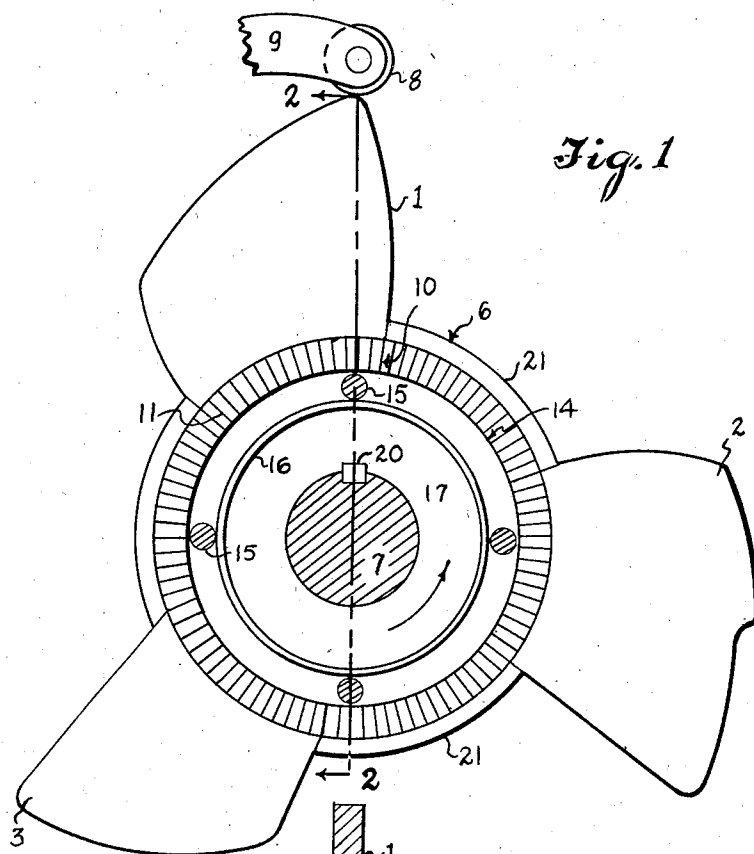
R. W. BATES

2,431,159

CAM ASSEMBLY FOR SCREW MACHINES

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2 Sheets-Sheet 1



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Fig. 3

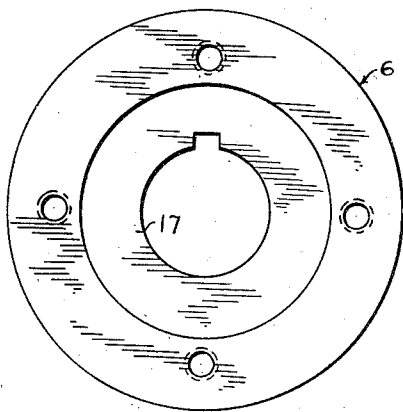


Fig. 4

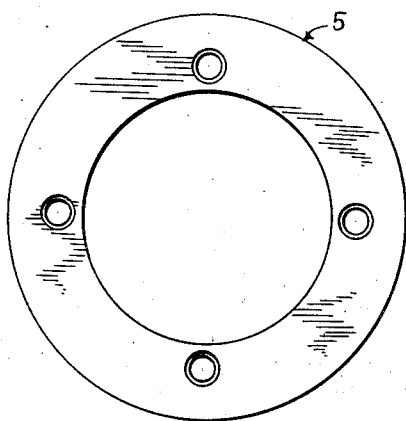
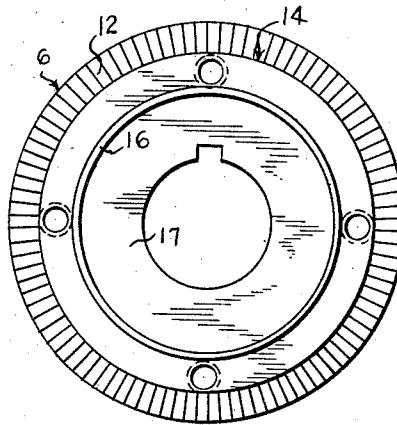


Fig. 5

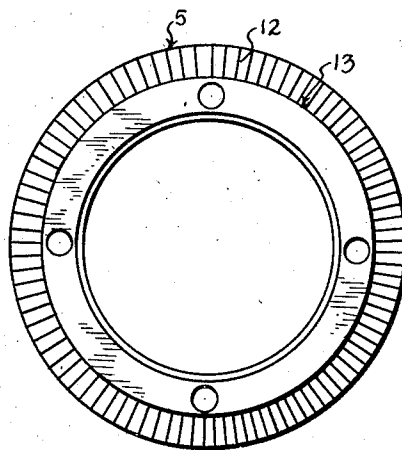
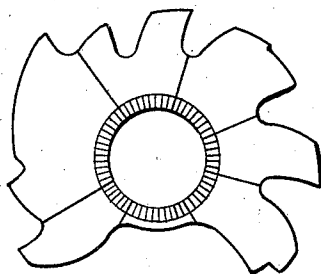


Fig. 6

Fig. 7



By

Inventor
Roy W. Bates

J. S. Murray
Attorney

UNITED STATES PATENT OFFICE

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CAM ASSEMBLY FOR SCREW MACHINES

Roy W. Bates, Rockwood, Mich.

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4 Claims. (Cl. 74—568)

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This invention relates to rotary cams and particularly cam assemblies for screw machine use. Screw machines employ rotary cams to feed cutting tools to the work and it is common in such machines to successively actuate a number of tools by a single cam the depth of cut and velocity of feed being controlled by the peripheral form of the cam. In the practice now followed, it is necessary to install a differently designed cam for almost every different screw machine product. This entails heavy expense, since these cams are of high grade steel and their proper designing and machining entails a high degree of skill and accuracy.

The object of the invention is to improve a cam designed to control different successive operations by forming such cam in several segments, individually controlling the respective operations, the segments to be assembled in selective angular relations. Thus if two different screw machine products have one or more operations in common, the corresponding segments may be used in machining both such products, reducing the total labor and material in successively setting up the machine for the two products.

Another object is to provide a rotary cam assembly comprising separately formed cam members successively effective to control different operations and to adapt such members for relative circumferential adjustment to vary the sequence and relative timing of the operations.

A further object is to so construct a cam assembly for installation on a shaft that removal and replacement of a part having a cam contour or contours may be effected more quickly and easily than in present practice.

These and various other objects are attained by the construction hereinafter described and illustrated in the accompanying drawings, wherein:

Fig. 1 is a view of my improved cam assembly, looking along its axis, one of the clamping plates of the assembly having been removed.

Fig. 2 is a diametrical sectional view of the assembly taken on the line 2—2 of Fig. 1.

Fig. 3 is an exterior view of one of the clamping plates.

Fig. 4 is an interior view of said plate.

Fig. 5 is an exterior view of the other clamping plate.

Fig. 6 is an interior view of the plate shown in Fig. 5.

Fig. 7 is a view of an assemblage of a greater number of cam members than illustrated in Fig. 1.

In these views, the reference characters 1, 2

and 3 designate a group of differently designed cam members, clamped between annular plates 5 and 6 fixed on a shaft 7. Said cam members are formed of heavy steel plate and occupy a common plane, and their peripheries take effect on a roller 8 journaled on the end of an arm 9, serving to raise and lower such arm. This movement is utilized through suitable well-known mechanism (not shown) to feed various tools for the performance of successive cutting operations. Diverging from prior practice, I adapt a selective number of cam members to be clamped between the annular plates and permit extensive variation of the angular relation between such members. Thus the arcuate inner marginal portion 10 of each cam member is of a dovetail form and both lateral faces of such portion are formed throughout their extent with radial teeth 11 of substantial V form. These teeth are adapted to interlock with annular sets of similar teeth 12 formed respectively on the clamping plates 5 and 6 and radiating from the outer peripheries of said plates. At the inner ends of the teeth 12, the plates 5 and 6 are respectively formed with circular shoulders 13 and 14 serving as seats for the arcuate inner peripheries of the cam members, the shoulder 14 of the plate 6 being relatively wide, for a reason hereinafter explained. Inwardly of the teeth 12 the plates 5 and 6 are engaged by a plurality of clamping cap screws 15 which pass freely through the plate 5 and are headed against said plate, and which engage threaded sockets in the plate 6. Inwardly of the screws 15 one of said plates, as 6, is formed with an annular rib 16 fitting an annular recess of the other plate, the bolts being thus relieved of shearing stress. The plate 6 is formed inwardly of the rib 16 with a web 17 apertured to accommodate the shaft 7, said web having substantially the same thickness as the cam members 1, 2 and 3, and occupying the same rotational plane as said cam members. Said web is clamped between a collar 18 and a nut 19, said collar and nut being fixed on the shaft respectively by a key 20 and by screw threads. Segmental spacers 21 are interposed between the cam members, primarily for engagement by the roller 8 when the same is clear of the cam members, said spaces having radially toothed dovetailed anchorage portions such as those on the cam members.

Explaining now the use of the described cam assembly, it is to be understood that the shaft 7 is driven at a constant, gradual, selective speed such that a rotating piece of screw machine work

(not shown) may be subjected in one revolution of the shaft to a number of successive cutting operations equal to the number of cam members included in the assembly. While three such members are illustrated, any number from one to six may be employed, assuming the arm 9 to actuate a six socket tool turret, as in the practice now common. The included angles formed by different segmental cam members may differ considerably in magnitude, the magnitude being determined largely by the length of the roller-engaging periphery of a given cam segment. Fig. 7 exemplifies an assembly including six different cam segments and one spacer. In most assemblies one or more spacers 21 will be required, the number of necessary spacers increasing as the number of segments used is decreased. It is preferred to provide a sufficient number of spacers for all possible mutations as regards the employed number of cam members. Several of the spacers may be interposed between two of the cam members when spacing of the latter exceeds the arcuate extent of a single spacer. It commonly happens that two different screw machine products conform to each other as regards one or several of the necessary machining operations. In such a case, the cam assemblies used in producing both such products will to some extent employ the same cam members, whereas in the present practice of machining each of the cam members for a given product from a single disk blank, there is no possibility of thus taking advantage of a duplication of certain operations. For example, two products may be duplicates with respect to five operations, differing only as to a sixth operation. In present practice, the cam contours for the five duplicate operations must be repeated in machining two entirely distinct cam blanks. The present invention permits both pieces to be produced with seven segmental cam members, five of such members serving the purposes of both products.

Another highly useful feature of the invention lies in the extensive circumferential adjustability of the described cam members. Thus they may be assembled to take effect in any rotational sequence, and their spacing may be extensively varied to regulate, as desired, the time interval between consecutive cutting operations.

The interlocking radial teeth of the cam members and clamping plates affords strong assurance against any disturbance of a desired angular relation between the cam members, and the dovetailed form of the anchorage margins of said members and the conforming incline of the surfaces bearing the teeth 12 affords positive assurance against any outward yielding of the cam members.

It is to be noted finally that any removal and replacement of the cam members or any thereof entails no complete disassembly. In other words, the plate 6 may always remain clamped between the collar 18 and nut 19, the plate 5 being removable without disturbing the plate 6, by simply loosening the cap screws 15. During shifting of the plate 5 into or out of its clamping position, the cam members and spacers will be fully supported by the plate 6, this being assured by the wide circular shoulder 14 against which said parts seat. It is never necessary to remove the screws 15, their

retraction a distance approximating one eighth of an inch sufficing to permit removal and insertion of cam members and spacers. This involves a decided advantage over the present practice of forming all cam surfaces on a single annulus since such an annulus may be removed and replaced only by movement along the shaft and the installation must adjoin an end of the shaft to afford such removal or replacement. There is no essential relation between my improved assembly and an extremity of the cam shaft.

The importance of adapting the web 17 to occupy the same plane as the cam members and of giving said web substantially the same thickness as such members lies in assuring a proper engagement of the roller 8 with the cam members when said web is clamped between the collar 18 and nut 19, said roller, collar, and nut being standard parts of a screw machine now in common use.

What I claim is:

1. A cam assembly comprising two opposed, substantially parallel, annular plates, their outer peripheries jointly forming an annular groove of dovetail cross section, a cam member jointly carried by and outwardly projecting from said plates and having an inner portion of dovetail cross section fitted in said groove and clamped between said plates, the opposed walls of said groove and the faces of the cam member engaged by such walls having interfitting radial teeth, and means for releasably maintaining clamping engagement of the plates with the cam.

2. A cam assembly as set forth in claim 1, one of said plates having an annular shoulder forming the bottom of said annular groove and providing a seat for said cam member.

3. In a cam assembly as set forth in claim 1, an annular rib on one of said plates fitted into the other of said plates.

4. A cam assembly comprising two opposed, substantially parallel, annular plates, one having a web inwardly extending beyond the other, a cam member clamped between said plates and projecting beyond their peripheries to exercise its cam function, said cam having an arcuate set of substantially radial teeth and one of the plates having an annular set of teeth interengaged with those of the cam to resist relative rotation of the cam and said toothed plate, a shaft extending through said plates, means oppositely engaging the web of the web-forming plate to clamp such plate on the shaft, and a separate means for separably clamping the plates against said cam member.

ROY W. BATES.

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