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ADJUSTABLE ECCENTRIC

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Fig. 1

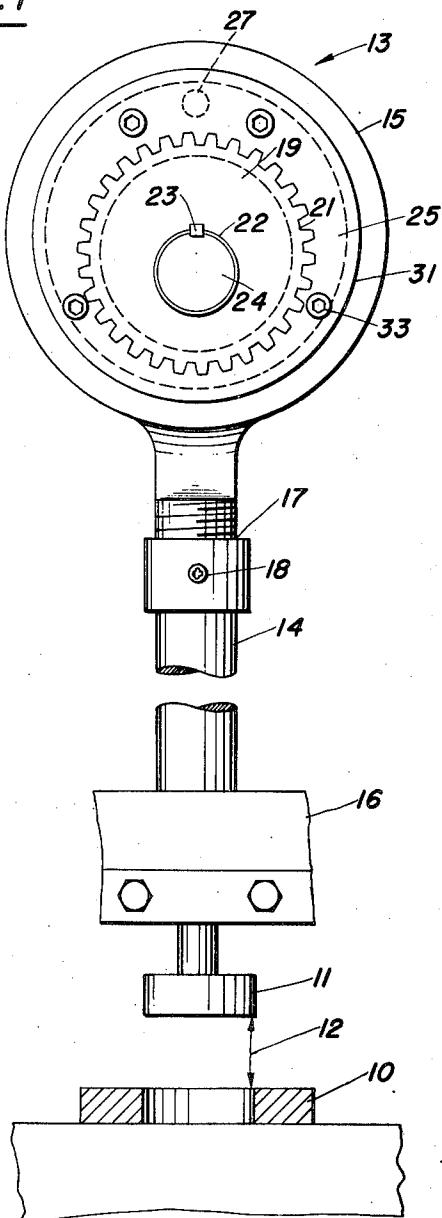
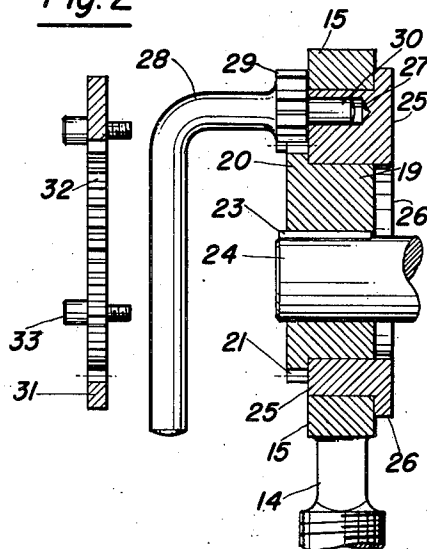


Fig. 2



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ADJUSTABLE ECCENTRIC

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This invention refers to an adjustable eccentric and more specifically to a safety punch press having an adjustable eccentric for varying the stroke thereof.

An object of this invention is to provide a new and improved adjustable eccentric.

Another object of this invention is to provide a new and improved safety punch press having an adjustable eccentric so that the clearance between die and punch can be adjusted to just receive the work and exclude the hands of the workman.

Another object of this invention is to provide a punch press having an adjustable stroke of economical, new, and improved design.

Another object of this invention is to provide apparatus substantially as shown and described.

In accomplishing these and other objects of the present invention, I have provided improved details of structure, the preferred form of which is illustrated in the accompanying drawings, wherein:

Fig. 1 is a front elevational view of the punch press and eccentric.

Fig. 2 is a transverse section of the eccentric with the locking ring removed and an adjusting key in place.

There is shown a die 10 and a punch 11 raised a distance 12 above said die through the action of a rotating eccentric 13. The punch 11 is actuated in the conventional manner by the eccentric 13 through a connecting rod 14, annular bearing strap 15, and a pivotable connection (not shown) such as a ball and socket joint within the usual crosshead 16. A screw adjustment for varying the length of the connecting rod is shown at 17 with a set screw 18.

The eccentric 13 is of variable eccentricity and is shown at its maximum eccentricity and with the connecting rod at the top of its stroke in the position to bring punch 11 to its greatest height.

To permit of varying its eccentricity, the variable eccentric 13 is made up of two eccentrics, one inside of the other. The main or primary eccentric comprises a circular disk 19 having an axially extended concentric cylindrical portion 20 perimetally toothed as at 21 and an eccentrically placed bore 22 with keyway 23 for keying the eccentric to the drive shaft 24.

A secondary eccentric in the form of an eccentric ring 25, with shoulder 26, is journaled on the circular disk 19 of the primary eccentric and journaled within the annular bearing strap 15. The shoulder 26 abuts against the back side

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of the annular bearing strap 15. Formed within said eccentric 25 is a key hole 27 placed beyond the gear teeth of primary eccentric 19 when said two eccentrics are in working assembly.

An adjusting key 28, having a handle and gear teeth 29 of a size to mesh with gear teeth 21 of primary eccentric or disk 19 when nipple 30 is placed in key hole 27, is shown in operating position in Fig. 2 and is used to rotate the eccentrics 19 and 25 relative to each other.

A locking ring 31 shown detached in Fig. 2 but in locking position in Fig. 1 is an eccentrically bored ring internally toothed as at 32 to mesh with the teeth 21 of primary eccentric or disk 19. The ring 31 is provided with holes through which extend bolts 33 to engage corresponding threaded openings in the secondary eccentric 25. Thus the teeth 21 and the teeth 32 form a detachable coupling for locking the two eccentrics 19 and 25 to rotate together. The strap 15 is prevented from undesired axial movement by being held between locking ring 31 and shoulder 26.

Operation

In the operation of the punch press it is desirable to adjust the length of the stroke for different thicknesses of material so that the punch is raised above the die to a height just sufficient to allow the insertion of the material to be worked, and thereby give increased safety to the operator in that it assists an avoidance of finger injury.

To make this adjustment the locking ring 31 is removed by loosening the bolts 33 and the key 28 is inserted in the key hole 27 as shown in Fig. 2. Then with the key 28 acting as a driving planet gear, secondary eccentric 25 as a driven planet carrier, and primary eccentric 19 as a fixed sun gear the two eccentrics are rotated relative to each other and the total additive eccentricity of the two eccentrics is varied, thereby to determine the length of the stroke of the press.

While I have shown but one embodiment of my invention, it is apparent that the device is susceptible to modification without departing from the spirit of the invention. I do not wish, therefore, to be limited by the disclosures set forth, but only by the scope of the appended claims.

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

I claim:

1. A variable eccentric comprising a connecting rod and annular bearing strap, an eccentric ring journaled within said strap, said ring having a key hole axially placed herein for receiving a nipple of a toothed adjusting key, a disk journaled within said eccentric ring having an eccentrically placed bore with key way, a perimet-
rically toothed shoulder formed as a part of said disk, the teeth on said shoulder meshing with the teeth of the adjusting key when its nipple is placed in said key hole of the eccentric ring for relative rotation of said disk with respect to said eccentric ring, and an eccentric detachable coupling ring internally toothed for meshing with the teeth of said disk and having bolt holes through which bolts may extend to engage corresponding threaded openings in the eccentric ring for securing the disk and eccentric ring to rotate together.

2. A variable eccentric comprising a strap, an eccentric ring journaled within said strap and having a key hole axially placed therein for receiving a nipple of a toothed adjusting key, a disk journaled within said eccentric ring having an eccentrically placed drive shaft connection and an axially extended perimet-
rically toothed cylindrical portion for meshing with the teeth of the adjusting key when in place in said key hole for rotation relative to said eccentric ring, and an internally toothed detachable ring adapted to mesh with teeth on said disk and means for securing said detachable ring to said eccentric ring for coupling the eccentric ring with said disk to rotate together.

3. An adjustable stroke safety punch press comprising a die, a punch, a crosshead, a connecting rod and annular bearing strap, an eccentric ring journaled within bearing strap having an axially aligned key hole and a plurality of axially aligned threaded openings, a disk journaled within said eccentric ring having an eccentrically placed bore with keyway and having an axially extended concentric cylindrical portion perimet-
rically toothed, a detachable coupling ring internally toothed adapted to mesh with the teeth of said extended cylindrical portion of said disk and having a plurality of extended axially aligned openings corresponding with the openings in said eccentric ring to receive bolts to secure said disk to said eccentric ring to rotate together, an independent adjusting key having a nipple to fit in said key hole and a gear adapted to mesh with the teeth of said disk upon the removal of said coupling ring for the relative rotation of said disk with respect to said eccentric ring, thereby to adjust the additive eccentricity of the eccentric ring and disk to that amount to give just sufficient clearance between the die and the punch for the insertion of the material to be worked and exclude the operator's hands, and a drive shaft keyed to the eccentrically placed bore within the disk.

4. A variable eccentric comprising an eccentric disk member, an eccentric ring member journaled on said disk member and adapted to serve as a bearing for a connecting rod strap, a series of circumferentially extending gear teeth on one of said members adapted to mesh with the teeth on a detachable toothed adjusting key, a bearing surface formed on the other of said members to receive said key in bearing relation, whereby rotation of said key while in engagement with said bearing surface and in mesh with said series of gear teeth produces relative rotation between said members, and means attachable upon removal of said key for detachably securing said members together to prevent relative rotation thereof.

5. A variable eccentric comprising an eccentric disk member, an eccentric ring member journaled on said disk member and adapted to serve as a bearing for a connecting rod strap, a series of circumferentially extending gear teeth on one of said members adapted to mesh with the teeth on a detachable toothed adjusting key, a bearing surface formed on the other of said members to receive said key in bearing relation, whereby rotation of said key while in engagement with said bearing surface and in mesh with said series of gear teeth produces relative rotation between said members, and means for detachably securing said members together to prevent relative rotation thereof including an element having teeth adapted to engage with the teeth of said series on said first mentioned member.

6. An adjustable eccentric comprising an eccentric disk, an eccentric ring journaled on said disk and adapted to serve as a bearing for a connecting rod strap, said ring having a bearing surface formed thereon to receive a toothed adjusting key in bearing relation, said disk having a series of gear teeth extending circumferentially thereon and adapted to mesh with the teeth on said key when said key is in bearing relation with said bearing surface, a locking member having a portion adapted to interengage with said gear teeth on said disk, and means for detachably securing said locking member to said ring whereby said disk and said ring are locked together against relative rotation.

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