A. N. VERDIN & W. H. KAPPES.

FORMING PRESS.

APPLICATION FILED FEB. 8, 1909.

1,004,829.

Patented Oct. 3, 1911.

3 SHEETS—SHEET 1.

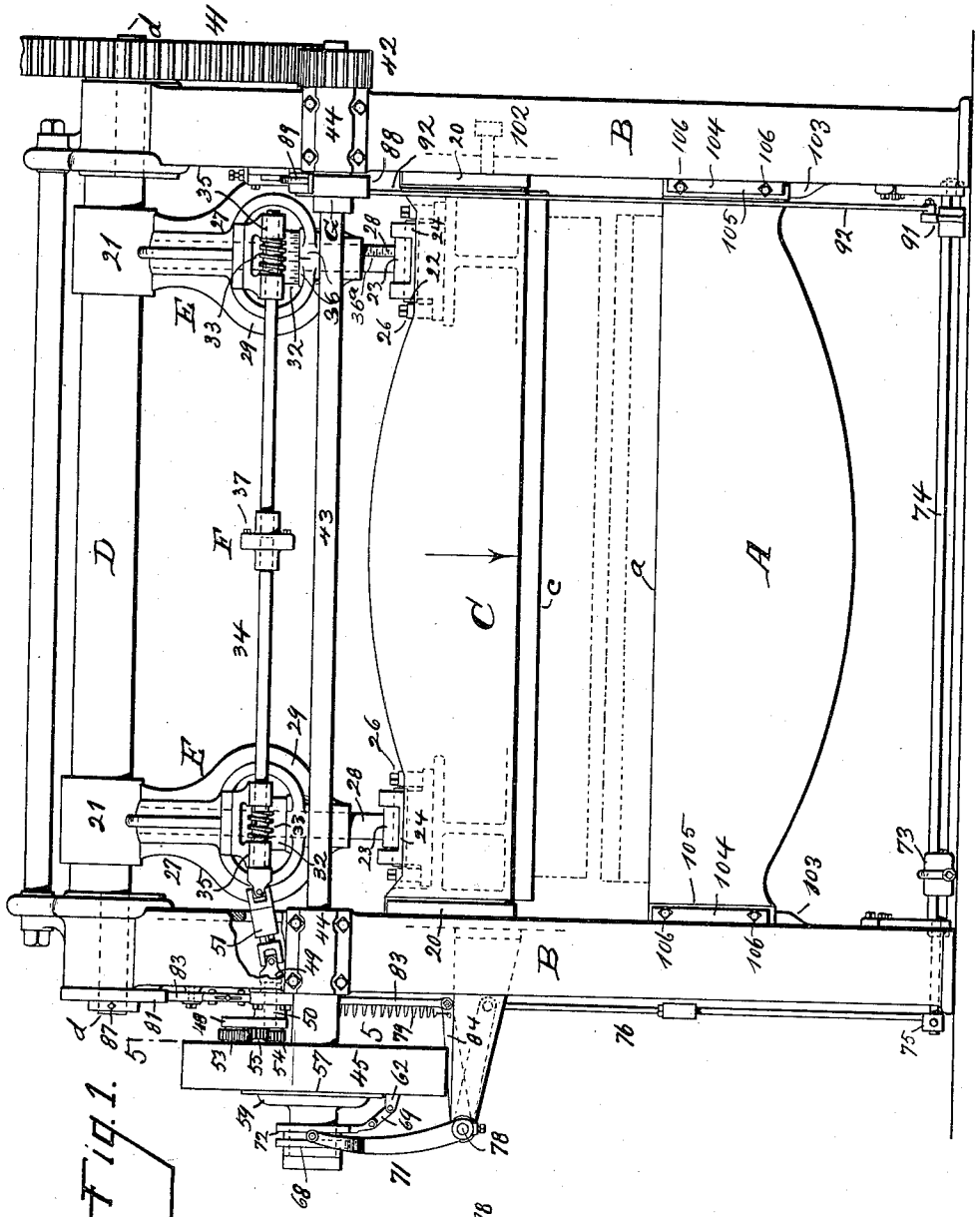

Fig. 1.

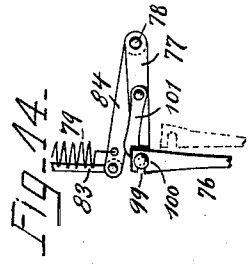

Fig. 14.

Witnesses.
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3 SHEETS—SHEET 2.

Fig. 5.

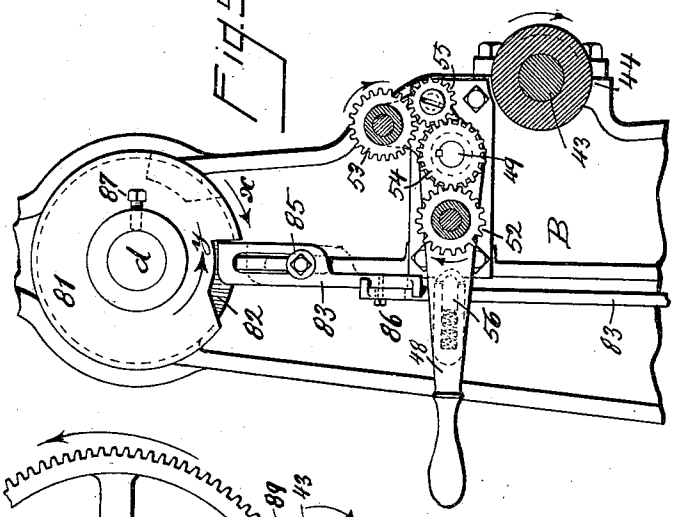
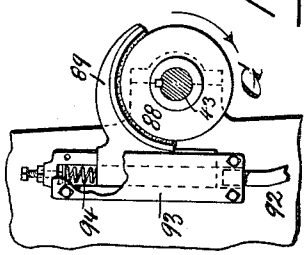


Fig. 12.



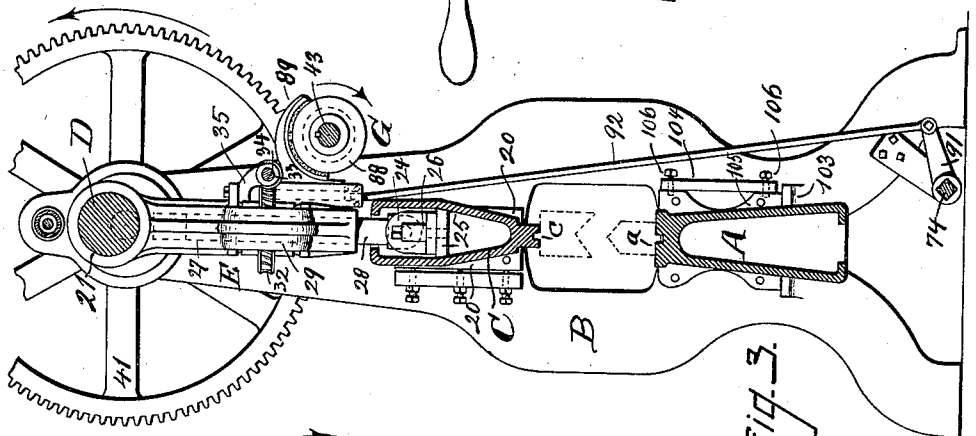


Fig. 3.

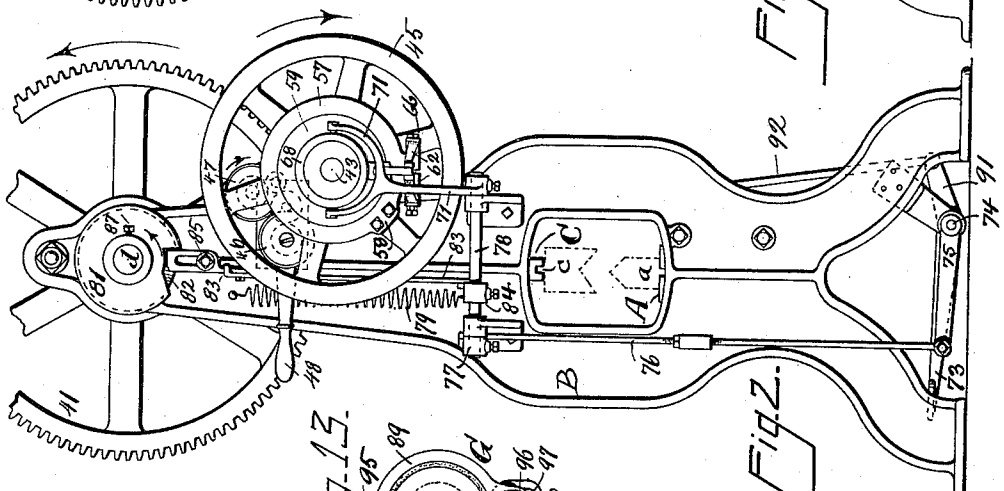
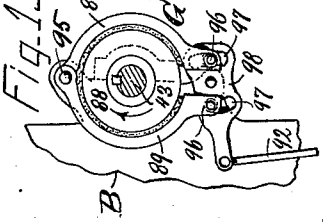


Fig. 2.

Fig. 13.



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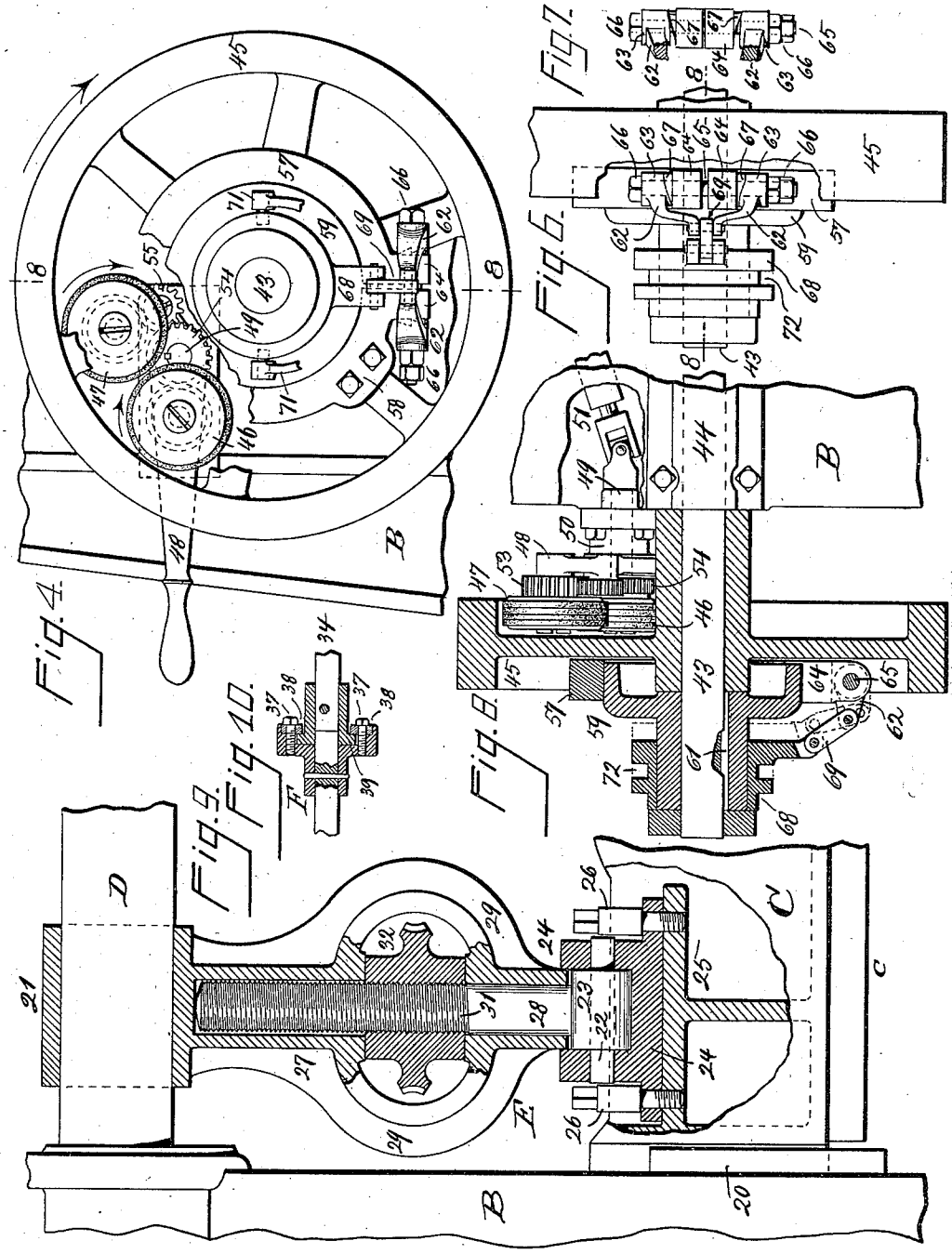

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UNITED STATES PATENT OFFICE.

ALOIS N. VERDIN AND WILLIAM H. KAPPES, OF GLENDALE, OHIO, ASSIGNORS TO VERDIN, KAPPES & VERDIN, OF CINCINNATI, OHIO, A FIRM.

FORMING-PRESS.

1,004,829. Specification of Letters Patent. Patented Oct. 3, 1911.

Application filed February 8, 1909. Serial No. 476,766.

To all whom it may concern:

Be it known that we, ALOIS N. VERDIN and WILLIAM H. KAPPES, citizens of the United States, and residing at Glendale, Hamilton county, State of Ohio, have invented certain new and useful Improvements in Forming-Presses; and we do declare the following to be a clear, full, and exact description thereof, attention being called to the accompanying three sheets of drawings, with the reference characters marked thereon, which form also a part of this specification.

This invention relates to improvements in the construction of forming presses, meaning machines which are used for forming to certain intended shapes flexible material, usually sheet-metal. Complementary dies, one stationary and the other movable, and both detachably connected to permit exchange and adjustment, are generally used in connection with such presses.

The improvements relate to the construction of such a press in general and more particularly of those parts of it which concern its operation for the purpose of actuating the movable die, for controlling this actuation and for reversing and stopping it, including also certain adjustments connected with these parts.

In the following specification and particularly pointed out in the claims at the end thereof, will be found a full description of our invention, together with its operation, parts and construction, which latter is also illustrated in the accompanying three sheets of drawings, in which:—

Figure 1, is an elevation of the press, it being more particularly a rear elevation, although a front-elevation, if shown, would present substantially the same appearance. Fig. 2, is an end-elevation of the press, it showing more particularly the left end as the press is shown in the preceding figure, it being also the right end with reference to the position of the operator, the driving mechanism of the press being located there, together with the manipulating-means for controlling operations. Fig. 3, is a similar view taken on a plane parallel to the preceding figure, but back of the same, it being more particularly a vertical section of the press between its ends. Fig. 4, shows a portion of Fig. 2, at enlarged scale, parts being broken away. Fig. 5, shows the same figure with parts nearest the observer removed, the line of the resulting section being indicated at 5—5 of Fig. 1. Fig. 6, shows parts of an underside-view of Fig. 4, parts being broken away. Fig. 7, shows parts of this figure in different adjustments. Fig. 8, is a vertical central section of Fig. 4, taken on line 8—8 there indicated, also in Fig. 6. Fig. 9, shows an enlarged scale and in section a portion of the upper part of Fig. 1, near the left-side thereof. Fig. 10, shows at enlarged scale a longitudinal section of a certain coupling appearing in Fig. 1. Fig. 11, is an elevation of this coupling, the view being taken at right angles to the preceding figure and showing more particularly its flat side on the right. Fig. 12, is an enlarged portion of Fig. 3, it showing more particularly one form of a certain brake shown there. Fig. 13, in a similar view, shows a modified construction of this brake. Fig. 14, illustrates a certain feature connected with the treadle-mechanism.

The frame of the press consists of the horizontal member or bed A, and the upright side-frame-members B B, also called housings, the bed being supported between them and rigidly secured to each. The movable and operative parts are also supported on and between these housings, the principal one of these parts being the slide or ram C. The underside *c* of this slide is opposite and above the upper-side *a* of the bed so that with suitable complementary dies attached to these opposite surfaces as indicated in dotted lines in Figs. 1, 2 and 3, and the slide being arranged to reciprocate with reference to the bed, certain work, corresponding in character to the particular dies used may be performed. These opposite sides *a* and *c* are arranged to permit attachment and interchange of various dies, suitable means being provided for their detachable connection, so that work of various kinds and of different shapes may be produced. The ends of the slide are fitted to move between cheeks 20, which are secured to the inner, opposite sides of housings B, and whereby the slide is guided during its operation.

Eccentrics are used to actuate the slide, the particular arrangement being by means of a shaft D, having eccentrically arranged

journals *d d*, whereby it is supported in bearings provided for them in the upper part of housings B. The action of this shaft is transmitted to the slide by links E, which at their upper ends are fitted around shaft D as shown at 21. At their lower ends they are hingedly connected to the slide. The connection is by means of a pin 22, fitted to an eye 23, formed at the lower end of each link, the ends of the pin being fitted to occupy opposite bearings in a box 24, connected to the slide. The connection is to webs 25, which form parts of the casting of the slide. The connection thereto of boxes 24 is by means of screws 26, which are so seated as to be opposite the ends of pins 22 in each case, and in which position they serve to hold these pins in place. (See Figs. 1, 3 and 9.) No other means, setscrews for instance, usually employed, which would hold these pins rigid, are required to hold them within their bearings and they are left free to shift their position rotarily which prevents them from wearing flat which they would do if held rigid so as to receive the effects of the thrust of the slide always in the same place. While the stroke of the slide is of permanent and fixed length, its position with reference to the bed may be adjusted to suit the character of the work to be performed, with particular reference to the height thereof. For such purpose the links are each made in two parts which are adjustably connected to each other and provided with a screw-connection to move one part with reference to the other. 27 is one of these parts and 28 is the other, both telescopically arranged and engaging each other with a sliding fit. The upper part 27 is designed in form of a frame with two alined and spaced parts, the two parts being connected by frame-members 29. The lower cylindrical part 28 of each link is closely fitted into the upper part 27, and for a part of its length is screw-threaded as shown at 31. A gear-wheel 32, preferably a worm-gear is seated on this screw-threaded portion, its hub being correspondingly threaded. These gear-wheels are also closely fitted into the space between the two sections of the upper link-parts so that, if rotated while seated upon the threaded portion of parts 28, they cannot move in an axial direction. These gears form the nuts of the screw-connection whereby the two parts of each link are secured to each other, and since they cannot move with reference to the upper link-part, for reasons just pointed out, it follows that the lower link parts must move. This movement whereby the length of the links is adjusted, constitutes the adjusting movement of the slide with reference to the bed below. In Fig. 9, this movement in an upward direction is shown as far as it can extend, that is the links are as short as they can be made. As shown in Figs. 1 and 3, their length has been increased and the slide operates closer to the bed.

Both nuts must be actuated simultaneously which is done by worm 33, mounted upon a shaft 34 which is supported in bearings 35 provided on the upper portions of the links. Suitable means to rotate this shaft are provided, a preferable means to be described later.

The adjustment of the links to determine the position of the slide for setting dies may be gaged and observed by means of marks 36^a on the movable link-member. There is also a micrometer gage provided, nut 32 on one of the links being used and provided for the purpose with graduations 36 around its cylindrical outside which are read in conjunction with a complementary indicating-device on the adjacent part of the link which carries this nut. Minute adjustment of the screws may be had by limited rotation of the nuts and readily read on the one which carries these graduations. A die-setting record may be obtained from these graduations for dies frequently, but interchangeably used, which record may be carried on a list or stamped on these dies, there being two numbers for each setting-record, one of which corresponds to one of the graduations 36^a, and the other corresponding to one of the graduations 36. When such a die is to be placed it is now only necessary to consult these numbers and to adjust the links until these numbers are in indicating position. The particular die may now be connected and no further tests and trial operations are necessary, because having properly operated before with the same link-adjustment, it will obviously do so at all other times.

If for any reason, uneven wear for instance, the slide should sag at one end, that is to be out of parallelism with the bed, it may be re-trued by adjusting one link independently of the other. To permit this, shaft 34 is in two sections, coupled together by means of a suitable coupling F illustrated in Figs. 1, 10 and 11, the complementary members of which are each rigidly secured to the alined ends of the shaft-sections. The opposite sides of these complementary coupling-members present flat-surfaces and are held in close contact by means of screws 37, seated in one of the members and carrying clamping-blocks 38, whereby they engage the other member. By loosening these screws, the rigid continuity of shaft 34 is interrupted and either of links E may be adjusted independently of the other, a suitable implement being used to rotate the particular shaft-section. The two shaft-sections may be readily re-connected by re-clamping the coupling members to each other and this may be done at any point of rotation of the independently rotated shaft-section and no

matter how limited or how extensive this independent rotation has been. As explained, this adjustment is only for the purpose of correcting inaccuracies in position of the slide and has nothing to do with the previously described, simultaneous adjustment of both links. Shaft D, which by means of these links E actuates slide C is rotated in a suitable manner as for instance by means of a gear-wheel 41 mounted upon one of its extended journals and driven by means of a pinion 42, mounted upon a shaft 43, supported in bearings 44 on the housings. This shaft is driven by a pulley 45 which by preference is of such weight as to add also the function of a fly-wheel. This power is also used to obtain the power for operating shaft 34 whenever the length of links E is to be adjusted, although other means for this purpose and operated by hand are not excluded. Frictionally operating driving means are so used to operate shaft 34, which operate in conjunction with pulley 45, they consisting of two friction-pulleys 46 and 47, carried upon the side of a hand-lever 48. These parts are so located that the faces of these friction pulleys are opposite a portion of the inner side of the rim of pulley 45, as shown in Fig. 8. Lever 48 is pivotally mounted, the end-portion 49 of shaft 34 being used to serve for the pivot. This end-portion 49 is supported in a bearing 50 provided on the adjacent housing.

Since shaft 34, the bearings for which are carried on links E, does not occupy a fixed position, but follows the motion of these links as due to their actuation by eccentric shaft D, it becomes necessary to provide a flexible shaft-section between this movable shaft 34 and its fixedly located end-portion 49. This flexible portion, involving the use of universal-joints, is indicated at 51, and is located between bearing 50 and the nearest shaft-bearing 35, as best shown in Fig. 1. Each of friction-pulleys 46 and 47 is combined with a gear-wheel, they being indicated respectively at 52 and 53 in Fig. 5, so that in each case a friction-pulley and its gear-wheel rotate as one. On the free end of the shaft-portion 49, there is a gear-wheel 54 which is permanently in mesh with gear 52 above mentioned. 55 is an idler also supported on lever 48, and permanently in mesh with gear 53, and with gear-wheel 54. It will now be understood that if gear 54 is driven by the friction-wheel which rotates gear 52, shaft 49, 51, 34, will rotate in one direction and move the adjustable parts of links E and slide C thereon in a direction accordingly. If gear 54 is rotated by gear 53, driven by the other friction-wheel, all connected parts together with the slide move in the opposite direction. All of this is accomplished by bringing either one or the other of friction-wheels 46 or 47 in contact with the inside of the rim of pulley 45, lever 48 being rocked accordingly. This manipulation for adjusting the slide either up or down does not interfere with any of the other manipulations of the press, and since the operative connection with power-driven pulley 45 is by frictional contact, this adjustment may be had while the press is running and without requiring stoppage of the same.

Normally lever 48 occupies an intermediate position in which neither one of the friction-pulleys is in contact with the rim of pulley 45. Suitable holding-means are provided for this purpose which readily yield when the lever is positively moved. A spring-actuated locking-bolt 56 carried on the lever and yieldingly held in a notched keeper provided for it, is indicated in dotted lines in Fig. 5.

Suitable means to control the operation of the slide are provided, preferably in form of a clutch whereby the connection between the power-providing medium (pulley 45) and power-driven shaft 43 is either temporarily established or interrupted. Customary means to manipulate this clutch are provided. The preferred construction of this part of the press is as follows: 57 is an open or split ring, rigidly connected near one of its ends against one side of pulley 45, bolts 58 being used for the purpose. It constitutes one of the complementary members of the clutch, a hub 59 around which this ring is loosely fitted, constituting the other clutch-member, said hub being rigidly connected to shaft 43 by means of a key 61. When the slide of the press is not in action, the power-driven pulley 45 which is loosely mounted upon shaft 43, carries clutch-ring 57 around clutch-hub 59 without effect upon this latter by reason of the clearance between them. When the clutch is manipulated however to operate the slide, this ring is caused to close around and grip the hub, so that this latter is forced to follow the power-driven-pulley, thereby also rotating shaft 43. The ring is contracted for this purpose by two levers 62, see Fig. 6, each provided with a hub 63 from which they extend and whereby they are enabled to act from opposite sides against two spaced projections 64, one on each end of the open clutch-ring from which they project outwardly. A rod 65 is loosely carried on these projections and supports beyond them the hubs of levers 62 above mentioned. Beyond these hubs shoulders are provided closely seated against the outer ends of hubs 63 and holding them at their inner ends closely against projections 64. These shoulders are formed by nuts 66 threaded upon the projecting ends of rod 65. The opposite contacting surfaces of hubs 63 and of projections 64 are cam-faced, the shape of these surfaces being that of circu-

lar inclined planes, as best shown at 67 in Fig. 6. It is now obvious, that if levers 62 are turned on rod 65 as shown in dotted lines in Fig. 8, the inclined surfaces on these hubs will ride up on the complementary opposite inclined surfaces on the outside of projections 64, as shown in Fig. 7. This movement necessarily induces also a lateral movement, that is one parallel to the axis of rod 65, and since hubs 63 can not yield axially, being prevented by shoulders 66, it follows, that the projecting ends 64 of the clutch-ring must yield. They are accordingly forced toward each other, thereby closing the clutch-ring and causing the same to tightly clamp the clutch hub. A limited movement of levers 62 is sufficient for the purpose of overcoming the normal clearance between clutch-ring and clutch-hub. This movement proceeds from clutch-sleeve 68, loosely mounted so as to be free for rotation as well as for movement in an axial direction and connected to the free ends of levers 62, by means of a link 69. If this clutch-sleeve is moved inwardly, that is toward the right, referring to Fig. 8, link 69 will turn levers 62 on rod 65 as shown in dotted lines, whereby the desired effect is obtained.

For the actuation of the clutch-sleeve, a customary forked clutch-lever 71 is used, the ends of which, diametrically opposite each other, occupy an annular groove 72 in the outside of the clutch-sleeve. The clutch-lever may be manipulated by any of the available means, hand-lever or treadle. A treadle 73 is used, mounted upon a rocker-rod 74, supported at opposite ends in bearings provided for it on the housings. The operative connection between treadle and clutch-lever is arranged to suit position of parts and consists accordingly of an arm 75 on rod 74, connected by means of a link 76 to another arm 77. This arm is mounted upon another rocker-rod 78 upon which clutch lever 71 is also mounted. A spring 79 returns the treadle to normal position after its manipulation, thereby carrying also all other parts back to their normal position and rendering the clutch inoperative.

In the most usual operation of the press shaft D makes only one revolution which is equivalent to one stroke of the die-carrying slide, after which the press stops to permit replacing or change of position of the work. The stoppage of this single operation must be so timed that it occurs when the upper or moving die is clear of the work, and by preference also with this die in its highest position. Since the accurate timing of this movement cannot be safely expected from the operator, stoppage is provided for by automatically operating means, as follows: Rigidly mounted upon one of the extended journals *d* of shaft D, the one nearest the treadle mechanism, there is a circular disk 81, provided with a notch 82 in its edge. This notch is normally occupied by the upper end of a lock-bar 83, connected so as to be affected by the manipulation of the treadle. An arm 84 is used for the purpose which is mounted upon rocker-rod 78. Suitable means to guide rod 83 during its limited movement are provided, as for instance the head 85 of a screw occupying a slot in said rod.

When the operator intends to start the slide, he merely taps the treadle to insure clutch-connection, to start shaft 43, after which he immediately removes his foot. This manipulation which induces instantly rotation of shaft D, also causes the end of lock-bar 83 to move out of the notch of disk 81, because rocker-rod 78 to which it is connected is affected by the treadle-movement. It further causes rotation of disk 81, because the same is rigidly mounted upon one of the journals of shaft D. This rotation causes the intact part of its circumference to move opposite the lowered end of lock-bar 83, so that, notwithstanding the operator having released the treadle immediately, the particular parts concerned here, including the clutch, are nevertheless still held in their operative and active positions by lock-bar 83, because this latter is prevented from returning to its normal position. This condition prevails until notch 82 comes around again and appears opposite the end of bar 83, whereby this latter is released so that it prevents no longer the return of the treadle-mechanism and permits spring 79 to carry all affected parts back to normal position. The clutch-connected power-supply is thereby cut off and slide C comes to a stop.

Bar 83 is preferably in two parts, as shown at 86 to permit adjustment for maintaining it at proper length with reference to disk 81.

As before stated it is necessary that the slide comes to a rest in an elevated position and by preference in its highest position above the bed, which means that shaft D be above its eccentrically located journals *d*. Notch 82 in disk 81 is therefore so located that it arrives opposite the upper end of rod 83 only when shaft D has moved into its high position above its journals. In locating this position, due regard should also be had to the inertia of the moving parts which tends to carry them beyond the intended stop, notwithstanding the power has been cut off by disconnection of the clutch. Notch 82 should therefore be so located as to release the lock-bar and to cause disconnection of the clutch before shaft D has arrived in its highest position, the movement being completed by the momentum of the moving parts, the effect of which, before exhausted, will carry them to their final po-

sitions. How much in advance bar 83 should be released depends obviously on a particular speed, as for instance if the press is run fast, notch 82 should be so located as to effect disconnection of the clutch earlier than if a slower speed were used. For this reason disk 81 is adjustably mounted, a set-screw 87, or other equivalent means being used to hold it in place.

Bar 83 in conjunction with notched disk 81, serves also as a lock which holds the slide elevated while not in operation, there being nothing else to prevent it from dropping down which if occurring unexpectedly might cause injury and damage. Disk 81 being thus prevented from rotating by bar 83, restrains also shaft D, against its tendency, induced by the weight of the slide, to swing around on its journals into its low position. The straight end of notch 82 is at that time in contact with the upper end of the lock-bar as shown in Figs. 2 and 5. This presumes of course that shaft and disk 81, tend to move in that direction (see arrow x), in case the slide should start to drop, since, if moving in the other direction, this lock would be ineffectual. To induce a tendency causing them to move in the desired direction, disk 81 is so adjusted that when the moving parts have come to a stop the center of shaft D, instead of being exactly vertically above the center of its journals, from which position it might drop over on either side, is caused to occupy a position slightly to the right of said journals, having reference to Fig. 3. In case the slide should now start to drop, immediately ensuing contact of the straight part of notch 82, with the end of bar 83 as shown in Fig. 5, will check further movement. This out-of-line position of the center of shaft D and its journals, while the shaft is at rest above them, is so slight in reality that it cannot readily be rendered perceptible in the drawing, nor does it perceptibly affect the position of the slide above the bed, and for practical purposes the slide may be assumed to be in its highest position, although theoretically it is somewhat lower. Movement and rotation of shaft D and disk 81 here referred to, that is in connection with the weight-induced dropping of the slide, and in a direction as indicated by arrow marked x in Fig. 5, has no connection with and should not be confused with the power-induced rotation which proceeds in opposite direction and is indicated by arrow y in same figure.

Prompt stoppage of the power-driven moving parts is aided by a brake-device G, which acts instantly as soon as the clutch-connection has been broken. The means for actuating this brake-device are operatively connected to the treadle-mechanism, so that manipulation of the treadle affects both the brake as well as the clutch, rendering one inoperative, while rendering at the same time the other operative, and vice versa. It consists of a brake-wheel 88, mounted upon shaft 43 and operating in conjunction with one or more brake-shoes 89, one being shown in Figs. 3 and 12, and two in Fig. 13.

Normally, that is when the clutch is disconnected, the brake-device is active, that is the brake-shoes engage the brake-wheel, being held in contact by spring-action. This engagement takes place instantly, as soon as disk 81 permits lock-bar 83 to release the treadle-mechanism. If the treadle is manipulated to start the press, an arm 91 on rocker-rod 74 acts by means of a rod 92 upon the brake-device in a manner which causes the brake-shoes to release the brake-wheel. In the form shown in Figs. 3 and 12, the single brake-shoe is slidably mounted in a box 93, and normally held against the brake-wheel by a spring 94. When the treadle is depressed, rod 92 is caused to rise up and lifts the brake-shoe off from the brake-wheel.

In the form shown in Fig. 13, the two brake-shoes are hingedly connected at 95, and extend nearly around the face of the brake-wheel. At their ends they have laterally projecting pins 96, preferably covered by a sleeve, which occupy grooves 97, provided in a lever 98, the free end of which is connected to rod 92. Grooves 97 are cam-shaped or eccentrically located in a manner that when the treadle is depressed, rod 92 is pushed upwardly and acts upon lever 98 in a manner which causes the brake-shoes to spread and release the brake-wheel. If the treadle is released, rod 92 acts upon the same lever in opposite direction, causing the brake-shoes to close around and grip the brake-wheel. Spring 79 of the treadle-mechanism provides in this case also the requisite spring-action. If necessary a spring may be added which by acting upon arm 91, augments the action of the brake.

In order to avoid accidents by inadvertent action upon the treadle before the proper time, for instance while arranging or resetting dies, arrangement is made whereby the treadle-mechanism is rendered inoperative for the time being. This is done by interrupting at a suitable point the connection of the train of elements which, reaching from the treadle to the clutch, connect both. As shown in Fig. 14, the connection between link 76 and arm 77 is rendered detachable so that, when said link is disconnected, the treadle drops onto the floor and is thus not only incapable of transmitting any action to the clutch, but it is also out of the way. For such purpose a lateral notch 99 is provided at the upper end of link 76, which receives a pin 100 on arm 77 and from which it may be readily disengaged. A gravity latch 101, which may be conveniently ma-

nipulated, serves to hold the link in engagement with the pin.

The press may also be used for punching, proper dies being placed for the purpose. In such case it is only necessary to provide means serving to take up the end-play of the slide, which is necessary when the press is used for forming purposes. A screw 102, seated in one of the housings as shown in Fig. 1, and adapted to engage the end of the slide, or serving to move a gib up against such end, may be applied for the purpose.

The complementary die-supporting members and particularly their surfaces *a* and *c* upon which the dies are seated must for obvious reasons be accurately adjusted with reference to each other and maintained so. When the press is set up, the movable member or slide is usually adjusted first, after which the stationary member A is fitted thereto, a normal seat being provided for it, consisting of ledges 103 and shoulders 104 arranged at right angles thereto as shown in Fig. 3, and projecting inwardly from the housings as shown in Fig. 1. In fitting and adjusting these members, their centers are located with reference to shoulders 104, which serve as a normal means from which the measures are taken for both. The squared flanges 105 at the ends of bed A are seated upon ledges 103 and held against shoulders 104 by screws 106. The endwise connection of the housings to member A is subject to this adjustment.

Having described our invention, we claim as new:

1. In a press, the combination of a shaft, a slide supported to have a reciprocatory movement, links hingedly connected at one of their ends to the shaft and at the other to the slide and oscillated by the shaft to actuate the slide, each link consisting of two parts of which one is slidably received within the other and closely fitted so as to permit adjustment of the length of the link without affecting the axial alinement of its parts and means to adjustably hold one of the link parts to the other.

2. In a press, the combination of a shaft, a slide supported to have a reciprocatory movement, links hingedly connected at one of their ends to the shaft and at the other to the slide and oscillated by the shaft to actuate the slide, each link consisting of two parts, one of tubular shape and the other of cylindrical shape and closely fitted into the tubular part so as to be held by it in alinement with the axis of the link but permitting of a sliding adjustment, the cylindrical part being screw-threaded and an end-wise confined nut which engages the cylindrical link-part and is carried by the tubular link-part.

3. In a press, the combination of a slide mounted to have a reciprocatory movement, a shaft to actuate it, links moved by this shaft, each having a pin opening at its lower end, boxes having complementary pin openings connected to this slide to which the open ends of the links are fitted, a pin fitted to occupy the registering pin-openings of each engaged link and box to connect them and screws whereby the boxes mentioned are connected to the slide, said screws being so located that one is opposite each end of each pin, thus serving to confine these pins endwise in position, but leaving them free to shift rotarily in the openings which they occupy.

4. In a press, the combination of a frame a slide mounted to have a reciprocatory movement, a shaft to actuate it, links moved by this shaft and connected to the slide, the length of these links being adjustable, a shaft operatively connected to these links in a manner to permit their manipulation for adjusting their length, a power driven shaft, a pulley located outside of the frame to rotate it, two friction-gears supported within the periphery of the inside of the rim of this pulley and adapted to be brought selectively into frictional and driving contact with said inside of the rim so as to be thus rotated by the pulley, a gear-train whereby each friction-gear is operatively connected to the link-adjusting shaft, and adjustable controlling means whereby either one of the friction gears may be caused to rotate the link-adjusting shaft, one in one direction and the other opposite thereto.

5. In a press, the combination of a slide mounted to have a reciprocatory movement, a shaft to actuate it, links moved by this shaft and connected to the slide, they consisting each of two parts adjustable one on the other, a shaft consisting of continuous sections, bearings moving with the links and stationary supporting means, each supporting a shaft section, power-actuated means to rotate the entire shaft applied to the section supported in the stationary means and an intermediate shaft-section connected to the stationary and to the movable shaft-sections with articulated joints.

6. In a press, the combination of a slide mounted to have a reciprocatory movement, a shaft to actuate it, links oscillated by this shaft and connected to the slide, each consisting of two adjustably connected parts, a shaft-bearing provided on one part of each link, a sectional shaft mounted in these bearings and oscillating with the links to each of which it is operatively connected for the purpose of adjusting their length, means to rotate this shaft for this purpose, a coupling consisting of two complementary members, one rigidly secured to the juxtaposed ends of each of the sections of this shaft, bolts seated in one of these members and intermediate clamping-means adapted

to engage the other member by means of these bolts and whereby the two coupling-members are held to each other to form the shaft complete and which permits disconnection of one part from the other, after which either shaft-section may be rotated independently of the other and re-connected again without limitation by position of bolts to adjust one of the links only.

7. In a press, the combination of a slide mounted to have a reciprocatory motion, a shaft to actuate it, a power-driven shaft to operate this slide-actuating shaft, a clutch which controls operation of the power-driven shaft, a treadle-mechanism to manipulate the clutch, a lock-bar connected to be affected by the manipulation of the treadle, and means connected to move with the slide-actuating shaft and adapted to act automatically upon the lock-bar to act upon the treadle.

8. In a press, the combination of a slide mounted to have a reciprocatory motion, a shaft to actuate it, a gear-wheel rigidly mounted on it, a power-driven shaft, a pinion on it in mesh with the gear on the slide-actuating-shaft to operate it, a clutch on the power-driven shaft which controls its operation, a treadle-mechanism to manipulate this clutch, a lock-bar adapted to be automatically affected by the manipulation of the treadle and a notched disk rigidly mounted to rotate with the slide-actuating-shaft and adapted to co-act with the lock-bar to act upon the treadle.

9. In a press, the combination of a reciprocatory slide, an eccentrically mounted operating shaft to move it, means to rotate this shaft, mechanism to control this rotation automatically in a manner that it only ceases when the shaft stops in a position above the center of its rotation, and devices operating automatically to hold the shaft in this position while at rest.

10. In a press, the combination of a reciprocatory slide, an eccentrically operating shaft to move it, means to rotate this shaft, mechanism including a lock-bar to control this rotation and a disk having a notch in its edge mounted to rotate with the shaft it being secured thereto in a fixed position and adapted to co-act with the lock-bar in a manner causing the controlling mechanism to effect stoppage of the shaft-rotation when the shaft is in a position above the center about which it rotates in which position it is held by the lock-bar, the end of which occupies the notch in the disk.

11. In a press, the combination of a reciprocatory slide, a shaft to actuate it, links moved by this shaft and consisting each of two members, one being of screw-threaded, cylindrical form connected to the slide and the other consisting of two alined, tubular parts connected to each other with a space between them by two lateral frame-portions and adapted to receive the cylindrical member which is fitted into both these tubular parts for sliding adjustment, a nut seated upon this cylindrical member and occupying the space between the two parts of the other member and means to actuate these to adjust the position of one member with reference to the other member.

12. In a press, the combination of a reciprocatory slide, a shaft to actuate it, links moved by this shaft and consisting each of two members, one being connected to the shaft and the other to the slide and one member of each link being also screw-threaded, a nut seated upon this member and carried by the other member, means to rotate these nuts to adjust the length of the links by causing one of their members to move with reference to the other one, graduations on the longitudinally movable member of one link showing the extent of movement of the movable link-member with reference to the other member as accomplished by a complete rotation of the nut and complementary micrometer graduations, on one of the nuts and on a part of the stationary link-member adjoining it to indicate extent of movement, due to a partial rotation only of the nut.

13. In a press, the combination of a slide, a power-driven shaft operatively connected to it to move it, a clutch controlling rotation of this shaft, a treadle to manipulate the clutch and means whereby both are operatively connected to transmit manipulation of the treadle to the clutch, said connection being a separable one to render the treadle inoperative.

14. In a press, the combination of a slide, a power-driven shaft operatively connected to it to move it, a clutch controlling rotation of this shaft, a treadle to manipulate the clutch to start this rotation, mechanism connected to be also affected by the manipulation of the treadle and adapted, operating automatically, to stop rotation of the shaft, and means connecting this mechanism, the clutch and the treadle to each other so that movement of one of these members affects also the other member, the connection as to the treadle being a detachable one to render it inoperative.

15. In a press, the combination of a slide, a power-driven shaft operatively connected to it to move it, a clutch controlling rotation of this shaft, a treadle to manipulate the clutch, means comprising rods, links and levers all jointed to each other whereby the treadle is operatively connected to the clutch, the joint between two of these members being a detachable one, and locking means to control the connection at this joint.

16. In a press, the combination of a slide mounted to have a reciprocatory movement, a shaft to actuate it, a power-driven shaft to

operate the former shaft, a friction-clutch which controls this operation, a brake-wheel mounted on the power-driven shaft, complementary braking devices adapted to co-act therewith, locking mechanism which, when actuated, operates to hold the clutch in operative position during a stroke of the s'ide after which it operates to release the clutch, a treadle, and spring-actuated means whereby it is operatively connected to the locking mechanism and to the braking devices and which operate so that the initiatory movement which accompanies a treadle manipulation is sufficient to act upon the braking devices and upon the clutch in a manner to cause these members to maintain certain positions irrespective of any treadle-namipulation.

In testimony whereof, we hereunto affix our signatures in the presence of two witnesses.

ALOIS N. VERDIN.
WILLIAM H. KAPPES.

Witnesses:
C. SPENGEL,
T. LE BEAN.