Dec. 23, 1947. E. HALLANDER 2,433,117

NOTCHING PRESS

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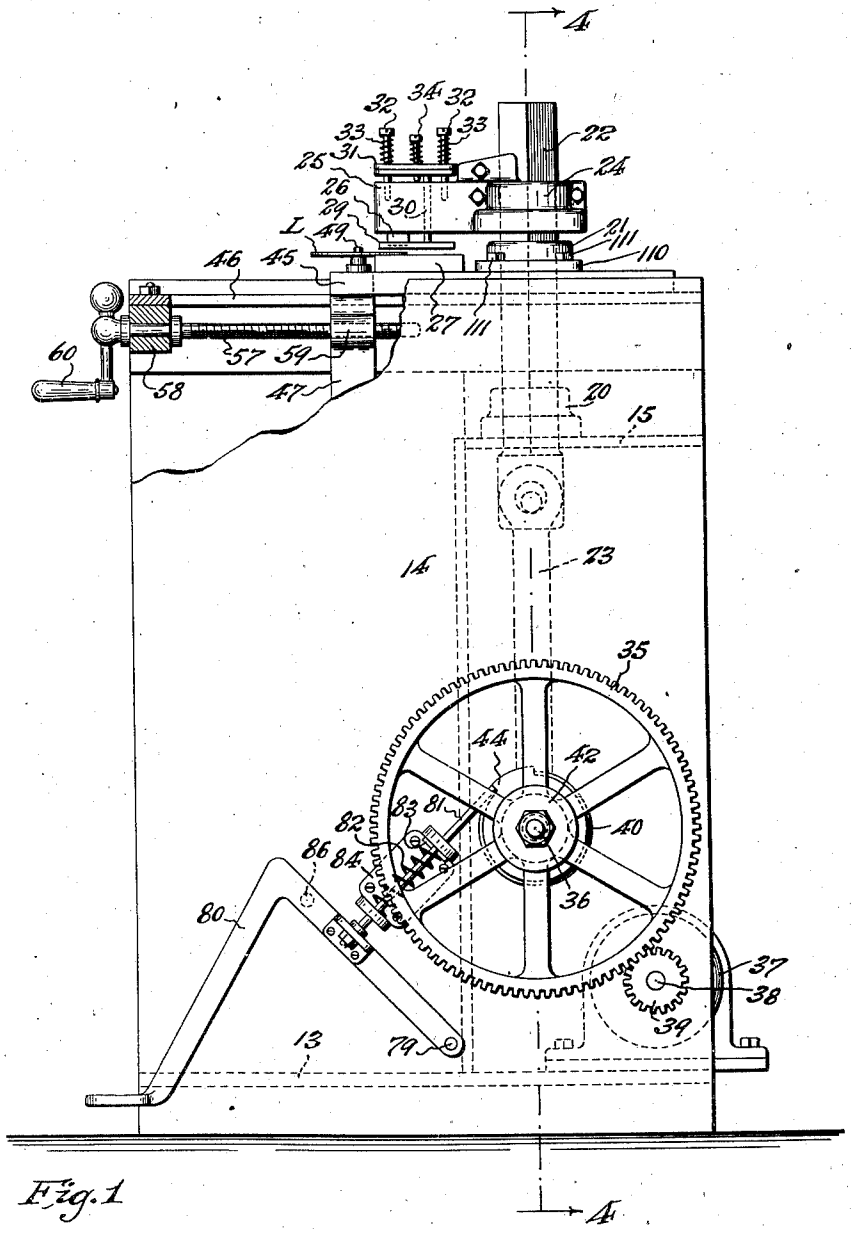


Fig. 1

INVENTOR.

Edward Hallander,

BY George D. Richards,

Attorney

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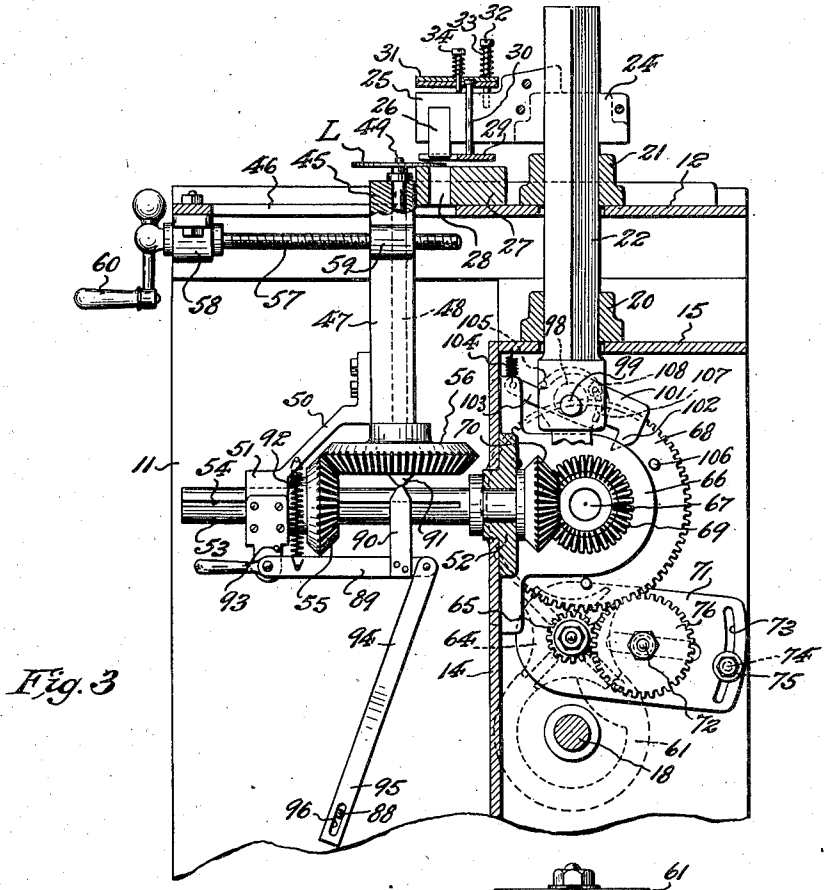


Fig. 3

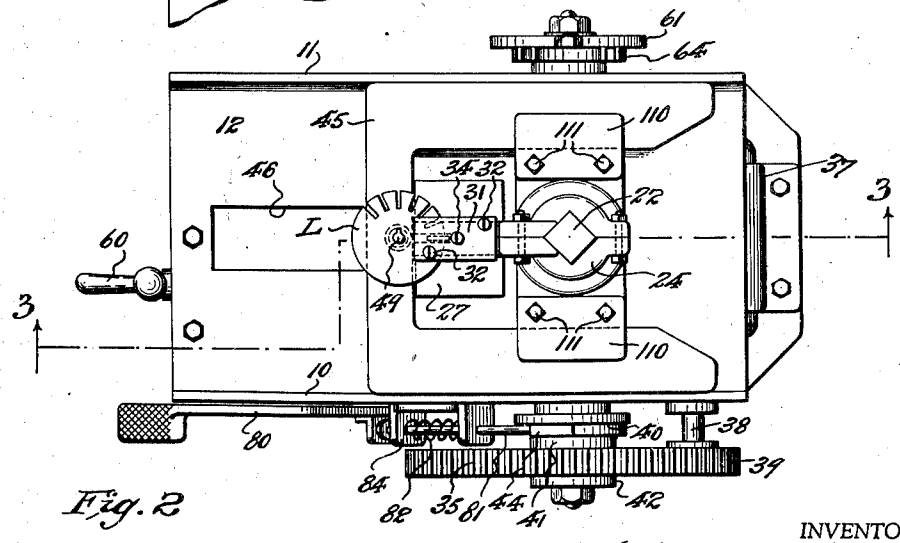


Fig. 2

INVENTOR.
Edward Hallander,
BY George D. Richards
Attorney

Dec. 23, 1947. E. HALLANDER 2,433,117

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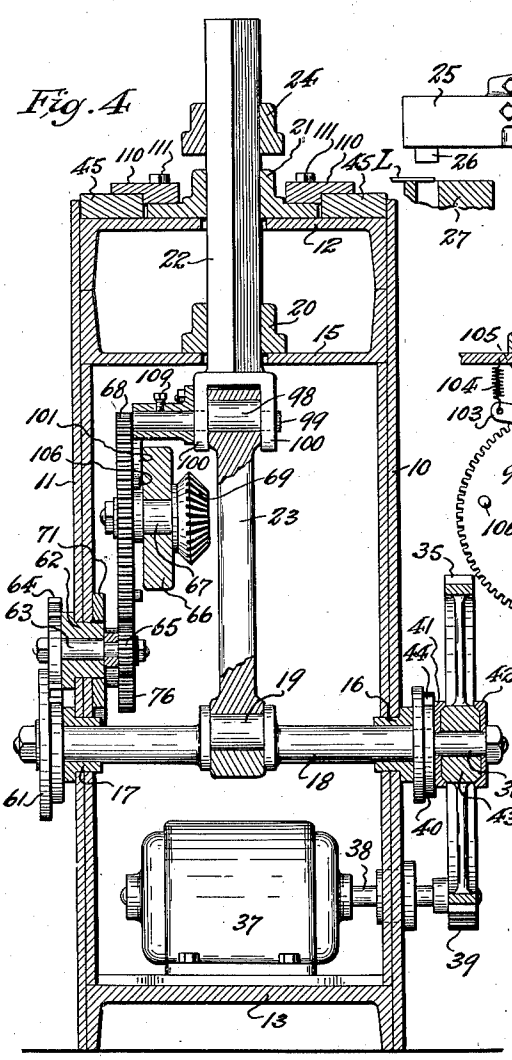


Fig. 4

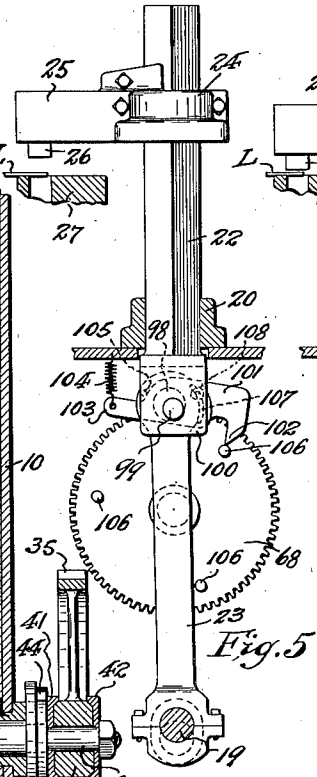


Fig. 5

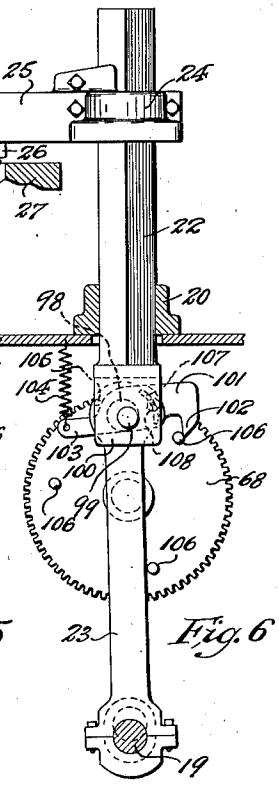


Fig. 6

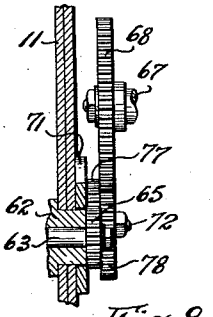


Fig. 8

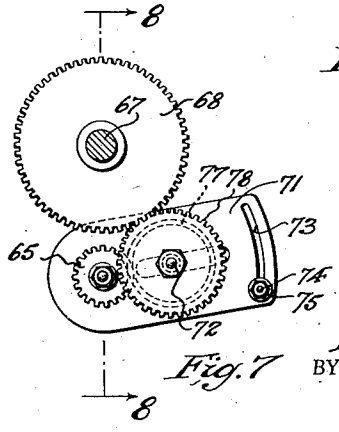


Fig. 7

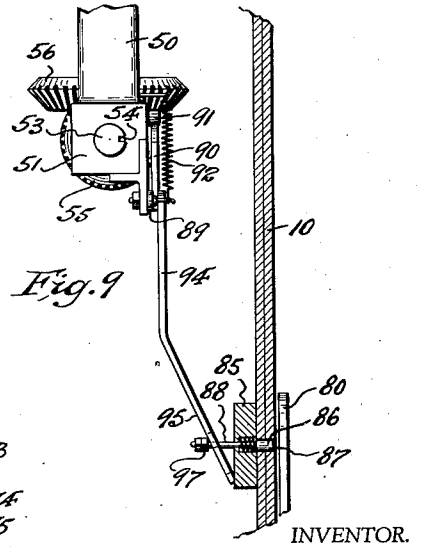


Fig. 9

INVENTOR.

Edward Hallander,

BY George D. Richards,

Attorney

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2,433,117

UNITED STATES PATENT OFFICE

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NOTCHING PRESS

Edward Hallander, Glen Ridge, N. J.

Application November 14, 1945, Serial No. 628,432

6 Claims. (Cl. 164—87)

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This invention relates to improvements in power presses; and the invention has reference, more particularly, to a novel power press especially adapted for notching or slotting laminations for rotors, stators, and armatures of motors, generators and other electrical apparatus and machines.

The invention has for an object to provide a very simple, compact and sturdy notching and slotting press which can be easily adjusted and converted with a minimum expenditure of time and labor whereby to accommodate its operation to various diameters of laminations and to various notching or slotting requirements; and to this end being provided with a work rotating spindle and driving mechanism therefor including means for adjusting the position of said spindle relative to the notching or slotting dies of the press, and a novel arrangement of indexing gear train in constant mesh which is intermittently actuated and timed by a driving Geneva gearing; provision being made for quickly and easily interchanging and compounding the gears of said indexing gear train.

The invention has for another object to provide the press crank-shaft with a novel clutch control means including means for automatically releasing a power transmission clutch and thereby stopping the press upon completion of a notching cycle.

A further object of the invention is to provide novel means for automatically altering the operative stroke of the male or punching die of the press whereby, if desired, to provide for notch skipping operation thereof at predetermined intervals during the progress of the notching cycle, so as to eliminate the formation of notches at desired points in and around a lamination undergoing the notching process.

Other objects of this invention, not at this time more particularly enumerated, will be understood from the following detailed description of the same.

An illustrative embodiment of this invention is shown in the accompanying drawings, in which:

Fig. 1 is a side elevational view of a notching press according to this invention, partially broken away to show certain interior parts; Fig. 2 is a top plan view of the press; Fig. 3 is a fragmentary vertical longitudinal section, taken substantially on line 3—3 in Fig. 2; and Fig. 4 is a transverse vertical section, taken on line 4—4 in Fig. 1.

Figs. 5 and 6 are fragmentary views similar to

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Fig. 3, but showing the operation of the skip notch controlling means.

Fig. 7 is a fragmentary view similar to Fig. 3, but showing a compound arrangement of the indexing gear train; and Fig. 8 is a sectional view thereof, taken on line 8—8 in Fig. 7.

Fig. 9 is a fragmentary transverse vertical section, showing means for automatically releasing a power transmission clutch upon completion of a notching cycle.

Similar characters of reference are employed in the hereinabove described views to indicate corresponding parts.

The illustrative embodiment of the notching press as shown comprises a suitable frame structure formed by side members 10 and 11, a top member 12 and a bottom member 13. Within the frame structure thus formed is suitably placed a transverse partition member 14 which terminates short of the top member 12, and extending rearwardly from said transverse partition member is a horizontal partition member 15 suitably spaced beneath said top member 12.

Affixed to the side member 10, rearwardly of said transverse partition member 14 and above said bottom member 13, is a bearing 16, and similarly affixed to and located in said opposite side member 11 is a bearing 17 disposed in transverse alignment with said bearing 16. Journaled in and between said bearings 16 and 17 is a crank-shaft 18 having a central crank-portion 19. Mounted in vertically aligned relation with each other, respectively on the horizontal partition member 15 and the top member 12, and in alignment with the crank-portion 19 of said crank-shaft 18, are guide members 20 and 21 through which extends a slide member 22. Said slide member 22 is guided by said guide members for perpendicular reciprocatory movements. Said slide member 22 is preferably of polygonal shape in cross-section so as to be restrained against rotation about its longitudinal axis. The lower end portion of said slide member 22 is connected by a pitman or connecting rod 23 with said crank-portion 19 of the crank-shaft 18, whereby to be reciprocated by the latter.

Affixed to the upper end of the slide member 22 is a blanking die head 24 which is provided with a forwardly projecting punch carrier arm 25 disposed to overhang the top member 12 of the press frame structure. Suitably mounted in said carrier arm 25 is a male die or punch 26, the operative end of which projects freely from and below the underside of said carrier arm. Affixed on the top member 12 of the press frame struc-

ture is a female die block 27 having a female die aperture 28 corresponding to and opposed to the male die or punch 26. Also carried by the punch carrier arm 25 of the blanking die head 24 is a stripper plate 29 which is disposed between said carrier arm 25 and the die block 27, and which is bifurcated to straddle the operative end of the punch 29. Said stripper plate 29 is yieldably supported from the carrier arm 25 by a stem rod 30, which extends upwardly through the latter so as to be slidably engaged therewith. The upper end of said stem rod 30 is affixed to a hanger plate 31, which is slidably supported by spaced guide posts 32 affixed to and upstanding from the upper side of said carrier arm 25. Said hanger plate 31 is yieldably urged toward the carrier arm 25 by compression springs 33 with which said guide posts are equipped, whereby, through the connecting stem rod 30, to yieldably urge the stripper plate 29 toward the female die block 27. Threaded through the hanger plate 31, so as to bear upon the carrier arm 25, is an adjusting screw 34, whereby the spacing of the stripper plate 29 relative to the female die block 27 may be suitably predetermined.

Mounted on the end of the crank-shaft 18 which projects exteriorly of the bearing 16 is a clutch controlled power transmission means, which may optionally be of any suitable type, such as pulley and belt, sprocket and chain or gearing. An illustrative form of such power transmission means, as shown, comprises a driven gear wheel 35 which is mounted on the exterior end portion 36 of the crank-shaft 18, so as to be freely rotatable thereon. An electric motor 37, supported in connection with the bottom member 13 of the press frame structure, furnishes a power source, power being transmitted from its armature shaft 38 by a spur gear 39 which meshes with said driven gear wheel 35.

Mounted on the crank-shaft 18 between said driven gear wheel 35 and the bearing 16 is a suitable axially expansible clutch means 40 which cooperates with a pair of clutch plates 41—42 adapted to embrace the hub 43 of said driven gear wheel 35; the outer clutch plate 42 being axially immovable, and the inner clutch plate 41 being axially movable toward and from the gear wheel hub 43. Said clutch means 40, when axially expanded, operates to move the clutch plate 41 toward the gear wheel hub 43 so as to frictionally grip the latter between the same and the clutch plate 42, whereby to transmit operative rotary motion to the crank-shaft 18 through said clutch means. Said clutch means 40 is provided with an external stop member 44 which, when engaged by clutch release means to be subsequently described, relaxes said clutch means 40 so as to free the driven gear wheel 35 from the grip of the clutch plates 41—42, thereby interrupting transmission of power to the crank-shaft 19, and thus stopping the press.

The means for supporting and rotating a lamination blank L subject to the action of the notching die means comprises a carriage plate 45 which is slidably supported upon the top member 12 of the press frame structure; said carriage plate being suitably cut away to straddle the female die block 27 and the guide member 21 supporting the slide member 22. Dependent from the forward end of said carriage plate 45, through an open way 46 with which said top member 12 of the press frame structure is provided, is a perpendicular bearing column 47. Rotatably mounted in and through said bearing column 47

is a work supporting and rotating spindle 48. Said spindle 48 is provided at its upper end with a splined coupler stud or adapter 49 of reduced diameter, over which the keyway of the center opening of a lamination blank L is engaged, whereby the latter is coupled to the spindle 48 so as to be rotated thereby. Affixed to the lower end portion of said bearing column 47 is an offsetting bracket arm 50 which terminates in a bearing block 51 disposed at right angles to the axis of said column and spindle. Mounted in the transverse partition member 14 of the press frame structure is a bearing 52 which is opposed to and aligned with said bearing block 51. Journaled in and between said bearing block 51 and bearing 52 is a spindle drive shaft 53 which is provided with a longitudinal keyway 54. Mounted on said spindle drive shaft 53 and keyed to the keyway 54 thereof so as to be slidable thereon, while nevertheless rotated thereby, is a bevel gear 55 which meshes with and drives a bevel gear 56 that is fixed on the lower end of said spindle 48. The preferable ratio of said gearing 55—56 is two to one.

Said carriage plate 45 and the spindle supporting and driving means connected therewith is adjustably movable toward and from the notching die means of the press, whereby to dispose the spindle 48 in adjusted spaced relation to said notching die means according to the diametric size of a lamination blank L desired to be operated upon. To this end an adjusting screw 57 is rotatably journaled in a supporting bearing 58 at and beneath the front end portion of the top member 12 of the press frame structure; said adjusting screw being threaded through a nut boss 59 with which the spindle bearing column 47 is provided. Affixed to the outer end of said adjusting screw 57 is a crank handle 60 by which the same may be suitably turned.

Operative between the crank-shaft 18 and the spindle drive shaft 53 is a Geneva gear actuated and timed indexing gear train suitably variable to transmit intermittent motion to the spindle driving means in such manner as to predetermine the number of notches or slots desired in any given case to be cut in a lamination blank L. To this end, the driver 61 of a Geneva gearing is fixed to the crank-shaft 18 exteriorly of the bearing 17 so as to be driven by said crank-shaft. Mounted in the side member 11 of the press frame structure, above the crank-shaft bearing 17, is another bearing 62 in which is journaled a shaft 63. The driven member 64 of the Geneva gearing is affixed to the outer end of said shaft 63, and affixed to the inner end of said shaft 63 is the driving gear 65 of the indexing gear train. Mounted on the rear face of the transverse partition member 14 of the press frame structure is a bearing bracket 66 in which is journaled a shaft 67. Fixed on the outer end of said shaft 67 is the driven gear 68 of the indexing gear train. Affixed on the inner end of said shaft 67 is a bevel gear 69 which meshes with and drives a bevel gear 70 which is fixed on the inner end of said spindle drive shaft 53, whereby to transmit the motion of said indexing gear train thereto, and therethrough to the work supporting and rotating spindle 48.

Pivotally mounted, preferably on the inner end of the bearing 62, to swing about the axis of the driving gear 65 of the indexing gear train toward and from the driven gear 68 of the latter, is an adjustable bracket plate 71 upon which is adjustably supported, to project from the exposed face

thereof, an axle stud 12, upon which may be rotatably mounted the intermediate gearing of the index gear train. The free end of said bracket plate 71 is provided with an arcuate slot 73 through which extends from the adjacent frame side member 11 a fixed stud 74, upon the threaded free end of which is engaged a clamp nut 75 operative to bind and hold said bracket plate 71 in a desired adjusted position. The indexing gear train may be arranged to operate on the basis of a direct ratio between the driving gear 65 and the driving gear 68 through a single idler gear 76 mounted on the axle stud 72 of the bracket plate 71 (see Figs. 3 and 4). Under such circumstances, the ratio of the gearing 65—68 may be varied within limits by selective use of various relative sizes of the gears 65 and 68, whereby to determine a desired number and spacing of notches to be cut in a given lamination blank L and attainable with the gear ratio limits so available. If it is desired to further increase the number of notches to be cut, as e. g. in lamination blanks of larger diametric and circumferential sizes, and to such end to increase the ratio of the gearing 65—68 beyond limits attainable merely by use of selected relative sizes of the gears 65 and 68, this may be done by interposing compounding idler gearing between the latter. In such case, a compound idler gear is mounted on the axle stud 72 of the bracket plate 71, and these parts are properly adjusted so as to bring one step 77 of this compound idler gear into mesh with the driving gear 65 and so as to bring the other step 78 thereof into mesh with the driven gear 68 (see Figs. 7 and 8).

Pivotally fulcrumed at 79 on the exterior face of the side member 10 of the press frame structure is a suitably shaped, foot operable clutch release lever 80. Affixed to said clutch release lever is a stop rod 81 which is directed toward the clutch means 40, so as to be moved by said release lever into and out of the path of revolution of the clutch stop member 44. Said clutch release lever 80 and its stop rod 81 is yieldably urged to clutch releasing position by suitable spring means, such e. g. as the compression spring 82 which thrusts against a cross-pin 83 with which the stop rod 81 is provided, and which is purchased by a stop rod guide yoke 84; the latter being affixed to the frame side member 10.

Mounted in a housing block 85, which is secured to the inner face of said frame side member 10, is a spring projected detent pin 86. Said detent pin 86 projects exteriorly through an opening 87 in the side frame member 10, in position to engage and hold said clutch release lever 80 and its stop rod 81 retracted to clutch stop member disengaging position, whereby to permit the clutch means 40 to function so as to transmit power from the driven gear wheel 35 to the crank-shaft 18. Said detent pin 86 is provided at its rearward end with an axial stem 88 adapted to project exteriorly from the housing block 84.

Means is provided for tripping the clutch release lever 80 to permit operative clutch releasing engagement by the stop rod 81 with the clutch stop member 44, whereby to automatically release the clutch means 40, and thus stop the press upon completion of the cycle of notching or slotting operations performed by the press upon a lamination blank L. An illustrative form of such trip means, as shown, comprises a trip lever 89 which is pivotally mounted on the bearing block 51 so that its free end portion extends beneath the spindle gear 56. Affixed to and upstanding from the free end portion of said trip lever 89 is a trip tongue 90 which lies in the path of revolution of a trip cam 91 which is mounted on the underside of said spindle gear 56. Pull spring means 92 yieldably upswings said trip lever 89 and its trip tongue 90 to a normal stopped position determined by a stop pin 93, whereby to operatively position said trip tongue 90 subject to engagement, at a proper time, by said trip cam 91. Pivotally connected with the free end of said trip lever 89 is a trip link 94 having an inclined lower end portion 95 which is oblique to the axis of said detent pin 86 and its stem 88, and which is slotted at 96 to straddle the latter. The extremity of said inclined lower end portion 95 of the trip link 94 bears at one side against the face of said housing block 85, and at the other side against an enlargement 97 with which the free end of said detent pin stem 88 is provided; said enlargement being preferably provided by a pair of jam nuts, whereby the operative relation of said trip link 94—95 to the detent pin 86 may be properly adjusted.

The operation of the notching press of this invention is as follows:

A lamination blank L to be notched is mounted on the coupler stud or adapter 49 of the work supporting and rotating spindle 48, with an inner portion thereof slidably supported on the female die block 27 over the die aperture 28 and beneath the male die or punch 26; the adjusting screw 57 being manipulated to properly position the spindle 48 for support of said lamination blank L in proper relation to said dies as may be required according to the diametric size of said lamination blank. This having been done, the operator presses down the clutch control lever 80 so as to withdraw its stop rod 81 from arresting engagement with the clutch stop member 44, thus freeing the clutch means 40 so as to bring the driven gear wheel 35 into driving relation to the crank-shaft 18, thereby starting operation of the press. As the clutch control lever 80 is thus swung down, it will pass the detent pin 86, which will be thereupon outwardly projected by its spring behind said lever 80 so as to hold the same in clutch freeing position.

As the crank-shaft 18 is rotated, the same will reciprocate the slide 22 and blanking die head 24, thus stamping the male die or punch through the lamination blank L with notching or slotting effect. As the punch 26 descends, the stripper plate 29 will be simultaneously lowered and yieldably pressed down upon the lamination blank L, whereby to hold down the latter during the notching operation of said punch, and as the punch thereafter ascends, so as to assure stripping of the lamination from the withdrawing punch.

The Geneva gearing which actuates the indexing gear train is operated by the rotating crank-shaft 18 in such manner as to effect alternate movement and dwell of said indexing gear train, whereby to transmit through the latter to the spindle driving transmission, and thus to the spindle 48 and lamination blank L carried thereby, a step by step movement of selected amplitude adapted to determine the desired number and spacing of the notches or slots cut by the punch 26 in said lamination blank L. The dwell of the Geneva gearing is timed to occur during the operative down stroke of the slide 22 and thus of the blanking die head 24 and punch 26, while the driving movement of said Geneva gearing is timed to occur during the up or recovery stroke

of the slide 22, blanking die head 24 and punch 26, so that the lamination blank L is automatically rotatively shifted a desired distance after each notching or slotting operation, preparatory to a succeeding notching or slotting operation.

By the time the last in the required cycle of notching or slotting operations is accomplished, whereby to complete the notching or slotting of the lamination blank L, the spindle gear 56 will have completed one revolution, and, as this occurs, the trip cam 91 carried by said spindle gear 56 will engage the trip tongue 90 so as to effect downswinging movement of the trip lever 89, and accompanying downthrusting movement of the trip link 94. Downward thrust of the trip link 94 causes its oblique lower end portion 95 to exert withdrawing force upon the detent pin 86, thus removing the restraint of the latter from the clutch control lever 69, whereby the stop rod 81 is projected into the path of and so as to engage the clutch stop member 44, and thus relax the clutch means 40 so as to release the driven gear 35, and thereby automatically stop the press upon completion of the aforesaid cycle of notching and slotting operations. The press being thus automatically stopped, the completed notched or slotted lamination is removed from the spindle 48 and replaced by a new lamination blank, whereupon the described operations are repeated.

In the notching or slotting of lamination blanks, it is sometimes desirable that interruptions in the sequence of notches or slots formed therein be provided for, e. g. that notches be omitted at one or more points around the circumference of the lamination blank L. In addition to the novel notching press mechanism so far above described, this invention further provides means capable of optional use whereby to permit the automatic skipping of notch formation at desired points in and around a lamination blank L, when required. Means for attaining such result comprises mechanism operative between the slide 22 and pitman or connecting rod 23 for temporarily shifting the former relative to the latter, whereby to alter the operative stroke position of the slide 22, blanking die head 24 and punch 26 in such manner that the down stroke of the latter terminates short of the lamination blank L, so as to avoid cutting or punching of the blank under such conditions. Such mechanism, in one illustrative form thereof as shown, comprises a rotatable eccentric wrist pin 98 with which the upper end of the pitman or connecting rod 23 is pivotally engaged; said wrist pin having trunnions 99 journaled in the coupler fork sides 100 with which the lower end of the slide 22 is provided. Releasably affixed to a trunnion 99, which is adjacent to the driven gear 68 of the indexing gear train, is a lever arm 101 having a dependent nosing 102 at its free end. Said lever arm is provided at its opposite end with a tail piece 103, to which is connected a pull spring 104 adapted to yieldably urge said lever 101 to a normal service position, as determined by a stop pin 105. The free end of said lever arm 101, when disposed in normal service position, lies adjacent to a face of said driven gear 68 of the indexing gear train, and in the path of one or more actuating studs 106 which are suitably located on and affixed to the latter.

In use, the mechanism operates as follows:

A stud 106 is so located on the gear 68 as to operatively contact the lever arm 101, when a movement of said gear 68 as transmitted from

the Geneva gearing is in turn transmitted thereby to the spindle driving means, whereby to rotatively shift the lamination blank L beneath the punch 26 to a point at which notching is desired to be skipped. Engagement of the stud 106 with the lever arm 101 operates to upswing the latter so as to rotate the trunnions 99 and thus rotate the eccentric wrist pin 98 within the end of the pitman or connecting rod engaged therewith. The effect of such rotation of said eccentric wrist pin 98 is to lift the slide 22, blanking die head 24 and punch 26 upwardly while the crank portion 19 is at the top of its revolving circuit (see Fig. 5), and to hold said parts in such upwardly shifted position during the down stroke movement thereof as effected by the down swing of said crank-portion 19 (see Fig. 6). Owing to the displacement or alteration of the path of reciprocation of the punch 26 as thus obtained, the descending movement of said punch will terminate short of the lamination blank L, and consequently cannot punch through the same. On the ensuing lamination shifting movement of the indexing gear train, the stud 106, which engaged the lever arm nosing 102, will pass on and away therefrom, thus releasing the lever arm 101 so that its spring 104 may return the same to normal initial position, and thereby reversely rotate the eccentric wrist pin 98 so as to permit the slide 22 and parts carried thereby to return to the normal stroke relation which again renders the punch 26 operative. Said lever arm 101, when notch skipping operation is not desired, may be moved to and secured in a non-service position. To this end, the base of the lever arm is provided with an arcuate slot 107 cooperative with a locking stud or nut means 108 which is carried by the adjacent coupler fork side 100 of the slide 22. By loosening a set screw 109 which affixes the lever arm 101 to a trunnion 99, said lever arm may be upswung about the latter, and then secured in such upswung out-of-service position by the locking stud and nut means 108, in which latter position the lever arm nosing 102 is held out of the path of movement of the stud 106 carried by the gear 68.

Means is provided for securing the carriage plate 45, and consequently, the work supporting and rotating spindle 48, against accidental displacement from a given position to which these parts have been adjusted. An illustrative form of such means comprises clamp plates 110 adapted to lap against portions of the carriage plate 45, whereby, when tightened down by bolts 111 threaded into the guide member 21, to grip and firmly hold said carriage plate against shift.

I am aware that many changes could be made in the described mechanisms and the details of construction thereof as shown in the accompanying drawings without departing from the scope of this invention as defined by the following claims. It is therefore intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. In a notching press, a frame structure, a female die mounted thereon, a perpendicular slide reciprocable in said frame structure, said slide having means to carry a male die for cooperation with said female die, means for reciprocating said slide to effect operative reciprocation of said male die toward and from said female die, said latter means comprising a crankshaft journaled across said frame structure and

a pitman connected between the same and said slide, a work supporting and rotating spindle, driving means for actuating said spindle, an indexing gear train adapted to actuate said spindle driving means, a Geneva gearing driven by said crank-shaft to intermittently drive said indexing gear train in timed relation to the reciprocal operation of said male die, and means for longitudinally shifting the slide relative to the pitman whereby to alter the operative stroke of the male die to interrupt its notching operation for notch skipping effect with respect to the work, said latter means comprising a rotative eccentric wrist pin connection between said slide and pitman, a lever arm for rotating said wrist pin, and means connected with a gear of said indexing gear train adapted to effect and time operative movement of said lever arm, comprising at least one stud projecting from a face of said gear and adapted to be moved by the latter into and out of operative engagement with said lever arm.

2. A notching press comprising a frame structure having a top member, a female die fixed on said top member, a cooperating reciprocable male die means supported by said frame structure, a crank-shaft journaled across said frame structure for operating said male die means, a work supporting and rotating spindle, a carriage means movably mounted on said frame top member, said carriage means having a dependent column for journaling said spindle, a drive shaft bearing carried by said column, a splined spindle drive shaft journaled in and between the frame structure and said bearing, a driver bevel gear splined to said spindle drive shaft, a cooperating driven bevel gear affixed to the lower end of said spindle, means for moving said carriage means to adjustably space said spindle relative to said dies, an indexing gear train comprising a driving gear, a driven gear and gearing intermediate said driving and driven gears, an adjustable bracket means pivotally mounted in connection with said frame structure for supporting said intermediate gearing in mesh with and between said driving and driven gears, and means for fixing said bracket means in adjusted position, and a Geneva gearing the driving member of which is fixed on and driven by said crank shaft and the driven member of which actuates the driving gear of said indexing gear train, whereby to intermittently rotate said work supporting spindle in predetermined steps in timed relation to the reciprocable operation of said male die means.

3. A notching press comprising a frame structure having a top member, a female die fixed on said top member, a cooperating reciprocable male die means supported by said frame structure, a crank-shaft journaled across said frame structure for operating said male die means, a work supporting and rotating spindle, a carriage means movably mounted on said frame top member, said carriage means having a dependent column for journaling said spindle, a drive shaft bearing carried by said column, a splined spindle drive shaft journaled in and between the frame structure and said bearing, a driver bevel gear splined to said spindle drive shaft, a cooperating driven bevel gear affixed to the lower end of said spindle, means for moving said carriage means to adjustably space said spindle relative to said dies, an indexing gear train comprising a driving gear, a driven gear and gearing intermediate said driving and driven gears, an adjustable bracket means pivotally mounted in connection with said

frame structure for supporting said intermediate gearing in mesh with and between said driving and driven gears, and means for fixing said bracket means in adjusted position, a Geneva gearing the driving member of which is fixed on and driven by said crank shaft and the driven member of which actuates the driving gear of said indexing gear train, whereby to intermittently rotate said work supporting spindle in predetermined steps in timed relation to the reciprocable operation of said male die means, a clutch controlled power transmission means for actuating said crank-shaft, a clutch control means manipulatable to condition the clutch of said power transmission means for power transmitting effect, a spring projected detent pin supported by the frame structure and adapted to engage and releasably hold said clutch control means as thus manipulated, spring means adapted to move said clutch control means to clutch releasing position, a trip cam carried by said driven gear of the spindle, a trip lever means pivoted to said spindle drive shaft bearing to extend beneath said driven gear of the spindle subject to engagement by the trip cam of the latter, and a trip link pivotally connected by one end to said trip lever means to extend downwardly therefrom, the free end of said trip link having an inclined thrust portion cooperative with said detent means whereby to retract the same against the tension of its actuating spring so as to release said clutch control means for clutch releasing movement.

4. A notching press comprising a frame structure having a top member, a female die fixed on said top member, a cooperating reciprocable male die means supported by said frame structure, a crank-shaft journaled across said frame structure for operating said male die means, a work supporting and rotating spindle, a carriage means movably mounted on said frame top member, said carriage means having a dependent column for journaling said spindle, a drive shaft bearing carried by said column, a splined spindle drive shaft journaled in and between the frame structure and said bearing, a driver bevel gear splined to said spindle drive shaft, a cooperating driven bevel gear affixed to said spindle, means for moving said carriage means to adjustably space said spindle relative to said dies, an indexing gear train adapted to actuate said spindle drive shaft, a Geneva gearing the driving member of which is fixed on and driven by said crank-shaft and the driven member of which actuates said indexing gear train, whereby to intermittently rotate said work supporting spindle in predetermined steps in timed relation to the reciprocable operation of said male die means, a clutch controlled power transmission means for actuating said crank-shaft, a lever operated clutch control means manipulatable to condition the clutch of said power transmission means for power transmitting effect, a spring projected detent pin supported by the frame structure and adapted to engage and releasably hold said clutch control means as thus manipulated, spring means adapted to move said clutch control means to clutch releasing position, a trip cam carried by said driven gear of the spindle, and a trip lever system actuatable by said trip cam and including means operative when so actuated to withdraw said detent pin from holding relation to said clutch control means whereby to release the power transmission clutch.

5. A notching press comprising a frame structure having a top member, a female die fixed on

said top member, a cooperating reciprocable male die means supported by said frame structure, a crank-shaft journaled across said frame structure for operating said male die means, a work supporting and rotating spindle, a carriage means movably mounted on said frame top member, said carriage means having a dependent column journaling said spindle, a drive shaft bearing carried by said column, a splined spindle drive shaft journaled in and between the frame structure and said bearing, a driver bevel gear splined to said spindle drive shaft, a cooperating driven bevel gear affixed to said spindle, means for moving said carriage means to adjustably space said spindle relative to said dies, an indexing gear train adapted to actuate said spindle drive shaft, a Geneva gearing the driving member of which is fixed on and driven by said crank-shaft and the driven member of which actuates said indexing gear train, whereby to intermittently rotate said work supporting spindle in predetermined steps in timed relation to the reciprocable operation of said male die means, a clutch controlled power transmission means for actuating said crank-shaft, a lever operated clutch control means manipulatable to condition the clutch of said power transmission means for power transmitting effect, a spring projected detent pin supported by the frame structure and adapted to engage and releasably hold said clutch control means as thus manipulated, spring means adapted to move said clutch control means to clutch releasing position, a trip cam carried by said driven gear of the spindle, a trip lever means pivoted to said spindle drive shaft bearing to extend beneath said driven gear of the spindle subject to engagement by the trip cam of the latter, and a trip link pivotally connected by one end to said trip lever means to extend downwardly therefrom, the free end of said trip link having an inclined thrust portion cooperative with said detent pin whereby to retract the same against the tension of its actuating spring so as to release said clutch control means for clutch releasing movement.

6. In a notching press, a frame structure, a female die mounted thereon, a perpendicular slide reciprocable in said frame structure, said slide having means to carry a male die for cooperation with said female die, means for reciprocating said slide to effect operative reciprocation of said male

die toward and from said female die, said latter means comprising a crankshaft journaled across said frame structure and a pitman connected between the same and said slide, a work supporting and rotating spindle, driving means for actuating said spindle, an indexing gear train adapted to actuate said spindle driving means, a Geneva gearing driven by said crank-shaft to intermittently drive said indexing gear train in timed relation to the reciprocal operation of said male die, and means for longitudinally shifting the slide relative to the pitman whereby to alter the operative stroke of the male die to interrupt its notching operation for notch skipping effect with respect to the work, said latter means comprising a rotative eccentric wrist pin connection between said slide and pitman, a lever arm for rotating said wrist pin, means connected with a gear of said indexing gear train adapted to effect and time operative movement of said lever arm, comprising at least one stud projecting from a face of said gear and adapted to be moved by the latter into and out of operative engagement with said lever arm, said lever arm being contiguous to said slide and having an arcuate slot therein, and a locking means extending through said slot from said slide and manipulatable to optionally clamp said lever arm in an out-of-service position to which it may be moved.

EDWARD HALLANDER.

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