June 6, 1939. A. E. BORTON 2,161,243

SPLIT CAM

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Fig. 1.

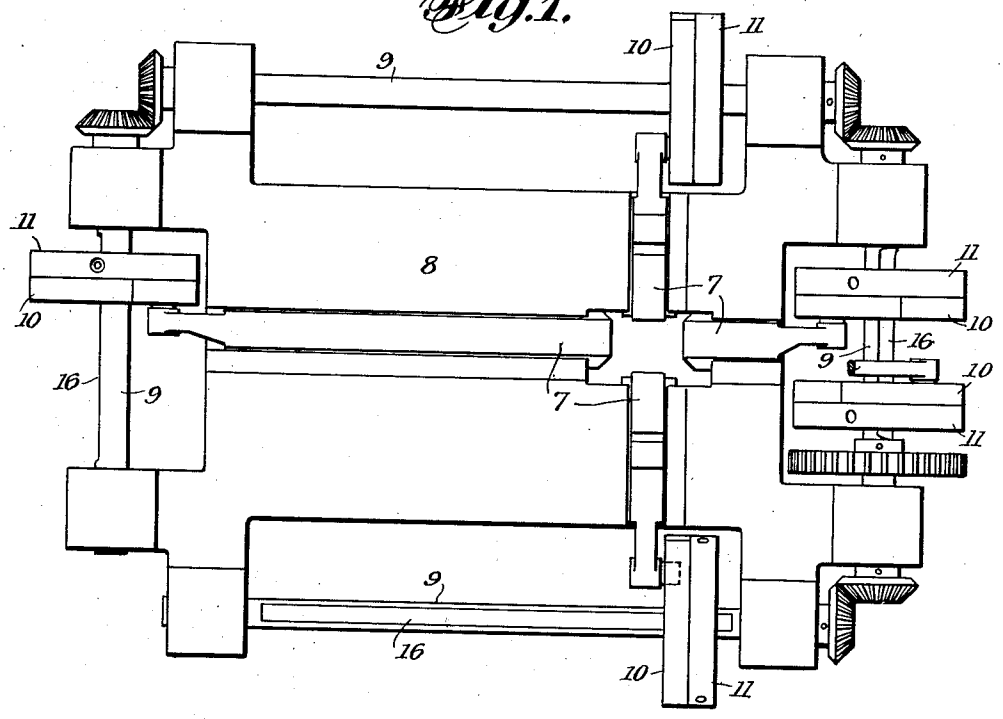


Fig. 2.

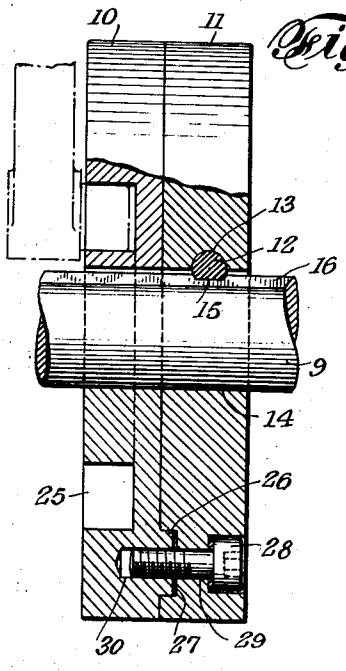
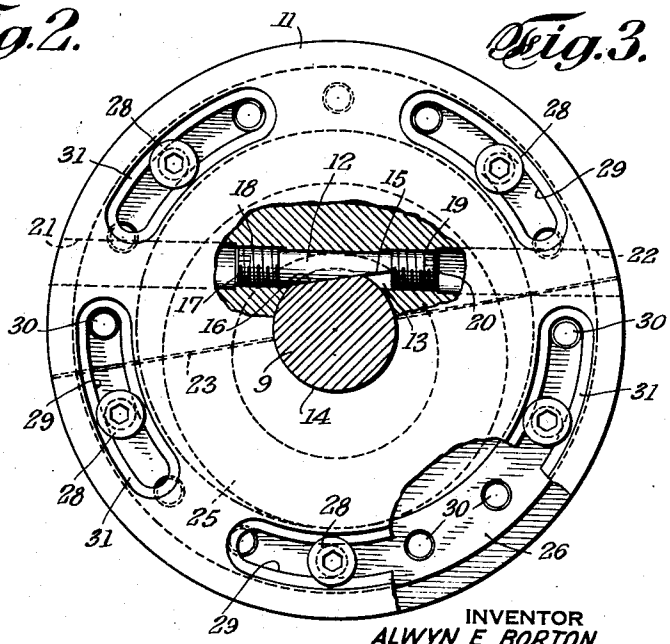


Fig. 3.



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Fig. 4.

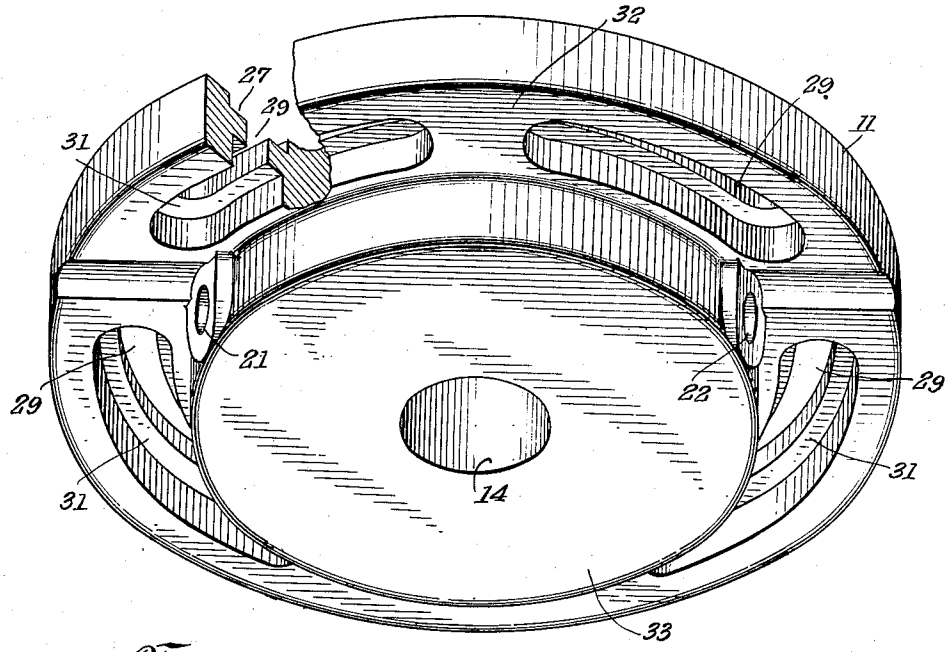
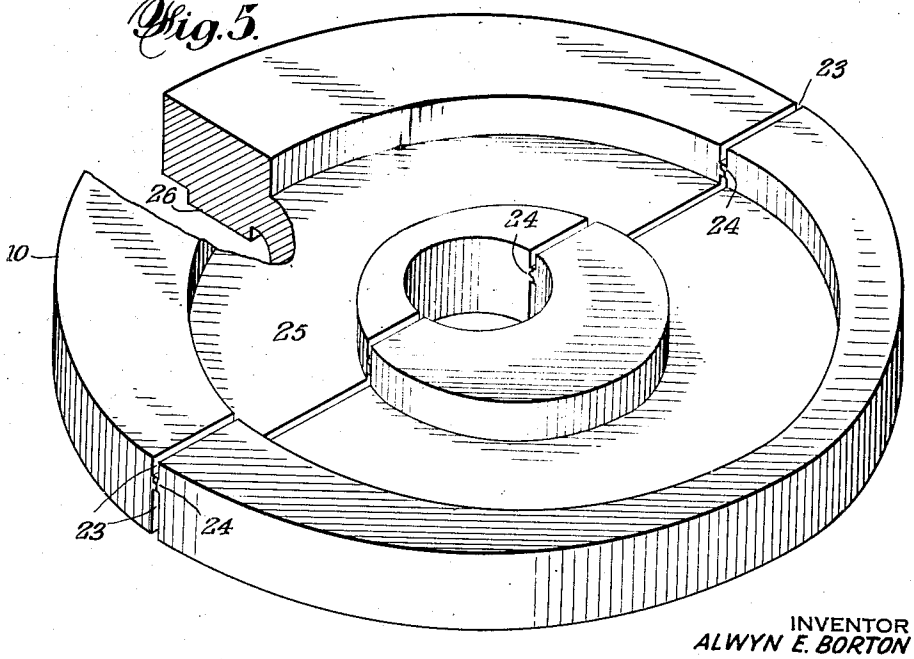


Fig. 5.



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SPLIT CAM

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Application September 14, 1937, Serial No. 163,730

5 Claims. (Cl. 74—567)

The invention herein disclosed relates to the construction of cams for so-called "multi-slide" metal working machines and the like. In machines of this type it is frequently necessary to shift the cams to different positions on the drive shafts and to substitute different cams for different kinds of work. As previously constructed, such adjustments and changing of cams have involved special difficulties and have taken considerable time and required the exercise of particular care and skill.

Objects of the present invention are to provide a cam structure which may be quickly and easily removed and replaced and which may be adjusted as required without disturbing other parts of the machine.

Further special objects are to provide a cam having such desirable characteristics, which will have the strength and smoothness of operation of the cams regularly employed.

The foregoing and other desirable objects are attained by the novel features of construction, combinations and relations of parts hereinafter described, illustrated in the accompanying drawings and broadly covered in the claims.

The drawings illustrate practical commercial embodiments of the invention, but it should be understood that structure may be further modified and changed as regards these particular illustrations, all within the true spirit and broad scope of the invention.

Fig. 1 is a broken plan view of a multi-slide machine showing the new cams in use thereon.

Fig. 2 is a broken part sectional view of one of the cams.

Fig. 3 is a rear face view with parts broken away and appearing in section.

Figs. 4 and 5 are perspective views illustrating a modified construction of the mounting plate and one of the cam blanks for attachment thereto.

The machine illustrated generally in Fig. 1, comprises a number of slides 7, carrying suitable tools or dies, guided to operate on the bed 8, of the machine and actuated from appropriately designed cams on the shafts 9.

The cams consist in the present disclosure of cam discs 10, removably and adjustably secured to mounting discs or plates 11.

The cam mounting plates 11 are adjustably keyed on the cam shafts 9, by means of cylindrical keys 12, Figs. 2 and 3, guided in cylindrical passages 13, intercepting the cylindrical shaft openings 14, in the plates and having flat inclined wedge faces 15, engageable with correspondingly flattened faces 16, of the shafts. These keys are forced into wedging engagement with the flats on the cam shafts by so-called Allen head screws 17, in the screw-threaded outer end portions 18 of the bores 13. The opposite ends of these bores are shown as similarly screw-threaded at 19, to receive the Allen head screws 20, which are set up against the inner end of the wedge keys and which can be used to force the keys loose after the first screws 17 are released. Larger passages 21, 22, extending from the screw seats outwardly through the rims of the mounting plates permit removal and insertion of the wedge keys and securing screws.

The construction described enables the cam mounting plates 11 being readily secured in different desired positions lengthwise of the shafts 9, and enables the keys being firmly set up and locked in place or backed away, when required, to release the plates.

The cam plates are constructed as shown particularly in Fig. 5, this is, slotted partly through from opposite sides as at 23, to leave a connecting web 24, which can be readily broken to separate the cam into two portions or "halves". In breaking, the metal will fracture on irregular lines, matching when the pieces are put together again to form a continuous or substantially continuous track for the cam roll. Actually, the fracture ordinarily, because of its wavy character, will be so nearly continuous that the roll will not feel any break and consequently will ride smoothly without any clicking.

Further, to prevent any clicking or objectionable variation in the operation of the cam roll, the cams are preferably "split" across an inactive or the least active portion of the cam, where there is no roll pressure or where the roll pressure is least. Usually the line of split will be run across as nearly as possible a pressure free portion, which may be a cylindrical, or so-called "idle" part of the cam, substantially as indicated in Fig. 5. The cam groove 25 indicated is more or less typical, the outline of same depending upon the operation to be effected.

For the purpose of bracing the split cam and holding the two parts in exact alignment, the cam is usually formed with an annular rib 26, on the back of the same fitting into a corresponding annular groove 27, in the inner face of the mounting plate. The cam plate and mounting plate are positively secured in the aligned condition described, by headed screws 28, extending through arcuate slots 29, in the mounting plate into screw seats 30, in the cam plate. These

slots are shouldered as shown at 31, to form seats for the heads of the screws 28, which as shown, may also be Allen screws. With the use of such screws, all parts are set within the outlines of the two plates, the complete cams then having no projecting parts.

Upon loosening screws 28, the cam plate 10 may be rotated angularly of the mounting plate 11, the annular rib 26, riding in groove 27, to hold the two parts of the cam together during such adjustment. If further adjustment than permitted by length of slots 29 is required, then screws 28 may be taken out and the two parts of the cam held together by the interlocking annular rib and groove, be turned in either direction as much as required. When these bolts are removed, the two parts of the cam may be lifted away from the mounting plate and a new two part cam be substituted and secured in desired angular position on the mounting plate. After or before thus securing the cam, the mounting plate may be loosened on its shaft and then secured in any desired longitudinal position on the shaft by proper manipulation of the wedge securing and wedge releasing screws 18, 19.

The mounting plate need not be the same full thickness throughout as shown in Figs. 1 and 2. Thus as illustrated in Fig. 4, the outer rim portion of the mounting plate may be reduced, substantially as indicated at 32, to a flange portion of only sufficient thickness to carry the groove 27, and shouldered arcuate slots 29. This construction provides greater accessibility to the thicker central portion 33, carrying the tangent passages for the wedge key and wedge key screws.

As shown particularly in Figs. 2 and 3, the screw seats 30, may be formed in the thickened rib portion 26, of the cam plate. By the use of the proper number of bolts, the cam disc may be rigidly anchored to the mounting plate. If desired, the screw seats 30, may be spaced a distance less than the length of the bolt receiving slots 29, so that two or more cam securing bolts may be passed through each slot. The cam blanks are usually completely finished, including the slotting from opposite sides before hardening. Then, after hardening, when broken, the fractures will be sharp and crystalline in character, so that the two parts when replaced, will substantially knit together.

The cam shaft with the flat keyway is inexpensively produced and is stronger and more rigid than a cam shaft with a radial keyway milled therein. The tapered flat sided wedge keys have sufficient surface engagement with the shaft to provide a firm positive driving engagement capable of carrying the heaviest loads, but such engagement can be quickly released by simply backing the wedge keys off slightly, whereupon the whole cam structure may be easily slid to any position lengthwise of the shaft. These flat wedges, unlike set screws such as previously employed, leave no burrs on the shaft to interfere with subsequent adjustment of the cams. Also, the setting up of these wedge keys has no tendency to shift the cam longitudinally of the shaft, as does a rotating set screw.

Any of the cams can be quickly removed by simply unbolting it from its mounting plate, the two parts of the cam coming away from opposite sides of the shaft as soon as the annular rib on the back of the cam is released from the retaining groove in the face of the mounting plate. Conversely different cams are as easily mounted by simply slipping them over opposite sides of the shaft into matching engagement of the fracture edges and then seating them against the face of the mounting plate where they can be quickly secured in the proper angular relation on the shaft.

What is claimed is:

1. A "split cam", comprising an originally integral cam disc broken across the line of least cam pressure and the broken parts re-engaged in the original relation, said cam disc parts having an annular rib on the back of the same and screw seats in said annular rib portion, a mounting plate having an annular groove receiving said cam disc rib and arcuate slots in line with said screw seats, bolts extending through said slots into said screw seats and keying means for said mounting disc.

2. A "split cam", comprising an originally integral cam disc broken across the line of least cam pressure and the broken parts re-engaged in the original relation, said cam disc parts having an annular rib on the back of the same and screw seats in said annular rib portion, a mounting plate having an annular groove receiving said cam disc rib and arcuate slots in line with said screw seats, bolts extending through said slots into said screw seats, keying means for said mounting disc and including a key passage formed in said mounting disc, a wedge key for engagement with a shaft and oppositely shiftable in said passage and screw means at opposite ends of said passage for forcing said wedge key in opposite directions.

3. A cam construction of the character disclosed, comprising a mounting plate and a cam plate engaged in face-to-face relation and having annular interlocking parts, fastenings for securing said plates in angularly adjustable relation, means for keying said mounting plate on a cam shaft, said cam plate being cut through from opposite faces to leave an intermediate web of the diameter of the cam plate and fractured across the remaining web.

4. In combination with a cam shaft having a longitudinally extending flat side portion and a cam structure longitudinally shiftable on said cam shaft, a tapered wedge key having a flattened side and mounted in said cam structure for engagement with the flat side portion of the cam shaft and screw means for forcing said flat sided tapered wedge key into holding engagement with said cam shaft.

5. In combination with a cam shaft having a longitudinally extending flat side portion and a cam structure longitudinally shiftable on said cam shaft, a tapered wedge key having a flattened side and mounted in said cam structure for engagement with the flat side portion of the cam shaft, screw means for forcing said flat sided tapered wedge key into holding engagement with said cam shaft and additional screw means for forcing said tapered wedge key in the opposite direction to free the same of holding engagement with the shaft.

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