

(No Model.)

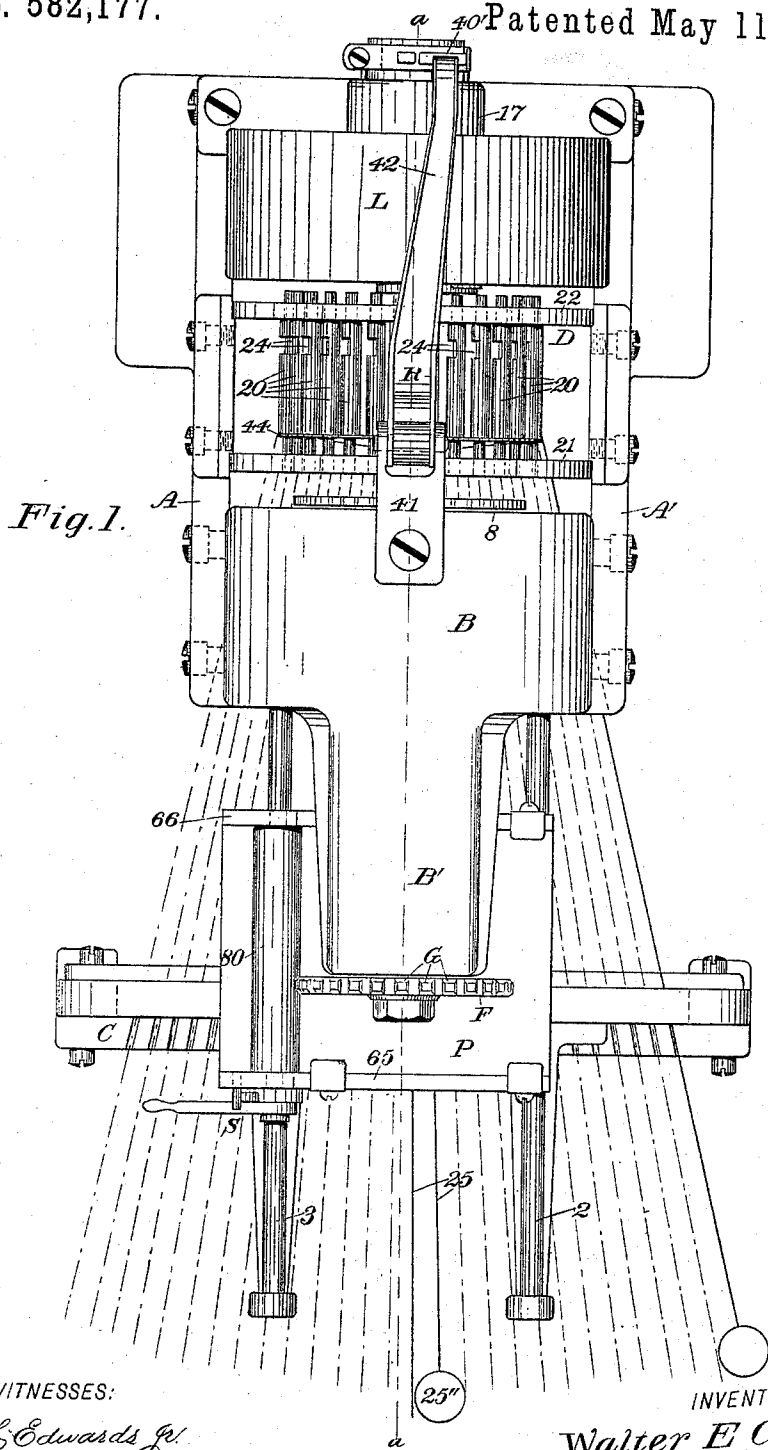
4 Sheets—Sheet 1.

W. E. CRANE.

MACHINE FOR PRODUCING PRINTING SURFACES.

No. 582,177.

Patented May 11, 1897.



WITNESSES:

J. L. Edwards Jr.
Fred J. Dole.

INVENTOR

Walter E. Crane.
BY J. H. Richards

ATTORNEYS.

(No Model.)

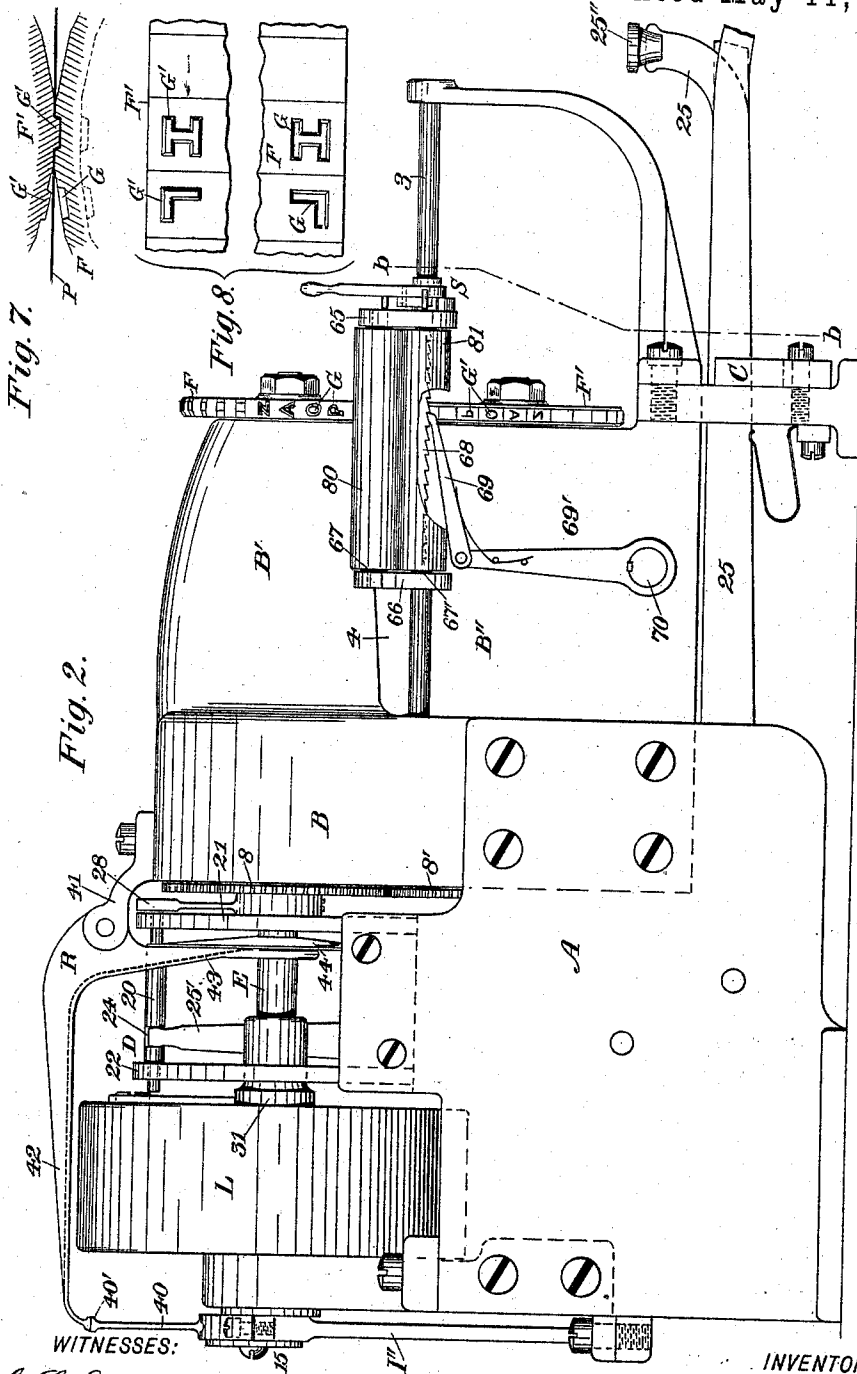
4 Sheets—Sheet 2.

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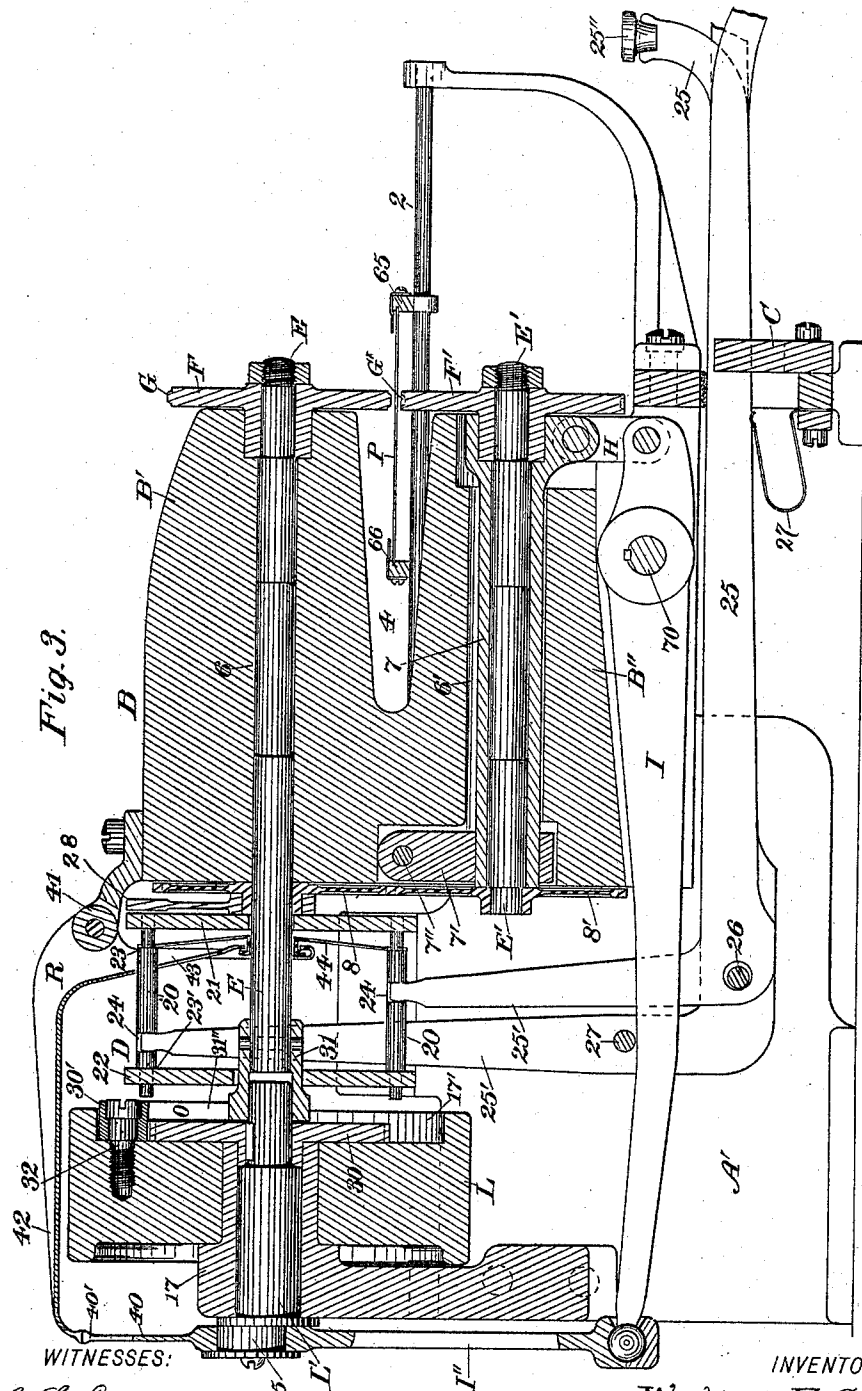
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Fig. 5.

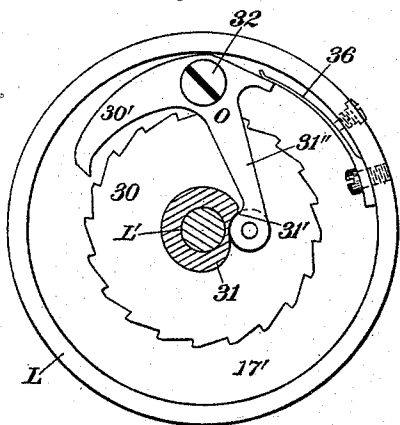


Fig. 6.

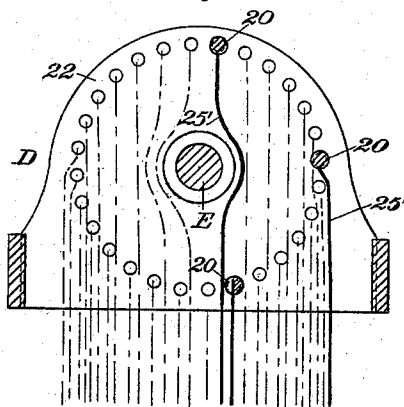
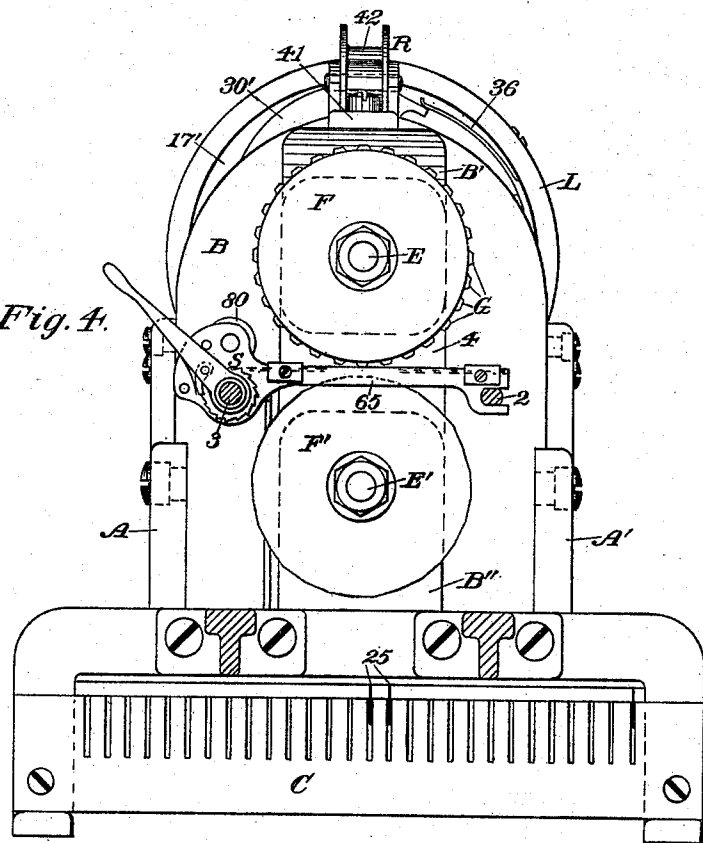


Fig. 4.



WITNESSES:

J. L. Edwards Jr.
Fred J. Dole.

INVENTOR

Walter E. Crane.

BY F. A. Richards

ATTORNEY.

UNITED STATES PATENT OFFICE.

WALTER E. CRANE, OF HARTFORD, CONNECTICUT.

MACHINE FOR PRODUCING PRINTING-SURFACES.

SPECIFICATION forming part of Letters Patent No. 582,177, dated May 11, 1897.

Application filed May 3, 1894. Serial No. 509,985. (No model.)

To all whom it may concern:

Be it known that I, WALTER E. CRANE, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Machines for Producing Printing-Surfaces, of which the following is a specification.

This invention relates to machines for producing printing-surfaces, the objects of the invention being, primarily, to furnish a machine by means of which printing-surfaces may be produced by stamping or impressing characters in relief upon a sheet of suitable material, one character at a time, this result being attained by means of coating complementary or mating dies, oppositely rotative in synchronism and having means for radially closing the dies upon the strip from opposite sides thereof when the dies are alined in working position.

Another important object of my invention is to provide means whereby errors in the formation of characters may be quickly corrected, which is a great desideratum, and to accomplish this by means of a pair of blotting-out dies, which may be readily brought into position each side the material and in alinement with the character it is desired to blot out and be pressed together in such manner as to leave the surface of the material in its original flat condition and in condition to sustain a reimpression, after which the proper pair of dies may be brought into position and the required character formed in the sheet.

Another object of the invention is to provide a series of key-levers each of which is adapted for controlling the movement of a certain pair of dies, and to provide mechanism of such construction and organization that upon the depression of a key-lever the proper pair of dies controlled by said key-lever will immediately be brought into position for use each side the printing-strip and held in a stationary position until operated to form a character in the strip, and immediately upon the stopping of said dies they will be closed together by a lateral movement to form an impression in the strip, after which the parts will be returned to their normal position ready for the next operation.

In the drawings accompanying and forming a part of this specification, Figure 1 is a plan view of a machine for producing printing-surfaces embodying my invention, said figure illustrating the parts in their normal inactive position and showing in full lines three key-levers, two of which control the movement of character-forming dies and one of which controls the movement of the pair of blotting-out or error-correcting dies, the balance of the key-levers being shown in dotted lines. Fig. 2 is a side elevation of the machine, looking toward the right hand in Fig. 1. Fig. 3 is a central longitudinal section taken in line *a a*, Fig. 1, looking toward the right hand in said figure. Fig. 4 is a vertical cross-sectional view of the machine, taken in line *b b*, Fig. 2, looking toward the left hand in said figure. Fig. 5 is a front elevation of the driver, the driving-shaft being shown in section. Fig. 6 is a cross-sectional view of the stop-pin-carrying frame, showing three pin-stops, which are operated by the levers shown in full lines in Fig. 1 and which determine the positioning of three pairs of dies, two pairs of which are character-forming dies and one pair of which are blotting-out or error-correcting dies, said figure showing a portion of the levers for actuating said pin-stops. Fig. 7 is a sectional detail of a portion of the two die-carriers, showing in full and dotted lines two positions of said carriers. Fig. 8 is a plan view of a portion of the two die-carriers, showing two pairs of complementary character-dies and one pair of blotting-out or error-correcting dies.

Similar characters designate like parts in all of the figures.

My improved machine for producing printing-surfaces in the form thereof herein shown and described comprises a plurality of pairs of coating dies, each pair having a cameo and intaglio complementary character, means for bringing two complementary or mating dies into alinement or working position, one at either side of a strip of material, and means for closing said dies onto the strip to form a raised type-surface, as will be hereinafter fully described.

The framework of my improved machine may be of any suitable construction adapted for carrying the several operative details, it

being herein shown as consisting of two side plates or uprights A and A', the main frame or head of the machine, (designated in a general way by B,) which is secured between the 5 uprights, the front plate C, which constitutes a guide for the key-levers 25, and a stop-carrying frame (designated in a general way by D) secured between the side plates A and A' at the rear of the head B, as will be 10 hereinafter described.

The main frame or head B is formed with a transverse recess midway of its height, as shown at 4, which forms practically two forwardly-projecting parallel arms B' and B'', 15 which are sufficiently remote from each other to permit the passage between them of the material (designated by P) to be operated upon.

Formed centrally and longitudinally 20 through the arms B' and B'' of the head B are journal-bearings 6 and 6', respectively adapted to receive the die-carrier shafts E and E', the bearing 6' being herein shown of greater diameter than the one 6 for a purpose 25 hereinafter described. In the form herein shown the die-carrier shaft E is journaled in the bearing 6 in the upper arm B' and is provided at its outer end with a die-carrier F, 30 having formed upon or secured to its periphery a series of dies G, which are herein shown as of cameo form, while the die-carrier shaft E' is shown journaled in a tubular bearing or shaft-carrier 7, supported for lateral movement in the enlarged bearing 6' in the arm B'' 35 of the head B. This shaft E' is also provided with a die-carrier F' at its outer end, upon the periphery of which is formed or secured a series of dies C' of intaglio construction, which coincide in position and number and 40 are adapted to coact with similar complementary dies upon the die-carrier F, said die-carriers being preferably located in the same plane and being adapted for rotation in synchronism, but in opposite directions, 45 as will be hereinafter more fully described.

As a means for supporting the tubular journal-bearing 7 of the shaft E' so that the same may have a lateral movement I have provided said bearing with a laterally-projecting arm 7' at the rear end thereof, which is 50 pivotally supported upon a stud 7'', secured in the head B, as most clearly shown in Fig. 3 of the drawings, the bearing or recess 6' of the arm B'' of the head B being of sufficient 55 diameter to permit the requisite lateral movement of the shaft-carrier 7 and its shaft E'. In the form thereof herein shown, these die-carriers F and F' are in the nature of wheels having remotely-disposed characters formed 60 upon and in the peripheries thereof, respectively, which characters constitute the dies for forming a similar character in a strip of material, the character being in relief upon one of the die-wheels or carriers and in indentation in the coacting die-wheel or carrier, 65 as will be seen by reference to Fig. 7 of the drawings, each die of one carrier being com-

plementary to or coinciding with a die arranged in a coinciding position upon the adjacent carrier. These two die-carriers or 70 die-wheels are secured to their respective shafts so that two coinciding dies, one of each series, will normally be in direct alignment and in close proximity to each other, sufficient space being left between the two 75 dies to permit the free passage of the material to be operated upon.

Secured to the rear ends of the two die-carrier shafts E and E' are gear-wheels 8 and 8', 80 respectively, which gear-wheels are in intermeshing engagement and are adapted for causing the two shafts E and E' to rotate simultaneously and with equal speed, so as to insure the constant coincidence in position 85 of complementary dies upon the two carriers and to bring any two selected complementary dies into working position directly in vertical alignment between the axes of the two shafts, it being understood that the successive dies of each set are radially disposed 90 with relation to its carrier-axis.

The driving mechanism for rotating the die-carriers F and F' and for imparting a closing movement to the dies comprises, in part, a 95 revoluble driver or wheel L, mounted for continuous rotation upon a tubular journal-bearing 17 upon the frame of the machine; a yielding driving device connecting one of the die-carrier shafts, as E, with the driver L; a 100 crank-shaft or die-closing shaft L', operatively connected with and adapted for closing the dies, and a clutch device intermediate to the said crank-shaft and driver L, as will be hereinafter more fully described. This 105 die-rotating and die-closing mechanism is of such construction and organization, as will be hereinafter more fully set forth, as to engage and rotate the die-carrier shaft E and the die-closing shaft L' alternately, so as to 110 first bring the requisite dies into working position and then automatically close said dies to form a type-surface in the strip of material held between said dies.

As a means for intercepting the rotation of 115 the die-carriers at various predetermined points in their travel to insure the positioning of a selected pair of dies for use I have provided in connection with one of the die-carriers a stop mechanism which in the preferred form thereof herein shown consists of 120 a multiplicity of pin-stops 20, which coincide in number to the number of pairs of dies employed. These pin-stops are herein shown supported for longitudinal movement in the 125 front and back plates 21 and 22 of the stop-carrying frame D of the machine and as having their angular positions relative to a common center coincide with the angular positions of the dies upon the die-carriers. These 130 pin-stops are shouldered, preferably, at their forward and rearward ends, as shown at 23 and 23', respectively, to limit the forward and backward movement thereof, and are each notched at one side, as shown at 24. In

the notch 24 of each pin-stop engages the upwardly-projecting end 25' of a key-lever 25. These key-levers are fulcrumed near their lower ends, a portion thereof upon a rod 26" and a portion thereof upon a rod 27, secured at their ends in the side plates A and A' of the machine. Each key-lever is provided at its forward end with a suitable key 25", having a character thereon to correspond with the character of the pair of dies whose movement said key controls after the manner of key-levers of ordinary type-writers.

It will be understood that the key-lever described constitutes one of a series of key-levers that correspond in number to the number of pairs of dies and pin-stops employed, all of which key-levers are practically duplicates of one another. Each key-lever is normally held up to its working position by means of a suitable spring or springs 27, bearing against the forward end thereof, and is adapted to independently actuate one of the pin-stops just described, which pin-stop determines the positioning of one pair of dies. These pin-stops are herein shown as located around the die-carrier shaft E and are adapted to be shifted independently with their forward ends intercepting the path of travel of the radial stop-arm 28, secured to the shaft E and adapted to rotate therewith, as most clearly shown in Figs. 2 and 3 of the drawings.

In the embodiment of my invention herein shown and described the driving mechanism consists of a driver L, mounted upon a cylindrical bearing 17, concentric to the crank-shaft or die-actuating shaft L', and adapted to be continuously rotated by a belt (not shown) driven from any suitable source of power, (which driver is recessed at one side, as shown at 17'), a clutch member 30, connected with the crank-shaft, a clutch member 31, connected with the die-carrier shaft, and a driving device (designated in a general way by O) carried by the driver L in position and adapted for engaging the clutch members 30 and 31 alternately to rotate the die-carrier, and upon the cessation of movement of said die-carrier to automatically operate the die-closing mechanism, as will be hereinafter more fully described.

The clutch member 30, which is secured to the crank-shaft L', is herein shown in the nature of a ratchet-wheel with peripheral teeth adapted to be engaged by a pawl or detent member 30', carried by the driver L, and the clutch member 31, secured to the die-carrier shaft E, is in the nature of a cam having a radial offset or bearing portion 31', adapted to be engaged by a yielding arm or clutch member 31", carried by the driver L. These two clutch members 30' and 31" are preferably formed integral, as shown in Fig. 5, and pivotally supported upon a stud 32, secured to the driver L, and constitute the shiftable driving device O for reciprocally operating the die-carrier shaft and die-closing shaft, as will be readily understood by

comparison of Figs. 1, 3, and 5 of the drawings. The driving device O will normally be held with the clutch member or arm 31" in engagement with the bearing-face 31' of the cam 31 and the clutch member 30' out of engagement with the clutch member 30 by means of a spring 36, secured in the recess 17' of the driver L, and bearing at its free end against a projection 32' upon the driving device O.

In practice the clutch member 31" will be provided at its working end with a friction-roller to bear against the clutch member 31. These two clutch members 31 and 31"—i. e., the cam and its driving-arm—constitute a frictional or yielding driving device for rotating the die-carrier shaft E. This device is also designated as a "let-off" driving device.

As a means for closing the dies when in working position to form a character in the strip of material the shaft-carrier 7 is herein shown as connected at its forward end, adjacent to the die-carrier F', by means of a link H, to the short or forward arm of a lever I, fulcrumed at I' upon a rock-shaft 70, secured in the head B. This lever is connected to the die-closing shaft L' by a link I", carried near its upper end upon the crank 15 of said shaft L', the construction and arrangement of the parts just described being such that upon a complete revolution of the crank-shaft or die-closing shaft L' the die-carrier F' is moved radially toward the die-carrier E to form an impression in the strip and is then returned to its normal position. This operation takes place immediately upon the cessation of rotary movement of the die-carriers.

The link I", which connects the die-closing shaft L' with the die-closing mechanism, is herein shown as having an upwardly-projecting arm 40, adapted for operating a pin-stop-retracting device, (designated in a general way by R.) This pin-stop-retracting device R is herein shown as a lever pivoted between the arms of a bracket 41, secured to the head of the machine, as clearly shown in Figs. 1, 2, and 3, and having the rearwardly-projecting arm 42 and downwardly-projecting arm 43. The rearwardly-projecting arm 42 terminates in alinement with and is adapted to be engaged by the upwardly-projecting arm 40 of the link I" upon the return or upward movement of said link, while the downwardly-projecting arm 43 engages a shiftable plate 44, shiftable supported upon the die-carrier shaft E, which plate engages the pin-stops 20 and is adapted upon the upward movement of the arm 42 of the retracting-lever to retract any of said stops which may have been thrown forward to intercept the movement of the carrier.

As a convenient means of operating the retracting-lever R the upper end of the arm 40 of the link I" is provided with a cam-like projection 40', which upon the upward movement of said link is adapted to engage the retracting-lever, moving the same sufficiently to retract the projected pin-stop, and upon

the completion of the upward movement of said link the projection 40' passes out from under the end of and leaves the retracting-lever R free to permit the retracting-plate 44 to be thrown forward when the pin-stop is actuated by a key. This construction and organization of retracting mechanism insures the retraction of the pin-stops previous to the completion of the operation of the die-closing mechanism and prevents a pin-stop being thrown forward to intercept the movement of the die-carrier until the die-closing mechanism has returned to its normal inoperative position.

It will be understood that the operation of the retracting device takes place at practically the same time as the release of a key, and that each key is held by the operator until the beginning of the upward movement of the arm 42.

In the form thereof herein shown and described the complementary dies are closed upon the strip of material to form a character therein by a lateral or radial movement of one die-carrier with relation to the other die-carrier. It will be seen that this laterally-movable die-carrier and its connected shaft form a reciprocatory impression device which is movable substantially in parallelism with the plane of movement of the die-carrier, the reciprocation of the first-mentioned die-carrier being in a plane preferably coinciding with the plane of movement of the other die-carrier.

In the drawings I have shown a simple form of shiftable carriage for supporting and feeding the strip of material P between the dies. In the form thereof herein shown the carriage consists of the front and back plates 65 and 66, respectively, which are remotely disposed and are connected together by suitable connecting-rods 67 and 67', which connecting-rods in the organization herein shown constitute shafts upon which are mounted feed-rolls 80 and 81. The carriage is supported for reciprocatory movement upon tracks or guide-rods 2 and 3, which extend through openings formed in the front and rear plates, as most clearly shown in Figs. 2 and 3. Secured to the front and rear plates 65 and 66 of the carriage is a feed-rack 68, the teeth of which are engaged by a pawl 69, carried at the upper end of a lever 69', secured to the end of the rock-shaft 70, journaled transversely in the head B. This shaft is shown engaged at its opposite end by a lever I, which constitutes one member of the die-closing mechanism and is controlled by the movement of said member through the operation of any one of the keys 25'' of the machine, as hereinbefore described, to thereby feed the carriage forward the requisite distance for spacing.

As a means for rotating the rolls 80 and 81 one of said rolls may be provided with any suitable pawl-and-ratchet mechanism—as, for instance, such as shown in Fig. 2 and designated by S—which mechanism is adapted for

intermittently rotating said rolls the requisite distance for feeding the strip P between the dies, as is necessary for "line-spacing." It is desired to state in this connection, however, that any suitable mechanism for feeding the strip of material might be employed without departure from my invention.

The operation of the machine is as follows: Assuming the driver L and die-carriers F and F' as being rotated in unison in consequence of the yielding or frictional connection between the die-carrier shaft E and driver L, a depression of a key-lever or selector will throw a pin-stop which determines the positioning of a certain pair of dies into the path of movement of the stop-arm 28, which arrests the movement of the die-carrier shafts, stopping the carriers, with the pair of dies selected, in working position or in position for use each side of the strip of material P. The driver L, continuing its rotation, carries the end of the driving member 31' out of engagement with the bearing-face 31' of the cam 31, which throws the clutch member 30' into engagement with the clutch member 30 upon the die-closing shaft, which immediately operates the die-closing mechanism and causes the dies selected, and which are in working position, to be closed to form an impression in the strip of material P. On the return movement of the die-closing mechanism the retracting-lever is operated, as will be clearly understood by reference to Fig. 3 of the drawings, to retract the projected pin-stop. This operation of the die-closing mechanism is accomplished during one revolution of the driver L. After the driver L has made a complete revolution the notch which forms the bearing-face 31' of the cam 31 comes opposite the working end of the clutch member 31'', which is immediately forced into engagement therewith by means of the spring 36, thus disengaging the clutch members 30 and 30', which controls the movement of the die-closing mechanism and in consequence of this operative engagement with the bearing-face of the cam at once inaugurates the rotation of the die-carriers.

By the construction and organization herein described it will be seen that the clutch members 31 and 31'' are normally engaged to rotate the die-carriers in unison with the driver L and that the clutch members 30 and 30' are dependent for their engagement upon the release of the clutch members 31 and 31'' from rotative engagement, this being accomplished, as before stated, by the interception of movement of the die-carriers, the cessation of movement of rotation of said carriers immediately inaugurating, through the medium of the clutch members 30 and 30', the operation of the die-closing mechanism.

Having thus described my invention, I claim—

1. In a machine for producing printing-surfaces upon a strip of material supported therein, a pair of coacting complementary or mating dies, means for rotating said dies in synchro-

nism but in opposite directions to bring them into alinement in working position, and means for automatically and radially closing said dies upon the strip to form a raised type-surface when the dies are alined in working position, substantially as described.

2. In a machine for producing printing-surfaces upon a strip of material supported therein, a pair of coacting complementary or mating dies, means for rotating said dies in synchronism but in opposite directions, means for stopping said dies in alinement in working position, and means for automatically and radially closing said dies upon the strip to form a raised type-surface when the dies are alined in working position, substantially as described.

3. In a machine for producing printing-surfaces upon a strip of material held therein, a plurality of pairs of coacting dies each pair having a cameo and an intaglio complementary character and adapted for impressing a strip held between the dies, means for rotating said dies to bring any pair of complementary or mating dies into alinement in working position one at each side of the printing-strip, and means for automatically and radially closing said pair of dies upon said strip to form therein a raised type-surface when said dies are alined in working position, substantially as described.

4. In a machine for producing printing-surfaces upon a strip of material held therein, a plurality of pairs of coacting dies each pair having a cameo and an intaglio complementary character and adapted for impressing a strip held between the dies, means for rotating said dies in synchronism but in opposite directions, means for stopping any pair of complementary or mating dies in alinement in working position one at each side of the printing-strip, and means for automatically and radially closing said pair of dies upon said strip to form therein a raised type-surface when said dies are alined in working position, substantially as described.

5. In a machine for producing printing-surfaces upon a strip of material held therein, a die-carrier having a plurality of cameo-dies, in combination with a coacting die-carrier having a plurality of similarly-disposed complementary intaglio-dies, means for bringing two mating dies one of each carrier into working position one upon each side of a printing-strip, and means for automatically and radially closing said dies upon said strip to form therein a raised type-surface, substantially as described.

6. In a machine for producing printing-surfaces upon a strip of material held therein, a die-carrier having a plurality of cameo-dies and a plane-faced or blotting-out die, in combination with a coacting die-carrier having a plurality of complementary intaglio-dies and a plane-faced or blotting-out die disposed similarly to the dies of the first-mentioned

die-carrier, means for bringing each pair of mating dies into working alinement one upon each side of a printing-strip, means for automatically and radially closing said dies upon said strip to form therein a raised type-surface, and means for bringing the blotting-out dies into working position one upon each side of said strip and for automatically closing them upon the printing-strip to blot out a character, substantially as described.

7. In a machine of the class specified, a pair of coacting die-carriers one of which carriers has one or more character-forming dies in cameo and one plane-faced or blotting-out die and the other of which carriers has one or more character-forming dies in intaglio and one plane-faced or blotting-out die said dies being disposed similarly to the dies of the first carrier, means for selectively bringing any pair of complementary dies into working position, and means for automatically and radially closing said pair of dies when in working position, substantially as described.

8. In a machine of the class specified, one or more pairs of dies each pair having complementary cameo and intaglio characters and a pair of blotting-out or plane-faced dies, means for selectively bringing one or the other of said pairs of dies into alinement in working position, and means for automatically and radially closing said dies when so alined in working position, substantially as described and for the purpose set forth.

9. In a machine of the class specified, two coacting die-carriers supported for rotation in the same plane and each having a plurality of similarly-disposed peripheral character-dies one set being in cameo and the other in intaglio and each having also one or more plane-faced or blotting-out dies, means for rotating said carriers in synchronism but in opposite directions to bring any pair of mating dies into alinement in working position, and means for automatically and radially closing said dies when so alined in working position, substantially as described and for the purpose set forth.

10. In a machine for producing printing-surfaces, a series of key-levers, a corresponding number of pairs of coacting dies each pair comprising one character in cameo and one character in intaglio, means controlled by the depression of a key-lever for bringing its corresponding pair of dies into alinement in working position, and means for automatically and radially closing said dies when the dies are in alinement in working position, substantially as described and for the purpose set forth.

11. In a machine for producing printing-surfaces upon a strip of material supported therein, a plurality of key-levers or selectors, a plurality of pairs of coacting complementary dies one pair for each key-lever, means controlled by the depression of a key-lever for bringing its corresponding pair of dies into

working position one upon each side of the printing-strip, die-closing mechanism in position and adapted for automatically and radially closing the dies to form an impression 5 in the strip when said dies are alined in working position, and means for retracting the die-closing mechanism, substantially as described.

12. In a machine for producing printing-surfaces upon a strip of material held therein, the combination with the framework, of two die-carrier shafts connected for rotation in synchronism but in opposite directions, a die-carrier secured to each shaft one of which 15 die-carriers has a plurality of character-dies in cameo and the other of which carriers has a plurality of similarly-disposed complementary character-dies in intaglio, means for rotating the die-carrier shafts so as to bring two mating dies of the carriers into alinement and in working position one at each side of the printing-strip, and means for automatically and radially closing said dies upon the printing-strip when the dies are alined in 25 working position, substantially as described and for the purpose set forth.

13. In a machine for producing printing-surfaces upon a strip of material held therein, two revoluble die-carrier shafts located in 30 parallelism and connected together so as to rotate in unison, die-carriers secured to said shafts, one of which die-carriers has a series of cameo character-dies, and the other of which carriers has a series of intaglio character-dies complementary to the dies of the first carrier and similarly disposed, means for rotating said die-carriers in unison so as to bring the complementary characters successively into working position in alinement 40 with each other, means for selectively stopping any pair of character-dies in working position, and means for automatically and radially closing said two dies upon the printing-strip at either side thereof to form a raised 45 type-surface, substantially as described.

14. In a machine for producing printing-surfaces, a continuously-rotating driver, two coacting die-carriers revolubly connected for synchronous but opposite movements, a yielding driving device operatively connecting the driver and one of the die-carriers, and means for simultaneously stopping the rotation of both of the die-carriers at predetermined points in their movements irrespective of the 55 continued movement of the driver whereby two complementary dies are brought into position for use, substantially as described.

15. In a machine for producing printing-surfaces, the combination of a rotatable die-carrier having character-forming dies in cameo, a rotatable die-carrier having similarly-disposed character-forming dies in intaglio and complementary to the dies of the first carrier and adjacent thereto, a carriage 60 in position and adapted for feeding a strip of material between said carriers, means for rotating said carriers in synchronism but in op-

posite directions, means for stopping the rotation thereof to bring a pair of complementary dies into working position, and means 70 for automatically and radially closing said dies upon the strip to form a type-surface therein, substantially as described.

16. In a machine for producing printing-surfaces, two rotatable die-carriers having 75 character-forming dies one in cameo and the other in intaglio, a shiftable carriage adapted for supporting a strip of material between the die-carriers, means for shifting said carriage to bring successive portions of the strip into 80 position to be acted upon by the successive dies, means for rotating said die-carriers in synchronism but in opposite directions to bring complementary dies successively into position at each side of the strip, and means 85 for automatically and radially closing said dies upon the strip to form a type-surface, substantially as described.

17. In a machine for producing printing-surfaces, the combination with two die-carriers revolubly connected for coincident movements in the same plane, of a driver connected with one of the die-carriers by a yielding driving device, a crank-shaft connected with the driver by a suitable clutch, 95 means for simultaneously stopping the die-carriers at predetermined points in their revolution to bring the requisite dies into position for use, and reciprocatory mechanism connecting the die-carriers with the crank-shaft and adapted for radially closing said dies, substantially as described. 100

18. In a machine for producing printing-surfaces, the combination with two die-carrier shafts revolubly connected for synchronous but opposite movements, and with the complementary die-carriers secured to the ends of said shafts, of driving mechanism comprising a revoluble carrier, a driving-shaft concentric therewith, a yielding driving device connecting said driver and one of the die-carrier shafts, a clutch connecting said driver with the driving-shaft, die-closing mechanism connecting the die-carriers and driving-shaft, and means for simultaneously 115 stopping the rotation of the die-carriers at predetermined points in their movements, substantially as described and for the purpose set forth.

19. In a machine for producing printing-surfaces upon a strip of material carried thereby, the combination with two revoluble die-carriers connected for coincident movements in the same plane, of die-carrier-rotating mechanism, carrier-stopping mechanism 125 for stopping said die-carriers simultaneously to bring the requisite dies into position for use, and die-closing mechanism operative by the stopping of said die-carriers, substantially as described. 130

20. In a machine for producing printing-surfaces, the combination with two rotatable die-carriers connected for synchronous but opposite movements, of carrier-rotating mech-

anism, die-closing mechanism coacting therewith and adapted for radially closing the dies, means controlled by the stopping of either of said mechanisms for actuating the other, a continuously-rotating driver in connection with said coacting mechanisms, and stopping devices for arresting the movement of said carrier mechanisms in successive positions, substantially as described.

21. In a machine for producing printing-surfaces, two rotatable die-carriers radially movable with respect to each other and supported in alinement upon shafts connected for rotation in synchronism but in opposite directions, each of said carriers having a plurality of dies, a continuously-rotating driver, stopping mechanism adjacent to one of said carrier-shafts and adapted for arresting the movement thereof in successive positions of the carriers, in combination with reciprocally-operable die-carrier-rotating mechanism and die-actuating devices connected with said continuously-rotating driver, substantially as described.

22. In a machine for producing printing-surfaces, the combination with a pair of rotatable die-carriers connected for synchronous but opposite movements and having each a plurality of dies, and with mechanism for closing the dies, of a rotatable driver, and means connected with said driver for automatically and alternately rotating the die-carriers and actuating the die-closing mechanism respectively, substantially as described.

23. In a machine for producing printing-surfaces, the combination with a pair of revoluble die-carriers connected together for synchronous but opposite movements and having each a plurality of dies complementary to each other, and with die-operating mechanism, of two actuating-shafts, one adapted for rotating the carriers, and the other adapted for operating the die-closing mechanism, a rotating driver, and means connected therewith in position and adapted for reciprocally engaging and rotating the two shafts aforesaid, substantially as described and for the purpose set forth.

24. In a machine for producing printing-surfaces, the combination of two rotatable die-carriers connected for synchronous but opposite movements and having radially-disposed dies, a die-carrier-rotating shaft, a die-actuating shaft, reciprocatory mechanism connecting the die-closing shaft and the die-carriers and adapted for radially closing the dies, a rotatable driver frictionally connected with the die-carrier-rotating shaft, and means connected with said driver for reciprocally operating the die-carrier-rotating shaft and the die-actuating shaft, substantially as described and for the purpose set forth.

25. In a machine of the class specified, the combination with a pair of coacting complementary die-carriers carried for coincident movements in the same plane, a pair of rotatively-connected die-carrier-rotating shafts,

and a die-actuating shaft, of a continuously-rotating driver, and means connected therewith in position and adapted for reciprocally engaging and operating the die-actuating shaft and one of said die-carrier-rotating shafts, substantially as described.

26. In a machine of the class specified, the combination, with a pair of coacting die-carriers, a pair of rotatively-connected die-carrier-rotating shafts, and a die-actuating shaft, of a continuously-rotating driver, and a carrier-shaft actuator and a die-actuating-shaft actuator connected to each other and to the driver and adapted for reciprocal operation to first rotate the die-carrier shafts and then simultaneously with the cessation of movement of said shafts to automatically rotate the die-actuating shaft, substantially as described.

27. In a machine of the class specified, in combination, two die-carrying shafts connected together for synchronous but opposite movements, complementary die-carriers secured thereto, and having each a plurality of dies, a die-actuating shaft, connections between said die-actuating shaft and dies, stop devices in position and adapted for engaging and arresting the movement of both die-carrier shafts simultaneously at predetermined points in the travel thereof, and driving mechanism for said shafts consisting of a continuously-rotating driver, and means carried by said driver in position and adapted for engaging and rotating the die-carrier shaft and the die-actuating shaft alternately, substantially as described and for the purpose set forth.

28. In a machine of the class specified, the combination, with a pair of coacting die-carriers, a pair of die-carrier shafts, and a die-actuating shaft, of a common driver for all of said shafts, independent clutch members secured one to the die-actuating shaft and the other to one of the die-carrier shafts, and reciprocally-operable clutch members carried by the driver and in position and adapted for alternately engaging the clutch members of said shafts to first rotate the die-carrier shafts and then simultaneously with the cessation of movement of said shafts to automatically rotate the die-actuating shaft, substantially as described.

29. In a machine for producing printing-surfaces upon a strip of material supported therein, in combination, two die-carriers supported in alinement upon shafts revolubly connected together so as to rotate in synchronism but in opposite directions, a radial stop-arm connected with one of said shafts, a series of pin-stops supported in position and adapted to be projected into the path of movement of the stop-arm to arrest the movement of the die-carriers, a continuously-rotating driver and alternately-operable carrier-rotating mechanism and die-actuating mechanism in position and adapted for first rotating the die-carriers to bring successive dies into

position for use, and then closing said dies radially upon a printing-strip to form a raised type-surface therein, substantially as described.

5 30. In a machine for producing printing-surfaces, two adjacent die-carriers secured to shafts rotatively connected together for synchronous but opposite movements, dies
10 formed upon or secured to the peripheries of said carriers, the dies of one carrier being of cameo form and the dies of the other carrier being of intaglio form, a radial stop-arm secured to one of said die-carrier shafts, a plurality of pin-stops coinciding in number and
15 angular position to the number and angular position of the dies upon the carriers and adapted to be projected, one at a time, into the path of travel of the stop-arm to stop the carriers with selected dies in position for use,
20 an independent pin-stop-actuating lever connected with and adapted for actuating said pin-stop, and means, substantially as described, for rotating said die-carriers and for radially closing said dies, substantially as and
25 for the purpose set forth.

31. In a machine for producing printing-surfaces, a pair of die-carriers supported in peripheral alinement upon shafts rotatively connected for synchronous but opposite movements said die-carriers having a series of radially-disposed complementary dies, a radial arm secured to one of said shafts, a series of independently-shiftable pin-stops corresponding in number and angular position with
30 the number and angular positions of the dies upon the carriers, means for projecting said pin-stops independently and selectively into the path of movement of the stop-arm, and mechanism for alternately rotating and radially closing the dies, substantially as described.
40

32. In a machine for producing printing-surfaces, the combination of a die-carrier having a plurality of complementary character-forming dies in cameo, a die-carrier having a plurality of complementary character-forming dies in intaglio located in peripheral alinement with the cameo-dies the two die-carriers being supported upon shafts connected for rotation in synchronism but in opposite directions and one of said die-carrier shafts having a radial stop-arm connected therewith, a continuously-rotating driver, a yielding driving device connecting said driver
50 with one of the die-carrier shafts, a plurality of shiftable stops corresponding in number and angular position to the number and angular positions of the dies of the carriers, a series of key-levers connected one to each
60 pin-stop and adapted for projecting said pin-stops selectively into the path of travel of the stop-arm of the die-carrier shaft, and means in connection with the driver and adapted for closing the dies radially immediately upon the
65 stopping of the die-carrier shafts by the projection of a pin-stop, substantially as described and for the purpose set forth.

33. In a machine of the class specified, the combination, with a revoluble driver, a die-carrier connected therewith, and mechanism
70 for intercepting the movement of said die-carrier at predetermined points, of a reciprocatory impression device connecting the die-carrier and the driver and adapted to be automatically actuated toward said die-carrier
75 by the driver and substantially in parallelism with the plane of movement of the die-carrier when the movement of said die-carrier is intercepted, substantially as described.

34. In a machine of the class specified, the combination with a pair of coacting die-carriers connected for synchronous but opposite movements, and with means for rotating said die-carriers to bring two coacting dies of said carriers into working position, of a reciprocatory die-closing device in position and adapted for automatically and radially closing said dies when in their working position, substantially as described.

35. In a machine of the class specified, the combination, with a revoluble die-carrier, of a revolving driver, a yielding driving device connecting said driver and die-carrier, a stop device in connection with and adapted for intercepting the die-carrier at predetermined
95 points in its movement, a reciprocatory impression device, and means substantially as described and connecting the driver and the impression device and the die-carrier and organized to cause the driver to automatically
100 actuate said impression device substantially in parallelism with the plane of movement of the die-carrier and toward and into engagement with the same upon the interruption of movement of the die-carrier and to thereby
105 form an impression, as set forth.

36. In a machine of the class specified, the combination, with the die-carrier and with the rotating driver, of a reciprocatory impression device connecting said driver and the die-carrier and adapted to be automatically actuated toward said die-carrier by the driver and substantially in parallelism with the plane of movement of the die-carrier and to thereby form an impression, substantially as described.
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37. In a machine of the class specified, the combination, with the revoluble die-carrier, and with the revoluble driver yieldingly connected therewith, of a reciprocatory impression device connected with the die-carrier and with the revoluble driver by a clutch and adapted to be automatically actuated toward said die-carrier by the driver and substantially in parallelism with the plane of movement of the die-carrier and to thereby form an impression, substantially as described.
120 125

38. In a machine of the class specified, the combination, with a pair of revoluble complementary die-carriers, the revoluble driver, and a stop mechanism connected with the revoluble die-carriers and adapted for interrupting the movement thereof at predetermined points in their travel, of a reciproca-

tory impression member connected with one of said die-carriers, and a clutch mechanism connecting said driver and the impression member and adapted to actuate said impression member immediately upon the cessation of movement of the die-carriers and to carry said impression member radially toward the opposite die-carrier and substantially in parallelism with the plane of movement thereof to thereby form an impression, substantially as described.

39. In a machine of the class specified, the combination, with a series of key-levers, and with a series of stops each connected with and actuated by a key, of a pair of revoluble complementary die-carriers, a stop-arm in connection with one of said die-carriers and adapted to be interrupted at predetermined points in its rotary movement, a rotary driver, a frictional driving device connecting said driver and one of said carriers, a reciprocatory impression member connected with one of said carriers, and a clutch connecting said reciprocatory impression member with the driver, whereby the impression member will be immediately actuated upon the interruption of movement of the die-carriers and the die-carrier connected with said impression member will be carried radially toward and into engagement with the other die-carrier and substantially in parallelism with the plane of movement of said other die-carrier to thereby form an impression, substantially as described.

40. In a machine of the class specified, the combination with a pair of revoluble die-carriers having complementary dies, and with the driving mechanism and the die-closing mechanism, of a series of shiftable pin-stops corresponding in number and angular positions with the number and angular positions of the dies upon one of said carriers and adapted to intercept the die-carriers at corresponding points in their movements, key-levers for independently operating said stops, and a retracting device in connection with the die-closing mechanism and adapted for retracting each pin-stop after an impression has been made, substantially as described and for the purpose set forth.

41. In a machine of the class specified, the combination, with a die-carrier-rotating shaft, and with a die-operating or die-closing shaft concentric therewith, of reciprocally-operable driving devices comprising a rotary driver, a cam secured to the die-carrier shaft, a ratchet-wheel secured to the die-closing shaft, and two operating members therefor pivotally carried by the rotary driver and connected for reciprocally and operatively engaging the cam and the ratchet-wheel to first rotate the die-carrier shaft and then the die-closing shaft upon the stopping of said die-carrier shaft, substantially as described.

42. In a machine of the class specified, the combination with two concentric shafts one

of which constitutes a die-carrying shaft and the other a die-closing shaft, of a clutch member secured to each of said shafts, and driving mechanism in position and adapted for reciprocally engaging the two clutch members to rotate either of said shafts upon the stopping of the other, substantially as described.

43. In a machine of the class specified, the combination with a die-carrier shaft provided with a die-carrier having a series of dies connected therewith, and with a corresponding die-carrier also having a series of dies connected therewith which die-carrier is connected with the first-mentioned die-carrier for synchronous but opposite movements, of a die-operating shaft concentric to one of the die-carrier shafts and connected with one of the die-carriers, a reciprocatory impression device connecting said die-operating shaft with the second die-carrier shaft and adapted to carry said die-carrier shaft toward the other die-carrier shaft to form an impression, clutch members secured one to each of the concentric shafts, a revoluble driver, and clutch members carried by said driver and in position and adapted for reciprocally engaging the clutch members of the two concentric shafts to rotate either of said shafts upon the stopping of the other, substantially as described.

44. In a machine of the class specified, the combination with two concentric shafts, one of which constitutes a die-carrying shaft, and the other of which constitutes a die-operating shaft, and with a revoluble driver, of a stop device adapted for interrupting the die-carrier shaft at predetermined points in its travel, a clutch member secured to each of said concentric shafts, and reciprocally-operable clutch members carried by the revoluble driver in position and adapted for first engaging and rotating the clutch member of the die-carrier shaft and upon the cessation of movement of the said shaft for engaging and operating the clutch member of the die-operating shaft, substantially as described and for the purpose set forth.

45. In a machine of the class specified, the combination with a die-carrier shaft having a cam-like clutch member secured thereto, of a crank-shaft having a clutch member secured thereto, a reciprocatory impression device connected with said crank-shaft and adapted to be carried radially toward said die-carrier shaft to form an impression, and a driving device for said shafts consisting of a revoluble driver, two spring-actuated arms carried by said driver in position and adapted for alternately engaging the two clutch members aforesaid and for alternately operating the two shafts with which said clutch members are connected, substantially as described and for the purpose set forth.

46. In a machine of the class specified, the combination with a rotatable die-carrier, of an adjacent die-carrier connected with the

first die-carrier for synchronous but opposite movements and supported for radial movement with relation to said first die-carrier, rotating mechanism for said carriers, a reciprocatory die-closing device connected with and adapted for moving one of said carriers radially toward the other to form an impression, and means for operating said die-closing device, substantially as described.

47. In a machine of the class specified, the combination of two rotatable connected die-carriers one of which is supported for radial movement with relation to the other, frictional driving mechanism for rotating said carriers, and a reciprocatory device in connection with and adapted for moving one of said carriers radially toward the other to form an impression and for withdrawing the carrier upon the completion of said impression, substantially as described.

48. In a machine of the class specified, the combination of two rotatable connected die-carriers one of which is supported for radial movement with relation to the other, frictional driving mechanism for rotating the die-carriers, stopping devices for intercepting the movements of the die-carriers at predetermined points, a reciprocatory carrier-operating device connected with and adapted for moving one of said carriers radially toward and from the other, and mechanism in connection with the frictional driving mechanism and controlled by the cessation of rotary movements of the die-carriers and adapted

for actuating the reciprocatory carrier-operating device, substantially as described.

49. In a machine of the class specified, the combination of two rotatable complementary die-carriers connected for synchronous but opposite movements, and means in position and adapted for first rotating the die-carriers to bring a pair of complementary dies into working position and then automatically and radially moving one of said carriers toward the other to form an impression in the strip of material which may be held between said carriers, substantially as described.

50. In a machine of the class specified, the combination with the framework, of a die-carrier shaft journaled in said framework and provided with a die-carrier having a plurality of character-forming dies, a complementary die-carrier shaft journaled in a tubular bearing, or shaft-carrier, pivotally connected with said frame and adapted for lateral movement, said die-carrier shaft also having a die-carrier with a plurality of character-forming dies in complement to the character-forming dies of the first-mentioned carrier, means for rotating said carriers in unison, and means for automatically and radially moving one of said carriers toward the other, substantially as described and for the purpose set forth.

WALTER E. CRANE.

Witnesses:

FRED. J. DOLE,

FREDERICK A. BOLAND.