

March 5, 1940.

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2,192,707

PRESS FOR OPERATING UPON CONTINUALLY TRAVELING MATERIAL

Original Filed Dec. 4, 1936

2 Sheets-Sheet 1

Fig. 2.

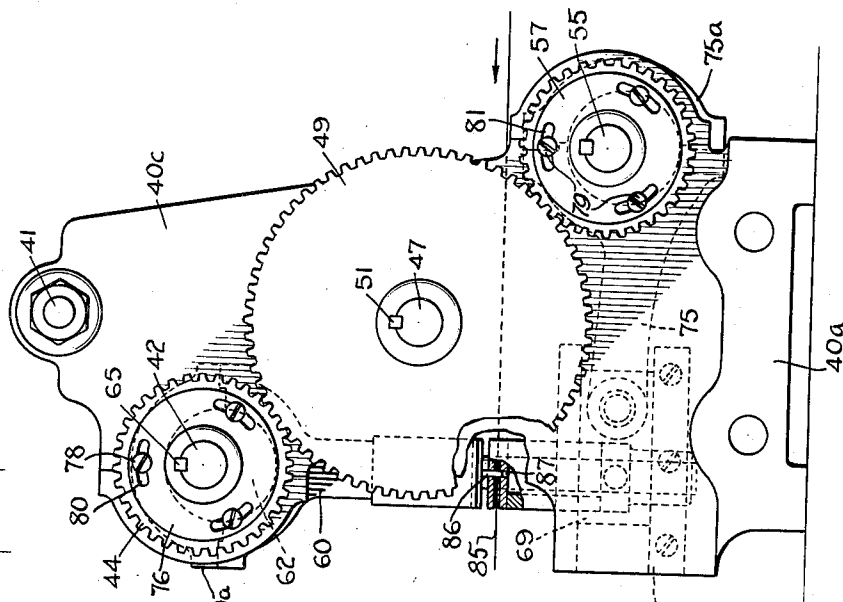
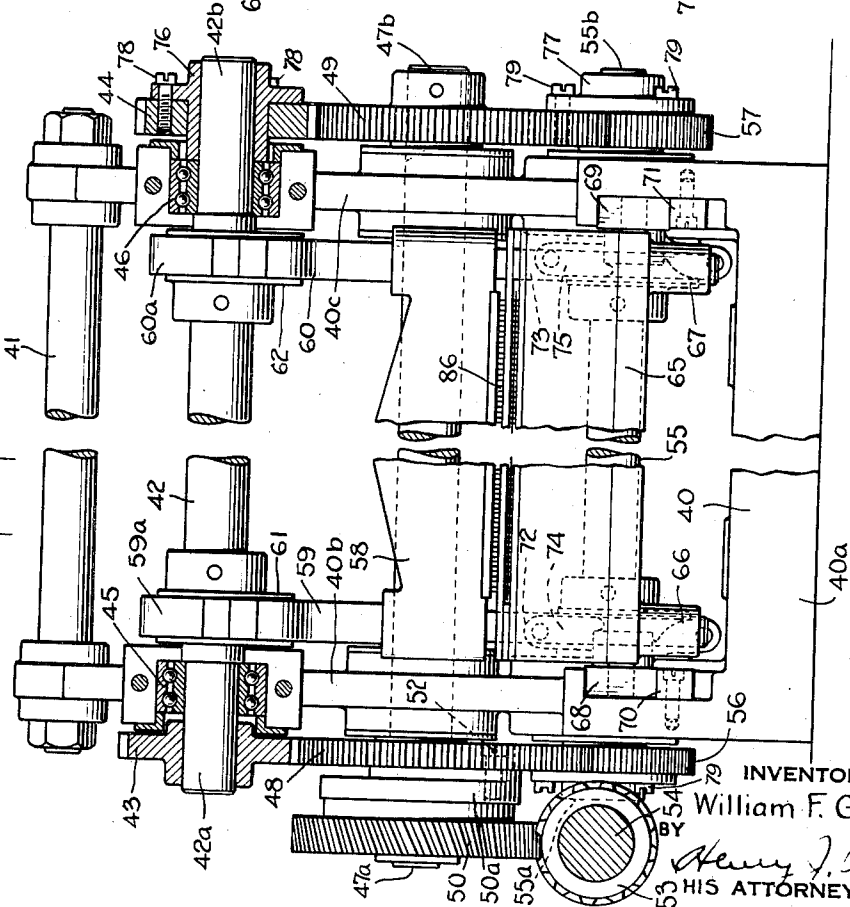


Fig. 1.



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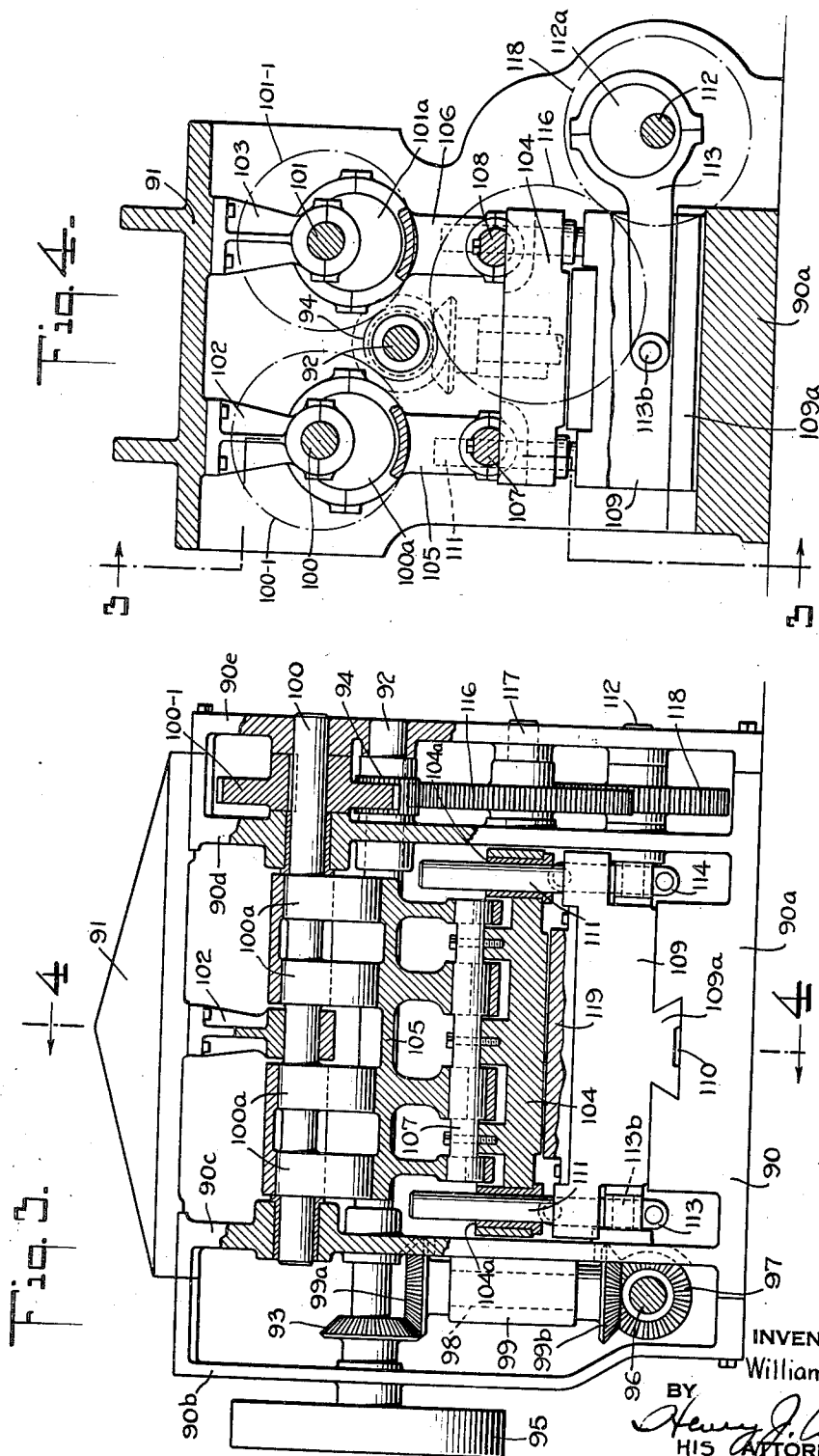
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UNITED STATES PATENT OFFICE

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PRESS FOR OPERATING UPON CONTINUALLY TRAVELING MATERIAL

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Application December 4, 1936, Serial No. 114,197
Renewed September 19, 1939

10 Claims. (Cl. 164—48)

This invention relates to presses for cutting, perforating, die cutting, embossing, stamping, or otherwise operating upon continually traveling material, usually in web form. More particularly, the invention relates to presses having a reciprocatory impressing jaw for operating on material as it travels continually, adjacent thereto.

To insure nicety of cut, uniformity of impression, or enhanced effectiveness of other types of work accomplished by presses designed to operate upon material traveling continually there-through, especially material in web form such as a continuous strip of paper or sheet metal, mutual coordinated travel of the operating jaws of the press, at a velocity synchronized with the velocity of travel of the material at the stage of operation of the press upon the material, is provided for. During the time interval of such mutual coordinated travel, synchronized in velocity, which is usually of short duration, the desired press operation is accomplished.

Embodiments of the invention comprise a suitable eccentric mounting for one jaw providing a general reciprocative movement therefor, including, as one component of its motion, a path of travel coincident with the travel of the material operated upon, and, as another component of its motion, a path of travel, at the stage of impression of the jaw, substantially perpendicular to the path of travel of the material operated upon for effecting the desired press operation, the eccentric mounting providing movement of the opposing jaw in a path substantially coincident with the travel of the material operated upon.

Synchronism of velocity of travel of the material being operated upon and of the impression jaw of the press means that the equal distances between successive impressions on the material will be predetermined in length by the specific structural dimensions of the actuating mechanism, and will remain constant for any given press unless otherwise particularly provided. According to one phase of the present invention means are provided whereby adjustment may be had for varying the length of such equal distances between successive impressions for any given press operation.

The above and other features and objects of the invention will become apparent upon consideration of the following detailed description and the accompanying drawings, in which:

Fig. 1 represents a front elevation of one embodiment of the invention, an unimportant cen-

tral section of the press being broken away for convenience of illustration;

Fig. 2 represents a side elevation, partly in section, of the embodiment illustrated in Fig. 1;

Fig. 3 represents a vertical section, taken on the line 3—3 of Fig. 4, of another embodiment of the present invention; and

Fig. 4 represents a vertical section taken on the line 4—4 of Fig. 3.

Referring now to Figs. 1 and 2 of the drawings illustrating an embodiment of the invention in a press designed for effecting a punching or perforating operation, it will be observed that the press comprises an upper eccentrically mounted work jaw and a lower pivotally mounted passive jaw slidably connected thereto so that its movement will be correlated with the movement of the work jaw. The press also includes means whereby the pivotally mounted passive jaw may be displaced bodily, forward or backward, and as additive to, or subtractive from its normal swinging motion. This affords variation in length of the equal distances between successive impressions on the continually traveling material.

More specifically, the press illustrated comprises a supporting frame 40 having a base portion 40a, and two mutually spaced upstanding side members 40b and 40c. A crossbar 41 extends between, and connects the upper portions of the side members 40b and 40c for imparting increased rigidity to the frame. A shaft 42 is journaled in the side members 40b and 40c and extends therebetween with its ends projecting outwardly, as at 42a and 42b, for the reception of drive gears 43 and 44, respectively. The shaft 42 may be mounted in the anti-friction bearing assemblies indicated generally at 45 and 46.

A main drive shaft 47 is journaled preferably centrally of the side members 40b and 40c and extends transversely therebetween. Its ends project outwardly, as at 47a and 47b, for receiving thereon intermediate drive gears 48 and 49, respectively, meshing with gears 43 and 44, respectively. The projecting end 47a is extended for receiving a main drive gear 50. Both the intermediate drive gears 48 and 49 and the main drive gear 50 are rigidly mounted on the shaft 47, intermediate gear 49 and main drive gear 50 being preferably keyed thereon (see 51 in Fig. 4) and intermediate gear 48 being advantageously held by a screw 52 which penetrates hub portion 50a of main drive gear 50. Main drive gear 50 meshes with a spur pinion 53 mounted rigidly on the shaft 54. Any suitable source of power may rotate

the shaft 54, and thus effect rotation of the main drive shaft 47, and therewith the shaft 42.

Another shaft 55 is journaled in the side members 40b and 40c of the supporting frame 40, and extends transversely therebetween at an appropriate location with respect to the shafts 42 and 47. Its ends 55a and 55b project outwardly for receiving thereon the gears 56 and 57, respectively. The shaft 55 is desirably journaled in anti-friction bearings in the same manner as the shaft 42.

Eccentrically mounted on the shaft 42 is the work jaw of the press. It preferably comprises a tool-holder member 58 supported at its ends by the connecting rods 59 and 60, whose upper bearing ends 59a and 60a, respectively, are mounted on the disks 61 and 62, respectively, the latter being rigidly and eccentrically mounted in mutually spaced relationship on the shaft 42 for rotation therewith.

The passive jaw of the press is mounted for cooperation with the work jaw in effecting the desired press operation. It comprises a tool-holder member or bed 65 mounted transversely on and between the longitudinally slotted supporting members 66 and 67 for forward swinging movement correlated with the forward movement of the work jaw.

For accomplishing the forward swinging movement, the supporting members 66 and 67 are pivoted at their lower ends to the blocks 68 and 69, respectively, slidably disposed in the slideways 70 and 71, respectively, the latter being provided on the inner surface of frame side members 40b and 40c, respectively. Leg members 72 and 73 depending rigidly from respective ends of the work jaw fit into the longitudinal slots of the supporting members 66 and 67, respectively, for sliding reciprocation therein during the entire reciprocatory stroke of the work jaw, as briefly described above.

Eccentrically disposed on the shaft 55 are mutually spaced connecting rods 74 and 75 pivotally secured at their free ends to the blocks 68 and 69, respectively. Bearing ends 74a and 75a of the connecting rods 74 and 75, respectively, are eccentrically mounted on the shaft 55 in a manner similar to the mounting of the bearing ends of connecting rods 59 and 60 on the shaft 42.

In order to provide for taking up any back lash between gears, the gear 44 is adjustably mounted on the end 42b of shaft 42. To this end hub plate 76 is rigidly mounted on the shaft end 42b. The gear 44 is mounted for free rotation on its hub plate but normally is held rigidly thereon as by means of set screws 78, secured to the gear and extending through arcuate hubs 80, located in the body of its hub plate and concentric therewith. Similarly the gears 56 and 57 are adjustably mounted on the respective ends of the shaft 55. Such adjustable mounting may be the same as the adjustable mounting of the gear 44, namely, as is illustrated with respect to the gear 57, by set screws 79 secured to the gear 57 and extending through arcuate slots 81, the latter being located in the body of the hub plate 77 and concentric therewith.

Mutual variation of position of the eccentricities of the sets of connecting rods 59 and 60 and 74 and 75 for a purpose hereinafter explained may be accomplished by the proper relative setting of the shafts 55 and 42 with respect to each other. The adjustment of the relative setting may be accomplished by loosening the set screws 79 of the gear 57 and the corresponding set screws

of the gear 56 thereby permitting the shaft 55 to be rotated the desired arcuate extent, the shaft 42 remaining stationary, whereupon the set screws of the gears 57, 56, are retightened.

The instant machine is designed to accomplish a punching or perforating operation on material, such as the web 85, traveling between the jaws thereof. For this purpose, a set of male punches 86 is mounted in the tool-holder 58 of the work jaw for cooperation with a set of female dies 87 mounted in the tool-holder 65 of the passive jaw.

Given any desired mutual adjustment of eccentricity of work jaw and passive jaw, as above explained, operation of the press is substantially as follows: The shaft 54, rotated by any suitable source of power, effects rotation of the shaft 47 through the meshing of spur pinion 53 with main drive gear 50. The intermediate drive gears 48 and 49 meshing with the gears 43 and 44, respectively, cause rotation of the shaft 42, and coincidentally rotary reciprocation of the work jaw, relative to the passive jaw, in a vertical plane. Simultaneously therewith, the intermediate drive gears 48 and 49 mesh with the gears 56 and 57, respectively, causing rotation of shaft 55 and, coincidentally, rectilinear reciprocation of the passive jaw in a horizontal plane. Coincidentally with the rotary reciprocation of the work jaw and the rectilinear reciprocation of the passive jaw, a forward and backward swinging movement of the passive jaw is effected by reason of the sliding connection between the legs 72 and 73 and the longitudinally slotted members 66 and 67 respectively.

For clean-cut cooperation of the punches 86 with the dies 87 in operating on the traveling web 85, it is necessary that the velocity of horizontal traverse of the operating jaws of the press at the stage of impression be equal to the velocity of travel of the web 85. Under such required conditions, variation in the length of the equal distances between successive impressions on the web 85 may be had only if there is a differential between the stated two velocities during that portion of the travel of the jaws other than at the stage of impression.

In the instant machine the velocity of travel of the web need not be synchronized with the velocity of horizontal traverse of the cooperating jaws of the press except at the impression stage. The latter synchronization is accomplished by adjustment of the respective eccentric drives for the work jaw and the passive jaw relative to each other in the manner heretofore described. Thus the reciprocation of the passive jaw forwardly or backwardly relative to its normal swinging motion may be additive to, or subtractive from the latter in effecting synchronization of the stated velocities.

Referring now to Figs. 5 and 6 of the drawings illustrating another embodiment of press designed in the instant case for a printing, embossing, or like operation; the numeral 90 indicates a frame for supporting the operating mechanism of the press. The frame 90 comprises a base portion 90a and two sets of upstanding side members, 90b and 90c, and 90d and 90e respectively. A top frame element 91 extends transversely between and connects the upper portions of the stated sets of upstanding side members.

Journaled in the sets of frame side members and extending transversally therebetween is a main drive shaft 92. Rigidly mounted on the shaft 92 between the frame side members 90b 75

and 90c is the miter gear 93, and rigidly mounted on the shaft 92 between the frame side members 90d and 90e is the spur pinion 94. A fly wheel 95 is conveniently mounted on the end of shaft 92 which protrudes outwardly from frame side member 90b.

A power-drive shaft 96 extends longitudinally of the frame 90 preferably at a low point thereof. Rigidly mounted thereon is a miter gear 97.

A vertically disposed, intermediate shaft 98, journaled in an extension 99 of frame side member 90c, has formed at its ends the miter gears 99a and 99b for meshing, respectively with the miter gears 93 and 97.

The work jaw of the press is eccentrically mounted on the two shafts 100 and 101 journaled respectively in the frame side members 90c, 90d and 90e and extending, mutually parallel therebetween. The shafts 100 and 101 are journaled intermediate their ends in bearings 102 and 103, respectively, depending from the frame top element 91. They are each provided with sets of eccentrics as at 100a and 101a, respectively, and have rigidly mounted thereon at locations between frame side members 90d and 90e the gears 100-1 and 101-1 meshing with the spur pinion 94.

The work jaw of the press comprises a tool-holder 104 mounted on the shafts 100 and 101 by means of the compound connecting rods 105 and 106 for rotary reciprocation in a vertical plane. One set of bearing ends of the respective connecting rods is mounted on the eccentrics 100a and 101a, respectively, and the other set of bearing ends thereof is mounted on the stationary shafts 107 and 108 respectively, the latter being rigidly secured to the upper surface of the tool-holder 104.

The passive jaw of the press is mounted for rectilinear reciprocation in a horizontal plane. Its motion is necessarily correlated with the motion of the work jaw, and the limits of its horizontal path are necessarily the limits of the horizontal travel of the work jaw.

Accordingly, the passive jaw comprises a tool-holder or bed 109 provided with the projecting slide 109a which is received by the slideway 110 of the frame base member 90a for rectilinear sliding movement longitudinally of the press. Extending upwardly from the corners of the tool-holder 109 are guide posts 111. They are slidably received, respectively, by respective passages 104a provided at the four corners of the tool-holder of the work jaw.

Desirably, the passive jaw is actuated in its reciprocation independently of, but correlated with, actuation of the work jaw.

For this purpose a shaft 112 is journaled in the frame side members 90c, 90d and 90e, and extends transversally therebetween. It is provided with a set of eccentrics 112a. Connecting rods 113 and 114 have their respective bearing ends 113a and 114a mounted on respective eccentrics 112a, and are pivoted at their free ends, as at 113b and 114b, to the tool-holder or bed 109 of the passive jaw.

An intermediate gear 116 is mounted for rotation on a short shaft 117, journaled in the frame side members 90d and 90e. It meshes with and is driven by the spur pinion 94. A gear 118 is rigidly mounted on the shaft 112, and, for rotating the latter, meshes with the gear 116. Rotation of the shaft 112 causes the passive jaw to reciprocate. Because of the slideway mounting of the

tool-holder 109, see 110 Fig. 5, the reciprocation is rectilinear and horizontal.

The sliding engagement between guide posts 111 and receiving passages 104a insures positive correlation of horizontal reciprocation between the work jaw and the passive jaw at all times.

A platen member 119 is mounted on the tool-holder or bed 109. Mutually opposing faces of the tool-holder 104 and the platen member 119 may be provided with any desired cooperating impression or embossing or the like means.

For press operation, the power drive shaft 96 is rotated by any suitable source of power, and in turn rotates main drive shaft 92 through the medium of vertically disposed intermediate shaft 98. Spur pinion 94 effects rotation of the two shafts 100 and 101 and therewith rotary reciprocation of the work jaw of the press. Spur pinion 94 also, simultaneously, through the medium of intermediate gear 116, effects rotation of the shaft 112, and therewith rectilinear reciprocation of the passive jaw of the press.

By reason of the correlation of reciprocation between work jaw and passive jaw, uniformity of impression and enhanced effectiveness of result is obtained by the press in operating on material passing continuously therethrough.

Whereas this invention has been illustrated and described with particular reference to certain of its preferred embodiments, it should be definitely understood that many changes may be made without departing from the spirit of the invention as defined in the following claims.

I claim:

1. In a press for operating on material traveling continually, a work jaw and a passive jaw, an eccentric mounting for said work jaw, a pivotal mounting for said passive jaw, said pivotal mounting being independent of said work jaw and of the eccentric mounting for the work jaw and being substantially opposite thereto, means carried by said work jaw and articulatively connecting with said passive jaw for actuating said passive jaw in correlation with the movement of the work jaw, the said work jaw and the said passive jaw cooperating, during mutual travel at a velocity synchronized with the velocity of material traveling through the press and along the same path, to accomplish the desired operation on said material in its passage through the press, and means for activating the passive jaw additionally relative to the work jaw along the path of travel of the material for obtaining synchronism of material and jaw velocity during the desired operation on said material.

2. In a press for operating on material traveling continually, a work jaw and a passive jaw, an eccentric mounting for said work jaw, a pivotal mounting for said passive jaw, said pivotal mounting being independent of said work jaw and of the eccentric mounting for the work jaw and being substantially opposite thereto, means carried by said work jaw and articulatively connecting with said passive jaw for actuating said passive jaw in correlation with the movement of the work jaw, the said work jaw and the said passive jaw cooperating, during mutual travel at a velocity synchronized with the velocity of material traveling through the press and along the same path, to accomplish the desired operation on said material in its passage through the press, and means for activating the passive jaw additionally relative to the work jaw along the path of travel of the material for obtaining synchronism of material and jaw velocity during

the desired operation on said material, said means being adjustable for synchronizing velocity of jaw travel with a variety of velocities of material travel at the stage of operation on the material.

3. A press for operating on traveling material passing between the jaws thereof, comprising an impression jaw and a passive jaw mounted for correlated movement one with the other, said impression jaw being eccentrically mounted for carrying its impressing portion in an elliptical path, and said passive jaw being pivotally mounted substantially opposite said work jaw for carrying its bed portion into coincidence and along with the outer arcuate end of the said elliptical path, means slidably interconnecting the said impression jaw and the said passive jaw for transmitting motion from the former to the latter and means for reciprocating the mounting of said passive jaw in a path which is substantially parallel to the path of travel of the material through the press.

4. In a press for operating on traveling material, a work jaw and a passive jaw, an eccentric mounting for said work jaw, a pivotal mounting for said passive jaw, said pivotal mounting being completely independent of said eccentric mounting and of said work jaw, connecting means rigidly carried by said work jaw, means secured to said passive jaw for slidably receiving said connecting means, a slideway disposed substantially parallel to the path of travel of the material through the press, means mounting said pivotal mounting for reciprocation within said slideway, eccentric means for reciprocating said mounting means within said slideway, and means for simultaneously motivating said work jaw and said eccentric means.

5. A press, as recited in claim 4, wherein the eccentricities of the stated eccentric mounting for the work jaw and the stated eccentric means for reciprocating the mounting means, are adjustable relative to each other.

6. In a press for operating upon traveling material, a stationary supporting frame, a work jaw mounted in said frame for movement about a closed orbit, a passive jaw mounted independently of said work jaw for movement in an arcuate path outside the said closed orbit of movement of the work jaw, the convexity of said arcuate path being directed toward the periphery of said closed orbit, and one location on said arcuate path being substantially coincident with one location on the said periphery of the closed orbit, means articulatively connecting said work jaw and said passive jaw for correlating the motions thereof, and means for reciprocating the mounting of the passive jaw in a rectilinear path which is substantially parallel to the path of travel of the material through the press.

7. In a press for operating upon traveling material, a stationary supporting frame, a work jaw mounted in said frame for movement about a closed orbit, a passive jaw mounted independently of said work jaw for movement in an arcuate path outside the said closed orbit of movement of the work jaw, the convexity of said arcuate path being directed toward the periphery of said closed orbit, and one location on said arcuate path being substantially coincident with one location on the

said periphery of the closed orbit, means articulatively connecting said work jaw and said passive jaw for correlating the motions thereof, the mounting of said passive jaw being secured within said frame for reciprocation along a substantially rectilinear path which is substantially parallel to the path of travel of the material through the press, and means for reciprocating said mounting of the passive jaw during the correlated movements of said work jaw and said passive jaw.

8. In a press for operating upon traveling material, a stationary supporting frame, a shaft journaled in said frame and carrying eccentric means, a work jaw mounted on said eccentric means for actuation thereby, a passive jaw pivotally mounted within said frame independently of said shaft and of said work jaw, means articulatively connecting said work jaw and said passive jaw for correlating motion of the latter with the former, a slideway in said frame substantially parallel with the path of travel of material through the press, the mounting of said passive jaw being secured within said slideway for reciprocation therealong, a second shaft journaled in said frame, connecting means eccentrically mounted on said second shaft and secured to said mounting of the passive jaw for actuating the same, a drive gear disposed between the first-named shaft and said second shaft, a driven gear mounted on said first-named shaft in mesh with said drive gear, and a driven gear mounted on said second shaft in mesh with said drive gear, at least one of said driven gears being adjustable to free-riding status on its shaft.

9. In a press for operating on traveling material, a work jaw eccentrically mounted for rotary reciprocation in a substantially vertical plane, a passive jaw pivotally mounted independent of said work jaw and of the mounting for said work jaw and substantially opposite thereto so as to swing in a substantially horizontal arcuate path in correlation with the corresponding portion of the reciprocative path of the work jaw, and means for reciprocating the mounting of the passive jaw along a path which is substantially parallel to the path of travel of the material through the press, the work jaw and passive jaw cooperating to effect a desired press operation on the material traveling therebetween, at a velocity synchronized with the velocity of the material.

10. In a press for operating on traveling material, a work jaw and a passive jaw, an eccentric mounting for said work jaw, a pivotal mounting for said passive jaw, said pivotal mounting being completely independent of said eccentric mounting and of said work jaw, connecting means rigidly carried by one of said jaws, means secured to the other of said jaws for slidably receiving said connecting means, means for actuating said work jaw whereby reciprocation of said connecting means within said receiving means will motivate said passive jaw in correlation with the movement with said work jaw, and means for activating the passive jaw additionally relative to the work jaw along the path of travel of the material for obtaining synchronism of material and jaw velocity during the desired operation on said material.

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