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Carlise

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[54] **APPARATUS FOR CHANGING THE OPERATING STROKE OF A PUNCH PRESS**

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[52] **U.S. Cl.** ..... **74/571 M,** 72/446, 74/600, 83/530

[51] **Int. Cl.** **F16c 3/28**

[58] **Field of Search** .....74/600, 571 M, 571 L, 74/571 R; 72/446; 83/530

[56] **References Cited**

UNITED STATES PATENTS

1,258,020	3/1918	Klocke	74/571 R
2,592,237	4/1952	Smith et al.	74/571 R

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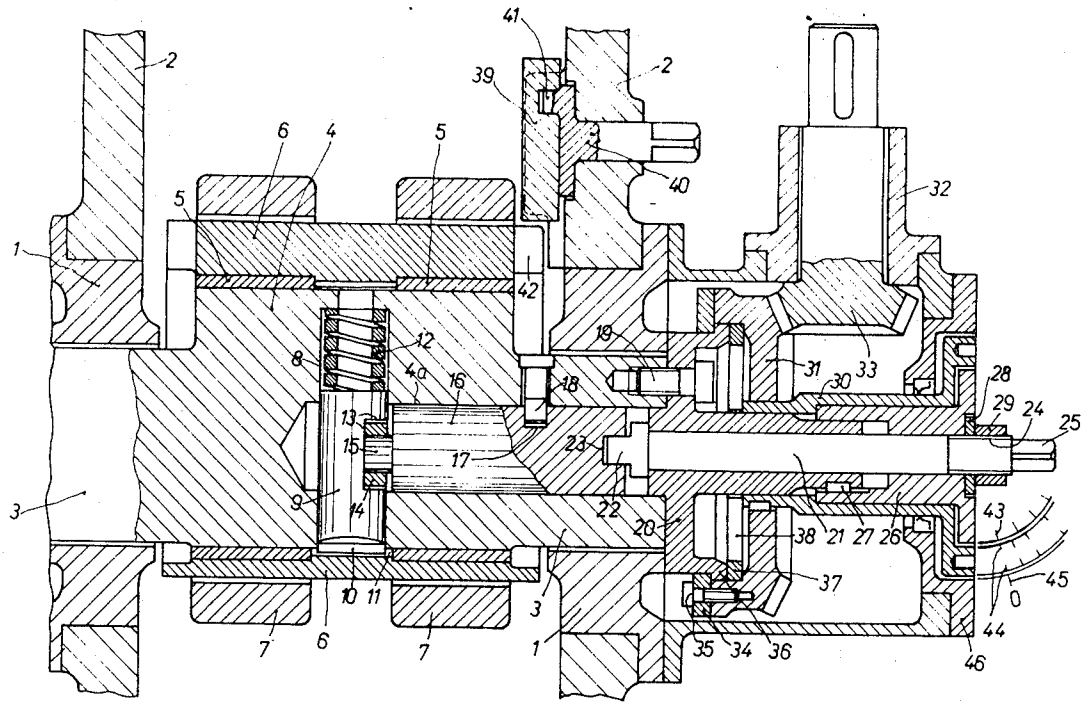
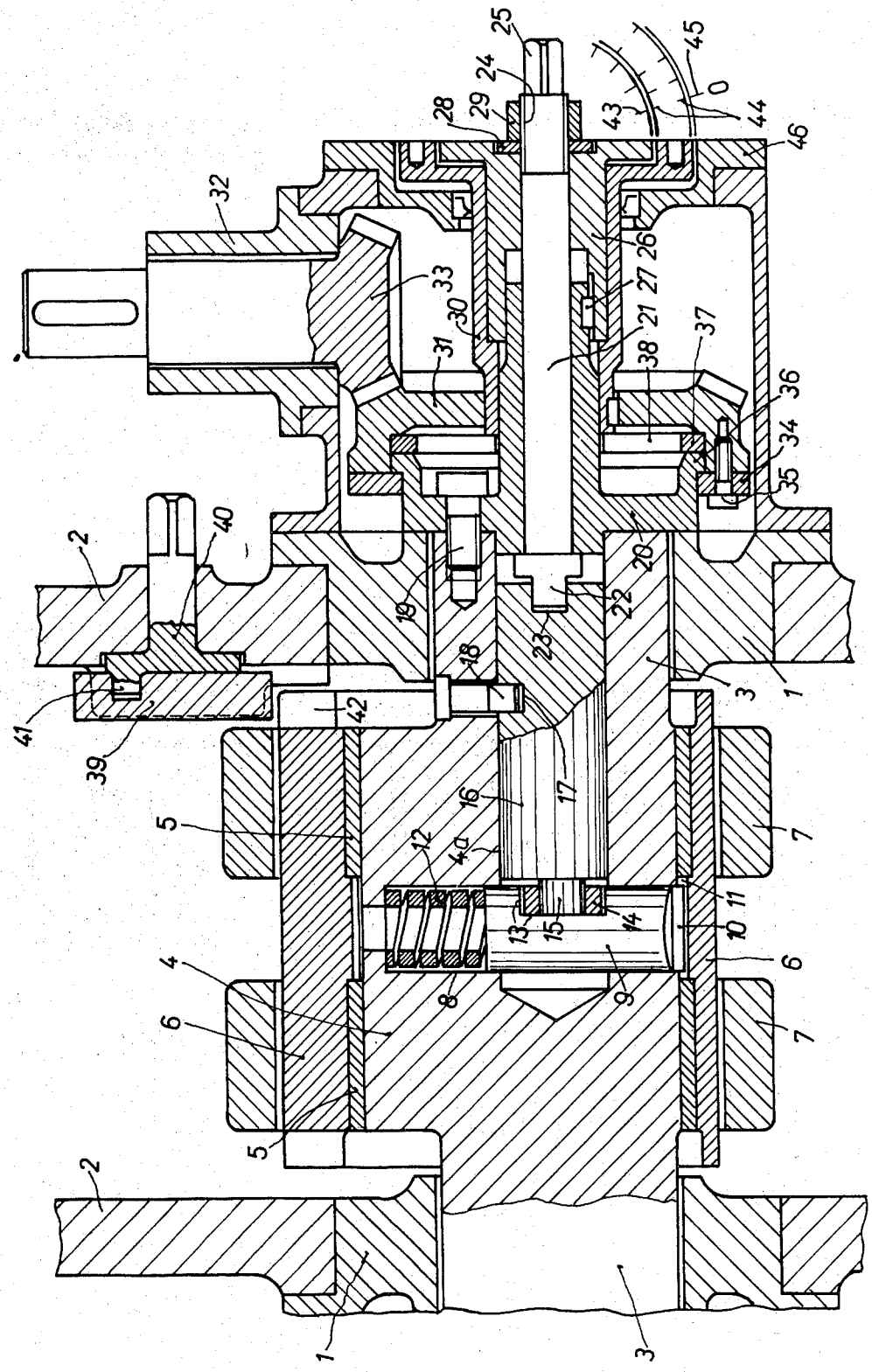
[57] **ABSTRACT**

Apparatus for changing the operating or work stroke of a punch press with a double eccentric for the mounting of a drive crank, said double eccentric being arranged upon a drive shaft and consisting of an inner eccentric and an outer eccentric sleeve or bushing. A locking pin guided in a radial bore of the inner eccentric at one end cooperates by means of teeth with internal teeth of the eccentric sleeve and at the other end is spring-loaded. A central adjustment spindle cooperates with the locking pin, and due to rotation of the adjustment spindle the locking pin can be displaced against the spring-load out of engagement with the internal teeth of the eccentric sleeve. There is also provided an axially displaceable sleeve or bushing which surrounds the adjustment spindle and cooperates with a slotted plate spring which in its stressed condition connects the inner eccentric by fixedly clamping same with a drive element. The inner eccentric, when the locking pin is inactivated, is rotatable with regard to the fixedly retained eccentric sleeve and therefore the eccentricity of the double eccentric and the drive stroke of the punch press is adjustable.

5 Claims, 1 Drawing Figure

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APPARATUS FOR CHANGING THE OPERATING STROKE OF A PUNCH PRESS

BACKGROUND AND SUMMARY OF THE INVENTION

The present invention relates to a new and improved apparatus for changing the workstroke of a punch press or machine with a double eccentric for mounting the drive crank, the double eccentric being arranged upon a drive shaft and consisting of an inner eccentric and an eccentric sleeve.

A simple advantageous constructional manifestation of such apparatus can be realized according to the concepts of this invention in that a locking pin guided in a redial bore of the inner eccentric cooperates at one end by means of teeth with internal teeth of the eccentric sleeve and the other end of such locking pin is spring-loaded. A central adjustment spindle cooperates with the locking pin. Due to rotation of the adjustment spindle the locking pin, against the action of the spring-load, can be displaced out of engagement with the internal teeth of the eccentric sleeve. An axially displaceable bushing or sleeve surrounding the adjustment spindle cooperates with a slotted plate spring which, in its stressed or tensioned condition connects by clamping the inner eccentric with a drive element. When the locking pin is inactivated the inner eccentric can be rotated relative to the fixedly retained eccentric sleeve and therefore the eccentricity of the double eccentric and the drive stroke of the punch press is adjustable.

The locking pin can advantageously possess a recess into which engages an eccentric pin of the adjustment spindle. The adjustment spindle can possess an annular groove which extends over one-half of its periphery, and into this groove there engages an impact or stop bolt in order to limit the adjustment spindle in its terminal positions.

Furthermore, the sleeve or bushing cooperating with the slotted plate spring can advantageously be axially displaceable by means of a threaded nut seated upon a threaded portion of the adjustment spindle.

Additionally, there can be concentrically provided about the adjustment spindle a first scale which cooperates with the inner eccentric and there can also be provided a second scale which cooperates with the drive element of the adjustment drive, the second scale cooperating with a fixed marker or indicia.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be better understood and objects other than those set forth above, will become apparent when consideration is given to the following detailed description thereof. Such description makes reference to the annexed drawings wherein the single FIGURE of the drawing illustrates in axial sectional view a preferred exemplary embodiment of inventive apparatus.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Describing now the drawings, there will be recognized a driven drive-or transverse shaft 3 mounted in bearings 1 of the machine housing or frame 2, this shaft 3 together with an inner eccentric 4 being integrally formed i.e. of one-piece. An eccentric sleeve or bushing 6 is mounted by bearings 5 upon inner eccentric 4. Two connecting rods 7 are mounted at the eccentric sleeve 6 and through the agency of which the punch press is driven. A locking pin 9 is guided in a radial bore 8 of the inner eccentric 4. One end of locking pin 9 possesses teeth 10 which cooperate with internal teeth 11 of the eccentric sleeve or bushing 6. A compression or pressure spring 12 acts upon the other end of locking pin 9. This compression spring 12 is arranged in bore 8 and strives to press the teeth 10 of the locking pin 9 into engagement with the internal teeth 11 of the eccentric sleeve 6, and to thereby fixedly retain against rotation the eccentric sleeve 6 at the inner eccentric 4.

The locking pin 9 possesses a recess 13 with which engages through the agency of a sleeve 14 an eccentric pin 15 of an adjustment spindle 16. Adjustment spindle 16 is rotatably mounted in an axial bore 4a of the inner eccentric 4 and the transverse shaft 3 and possesses an annular or ring-shaped groove 17 extending through an angle of 180° and with which engages an impact or stop bolt 18 threaded into the transverse shaft 3 in order to limit rotation of the adjustment spindle 16 in its terminal positions. An extended portion or extension 21 of the adjustment spindle 16 is displaceably guided in a bearing sleeve or bushing 20 secured by screws 19 or equivalent fastening means to the transverse shaft 3. This extended portion 21 engages by means of a cam 22 with a transverse groove 23 of the adjustment spindle 16. The extended portion 21 furthermore possesses at its outer end a threaded portion 24 and a square portion or four cornered shaft 25. By means of a wrench or other suitable tool placed upon the square portion 25 it is possible to rotate the extended portion 21 together with the adjustment spindle 16 in order to displace the locking pin 9 against the pressure of the spring 12 such that the teeth 10 come out of engagement with the internal teeth 11.

A sleeve or bushing 26 is non-rotatably mounted by means of a key or wedge 27 upon the bearing sleeve or bushing 20, however guided to be axially displaceable. A threaded nut 29 cooperates through the agency of a shim or underlay disk 28 with this sleeve 26, the nut 29 being located upon threaded portion 24 of the extended portion 21. The sleeve 26 is mounted at a further sleeve or bushing 30 in such a manner that sleeve or bushing 30 can be displaced by the bushing 26, however does not rotate therewith. Keyed to the bushing 30 is a bevel gear 31 which meshes with a gear 33 mounted at housing portion 32 and driven by such gear 33. At the rear face of the gear 31 there is secured by screws 35 or equivalent structure a guide ring 34. This guide ring 34 engages behind an outer flange 36 of bearing bushing 20. Between the outer flange 36 and the gear 31 there is located the peripheral edge of a plate or cup spring 37 possessing a slot 38 which extends from its peripheral edge towards the inside and bears at its inner edge against the sleeve or bushing 30 in such a manner that during inward displacement of such bushing or sleeve 30 the plate spring 37 is stressed and the guide ring 34 coupled with the gear 31.

A lock 39 is displaceably guided in the housing 2. This lock 39 can be brought into and out of engagement with a slot 42 formed at the eccentric bushing or sleeve 6 by means of a rotary disk 40 having an eccentric pin 41 and mounted at the housing 2, in order to fixedly retain the eccentric bushing 6 against rotation.

At the bushing or sleeve 26 rotating with the inner eccentric 4 there is provided at the outer end face thereof a scale 43. Concentric to the scale 43 there is provided at the outside of the bushing 30 keyed with

adjustment gear **31** a scale **44** which cooperates with a fixed marker or indicia **45** of a housing portion **46.**

Now in order to change the eccentricity of the double eccentric formed by the inner eccentric **4** and the eccentric sleeve or bushing **6** and therefore the operating or work stroke of the machine, the lock **39** is brought into engagement with the slot **42** and thus the eccentric bushing or sleeve **6** is fixedly retained. Then, due to rotation of the adjustment spindle **16** and the elongated portion or extension **21** thereof, the teeth **10** of the locking pin **9** are moved out of meshing engagement with the inner teeth **11** of the eccentric sleeve or bushing **6.** Now by rotating the nut **29** the sleeves or bushing **26** and **30** are axially displaced until the slotted plate spring **37, 38** is stressed or tensioned and thereby the gear **31** is coupled with the bearing bushing **20.** Now by means of the gear **33** and via the gear **31** and the bearing bushing **20** the inner eccentric **4** can be rotated with respect to the fixedly retained eccentric sleeve **6** and thus there can be adjusted the eccentricity of the double eccentric, wherein the adjustment can be read-off the scales **43, 44.**

While there is shown and described present preferred embodiments of the invention, it is to be distinctly understood that the invention is not limited thereto but may be otherwise variously embodied and practiced within the scope of the following claims.

Accordingly, what is claimed is:

1. Apparatus for changing the operating stroke of a punch press comprising a drive shaft provided with a connecting rod means, a double eccentric for mounting the connecting rod means, said double eccentric being arranged to be driven by the drive shaft and comprising an inner eccentric and an eccentric sleeve, said inner eccentric having a radial bore, said eccentric sleeve having internal teeth, a locking pin guided in the radial bore of the inner eccentric, said locking pin being provided at one end with teeth means cooperating with the internal teeth of the eccentric sleeve, means for spring-loading the other end of said locking pin, a central adjustment spindle means cooperating with the locking pin, wherein through rotation of the adjustment spindle means the locking pin can be displaced against the spring-load out of engagement with the internal teeth of the eccentric sleeve, an axially displaceable bushing surrounding the adjustment spindle means, a slotted plate spring means with which cooperates the axially displaceable bushing, means for selectively fixedly retaining said eccentric sleeve, a drive element means, the plate spring means in its stressed state operatively connecting the inner eccentric with the drive element means, whereby when the locking pin is displaced against the spring-load means the inner eccentric can be rotated with respect to the fixedly retained eccentric sleeve, and therefore the eccentricity of the double eccentric and the drive stroke of the punch press can be adjusted.

2. The apparatus as defined in claim **1,** wherein the locking pin possesses a recess, said adjustment spindle means having an eccentric pin engaging with said recess.

3. The apparatus as defined in claim **2,** wherein the adjustment spindle means possesses an annular groove extending over approximately one-half of its periphery, a stop bolt engaging with the annular groove in order to limit the adjustment spindle means in its terminal positions.

4. The apparatus as defined in claim **1,** wherein the adjustment spindle means comprises a threaded portion, a threaded nut seated upon the treaded portion of the adjustment spindle means for axially displacing said bushing cooperating with the slotted plate spring.

5. The apparatus as defined in claim **1,** further including a first scale concentrically arranged about the adjustment spindle means and cooperating with the inner eccentric, a second scale cooperating with the drive element means, a stationary marker with which cooperates the second scale.

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