H. B. CROKER.

DIE PRINTING PRESS.

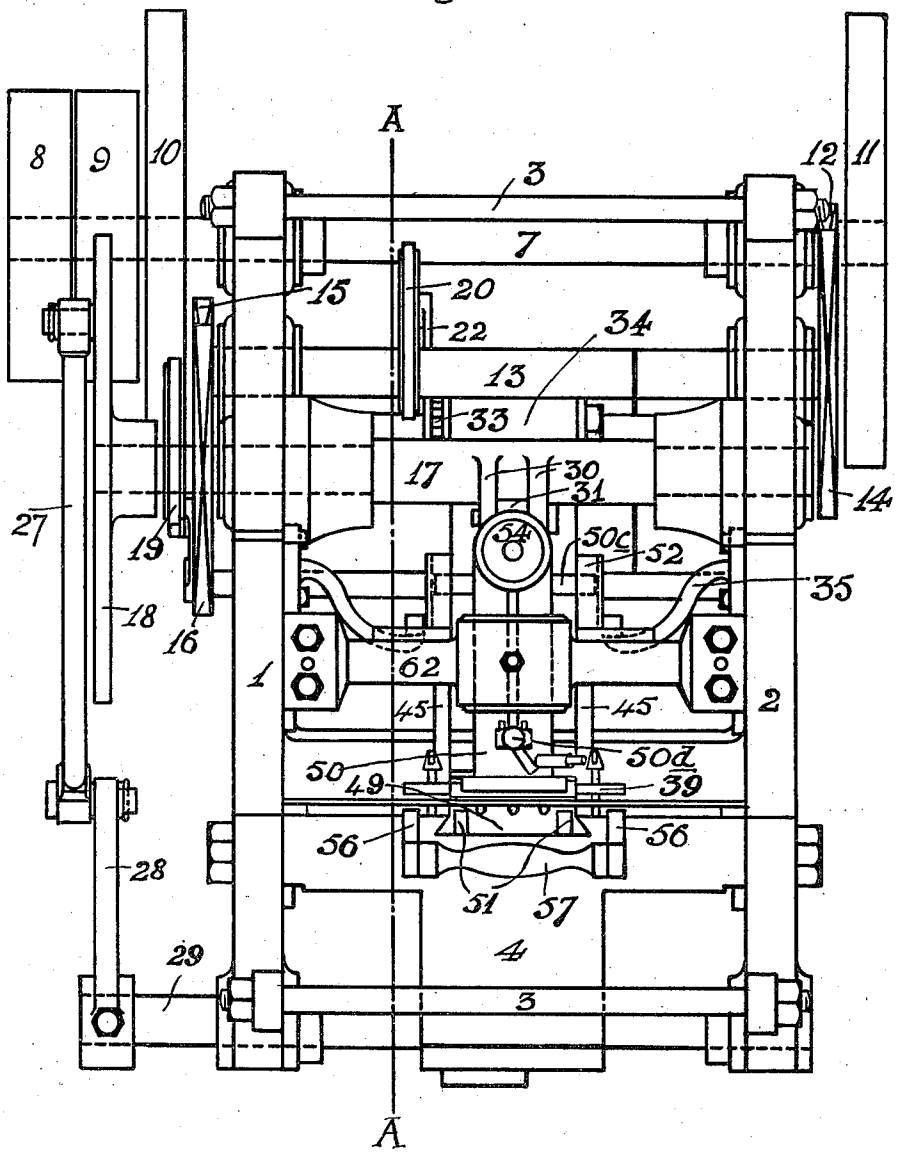
APPLICATION FILED FEB. 6, 1911.

1,028,191.

Patented June 4, 1912.

3 SHEETS—SHEET 1.

Fig. 1.



WITNESSES.

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3 SHEETS—SHEET 2.

Fig. 7.

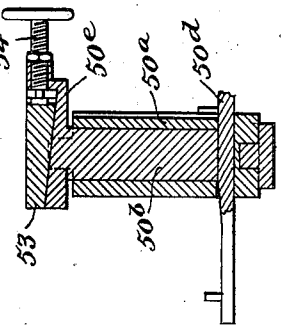

Fig. 6.

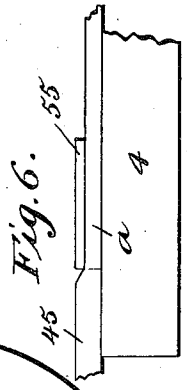

Fig. 2.

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3 SHEETS—SHEET 3.

Fig. 5.

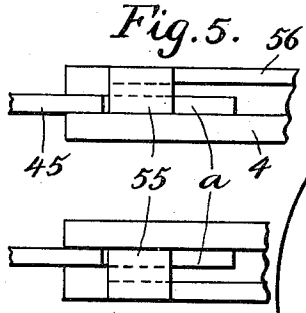

Fig. 3.

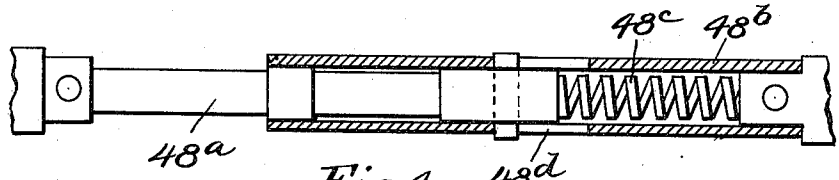

Fig. 4.

WITNESSES.

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UNITED STATES PATENT OFFICE.

HAROLD BLACK CROKER, OF LONDON, ENGLAND.

DIE PRINTING-PRESS.

1,028,191. Specification of Letters Patent. Patented June 4, 1912.

Application filed February 6, 1911. Serial No. 606,994.

To all whom it may concern:

Be it known that I, HAROLD BLACK CROKER, a subject of the King of Great Britain and Ireland, residing at London, England, have invented new and useful Improvements in Die Printing-Presses, of which the following is a specification.

This invention has relation to die printing presses and has for its object to provide a press that, while simple and cheap in construction, shall be capable of turning out work in a manner and in a style equal to that produced on more or less complicated, and therefore expensive presses.

In carrying out this invention, the press is hand or power driven, though, of course, the motive power employed will depend on the size of the machine. In the following description, it will be assumed that the press is power driven, the several rotating, oscillating and reciprocating parts deriving motion, either directly or indirectly, from a main shaft and being arranged and designed to come into and out of operation in the proper sequence and at the proper times. The die plate is mounted, as usual, on a carrier and is arranged so that it is face upward. The carrier has a rectilineal or a to and fro motion and is so driven that at the one or outer end of its stroke it comes to a dead stop and remains stationary for a considerable time. This stop of the carrier, and therefore of the die plate, is effected without stopping, even momentarily, any part of the drive. The carrier is driven, preferably, from a crank, which may have a rotary or oscillatory motion, and is connected with the carrier through a connecting rod. The connecting rod is made in two parts, and these parts are so connected and inter-related that relative motion can be set up between them. Preferably, the one part of the connecting rod slides within the other. The carrier at the outer end of its stroke comes into contact with a stop and this stop is so placed that the carrier is stopped sooner than otherwise would be the case. As soon as the carrier stops, relative motion between the two parts of the connecting rod is set up and this relative motion continues until the crank arrives in a position in which it can act, through the connecting rod, upon the carrier and set the same again in motion. A spring is, or may be, contained in the connecting rod.

The pressure plunger is arranged to have an upward and downward motion and to press the paper downwardly upon the upturned face of the die plate. The plunger is cam driven, the cam being carried by, or mounted on, a shaft driven from the main shaft and arranged above the upper end of the plunger. The cam is provided with a hardened steel roller at the part which contacts with the plunger. The plunger is made in two parts and these two parts may be connected together by a key or locking slide. When the key is moved to one position, the two parts of the plunger are moved slightly apart, or the lengths of the plunger is increased, and is then of such length that it can press the paper upon the die face. When the key is moved to its other position, relative motion of the two parts of the plunger occurs and it is reduced in length and, when depressed, cannot press the paper upon the die face. The key or locking slide thus forms what is known as the "impression check."

The die plate is wiped, as usual, after inking and for this purpose passes under a band or strip of paper moved intermittently. The paper is made up in the form of a roll, passes under a plate or device that can be adjusted in relation to the die plate, and then passes onward and is rolled up on a second roller. The adjustment of the wiping plate is effected by screws having springs at the top and bottom of the wiping plate. The ink distributing roller is, as usual, mounted and rotates within an ink trough, and the die plate is inked at or near the end of its stroke by an inking roller which is carried in arms and so moved that first the inking roller comes in contact with the ink distributing roller and then into contact with the die face as it progresses toward the wiping paper.

In order that the invention and the mode of carrying the same into practical effect may be clearly understood, reference will now be made to the accompanying sheets of drawings, on which—

Figure 1 is a front elevation, Fig. 2 is a side elevation, and Fig. 3 a sectional elevation, the section being on the line A—A

of Fig. 1, of a die printing press embodying, or in accordance with, the present improvements, Figs. 4 to 7 inclusive are views of details of construction. These figures and the constructions they illustrate will be particularly defined and described in the course of the following description.

The drawings are, in some respects, diagrammatic and illustrative only.

1, 2 are the main side frames of the die printing press and 5, 6 are subsidiary side frames. The main frames 1, 2 are arranged parallel with one another, are spaced a distance apart and are mounted on and bolted down to or otherwise fixed to a bed plate or foundation. The subsidiary frames 5, 6 are mounted on and bolted to the main frames and are positioned at or toward the rear end of the press. The main frames 1, 2 are tied together by a plurality of bolts 3, and are also connected at their front ends through the medium of a casting 4. This casting, in addition to the purpose just mentioned, also serves another purpose as will appear hereafter. It is of T-shape as seen in front elevation (see Fig. 1) and is, when viewed from above, also seen to be of similar shape. The cross members of the casting are secured at their ends to the side frames 1, 2 and the lower end of the vertical member 4^a of the portion of the casting seen in the front elevational view (Fig. 1) rests upon or is bolted down or otherwise fixed to the bed plate or foundation. The member of the portion of the casting seen when viewed from above and which corresponds to the member 4^a extends horizontally toward the rear end of the press and between the side frames 1, 2. This member is slotted longitudinally and is so made for a reason which will appear hereafter.

The main frames 1, 2, the subsidiary frames 5, 6 and the casting 4 support or carry all the parts of the press and the movable members of such parts are all driven or derive their motion, either directly or indirectly, from a main shaft 7. The main shaft 7 is mounted in bearings formed or provided in the upper portions of the main frames 1, 2 and is of a length such that it extends through the bearings and its ends project beyond the outer sides of the main frames 1, 2. On one of the projecting ends are mounted a loose pulley 8, a fast pulley 9, and a flywheel 10, the flywheel 10 being disposed between the fast pulley 9 and the outer side of the main frame 1, and on the other projecting end is mounted a flywheel 11 and also a pinion 12, the pinion 12 being disposed between the flywheel 11 and the outer side of the main frame 2. In the construction illustrated, the main shaft 7 is driven from the prime mover by belting, but it will be obvious that the driving may be otherwise; thus, for example, an electric motor may be used and when such a prime mover is employed it will be coupled directly to the main shaft 7, the pulleys 8, 9, and it may be the flywheels 10, 11 then being unnecessary.

13 is a second motion shaft, this shaft is driven from the main shaft 7, is mounted in bearings formed or provided in the main frames 1, 2 and is of a length such that it extends through the bearings and its ends project beyond the outer sides of the main frames 1, 2. Its bearings are so positioned that the shaft is below and more to the front end of the press than is the main shaft 7. On the end of the shaft 13 that extends beyond the outer side of the main frame 2 is mounted a spur wheel 14. The pinion 12 and the spur wheel 14 are such that they mesh; when therefore the main shaft 7 is rotated, the second motion shaft 13 is driven. On the other end of the shaft 13 and on the outer side of the main frame 1 is mounted a pinion 15. This pinion meshes with a spur wheel 16 mounted on one end of a third motion shaft 17. This shaft 17 is also carried in bearings formed or provided in the main frames 1, 2 and so positioned that the shaft is below and still more to the front end of the press than is the shaft 13. The shaft 17, unlike the shafts 7, 13, is of a length such that only one end extends beyond the outer sides of the main frames 1, 2; the projecting end extends beyond the outer side of the main frame 1 and has mounted on it the spur wheel 16 as already mentioned. There are also mounted on the projecting end, a crank disk or wheel 18 and an eccentric 19, the eccentric being disposed between the crank disk or wheel and the spur wheel 16 and the spur wheel 16 next the side frame 1. When therefore motion is imparted to the shaft 13 in the manner already mentioned, rotary motion is imparted through the gearing 15, 16 to the shaft 17 and the crank disk or wheel 18 and eccentric 19 and the parts connected therewith are driven.

20 is an eccentric. This eccentric is mounted on the shaft 13 and is disposed in a position between the main frames 1, 2. It is connected by means of a strap and connecting rod 20^a with one end of an arm or lever 22. The arm or lever is mounted at its other end upon a rod or spindle 23 and is capable of movement relatively thereto. The rod or spindle 23 is carried at its ends in the subsidiary frames 5, 6 and is, for the greater portion of its length, of circular cross section. Its end portions are, however, square and these portions fit or engage in correspondingly formed openings or holes or brackets in or on the subsidiary frames 5, 6. The rod or spindle 23 is thus incapable of rotation. The arm or lever 22 carries a pawl 32 and this pawl is arranged to

engage a ratchet wheel 33 attached to one end of, or formed in one with, a roller 34 that is rotatably mounted on the rod or spindle 23. The roller 34 is mounted on the circular portion of the rod or spindle 23 and is under the action of a brake so that there is a certain amount of resistance to its motion in a rotary sense when the pawl 32 engages the ratchet wheel 33 and tends to move the ratchet wheel around. The roller 34 and the arm or lever 22 are maintained in their proper positions on the rod or spindle by means of collars or other devices. When the shaft 13 is rotated, the eccentric 20 imparts an oscillatory movement to the arm or lever 22 and the pawl 32 acts on and drives the ratchet wheel 33 and roller 34 around in a step by step manner.

35, 35 are brackets. These brackets are mounted on the inner sides of the main frames 1, 2 and their free ends extend toward the center line of the press. The free ends of the brackets are shaped and adapted to hold the squared ends of a shaft 36, the central portion of which is circular in cross section. On the circular portion is mounted a roller 37; this roller is capable of rotation on the shaft and is under the action of a brake so that a certain amount of resistance is offered to its rotation. It is maintained in its proper position, which is in line with the roller 34, by means of collars or other devices.

39 is a plate that is mounted on, and is movable relatively to, bolts 39[a]. These bolts are mounted in the upper face of the horizontal rearwardly extending and slotted member of the casting 4 already referred to. The bolts 39[a] are encircled by springs above and below the plate 39, the compression on the springs and therefore the position of the plate relatively to the die, being adjusted by means of fly nuts 39[b].

38 is a band or strip of paper used for wiping the die after inking. This action is common to all die printing presses. The paper is made up in the form of a roll and is placed on the roller 37, its free end is then led downward and the paper is passed under the plate 39. The end of the paper is directed upward and secured to the roller 34. When the roller 34 is rotated, the paper is withdrawn from the roller 37, is caused to travel under the plate 39 and is wound on to the roller 34. From the nature of the drive of the roller 34 it will be seen that the paper travels in a step by step manner or intermittently, not continuously.

The eccentric 19 on the shaft 17 is connected through a strap and connecting rod 24 with one end of an arm or lever 25, the other end of which is mounted on a spindle 26. The spindle 26 is mounted in bearings in the subsidiary frames 5, 6 and is of a length such that one end extends through the bearing and beyond the outer face of a subsidiary frame. In the present arrangement, the end projects beyond the outer face of the frame 5 and the arm or lever 25 is mounted on this projecting end.

40 is an arm mounted on the spindle 26. There are two of these arms 40; they are spaced apart and are disposed between the frames 5, 6. Each of the arms is of compound formation, that is to say, it is made up of two parts, one of which is hollow, the other being solid and of a size to enter and slide within the hollow part. A spring is contained within the hollow part and presses at its ends against the inner end of the hollow part and on the end of the solid part contained within the hollow part. The spring resists inward movement of the solid part. The hollow part is slotted, the slot extending longitudinally thereof and a pin carried by the solid part engages this slot and limits the movement, inward or outward, of this part. The construction of each of the arms 40 is, in fact, very similar to the construction adopted for the rod connecting the die carrier with its operating arm or lever. The construction of this rod is illustrated in sectional elevation in Fig. 4, and will be hereinafter fully described. Fig. 4 also serves to illustrate an arm 40 as thus far described. The outer end of the solid part of each arm 40 is provided with a block that is slotted, or the part is itself slotted, and in each slot is mounted one end of a spindle 46 of a roller 41. The roller 41 is the die inking roller. It will be seen that when the shaft 17 is rotated in the manner already described, the arm or lever 25 will be oscillated or rocked and that a similar movement will be imparted to the spindle 26. The oscillatory or rocking movement of the spindle 26 will cause the arms 40 and the roller 41 carried thereby to move up and down or to sweep through the arc of a circle. At one part of its movement, the roller 41 will come into contact with the die and ink the die and at another part will come into contact with the ink distributing roller and be itself inked.

42 is the ink distributing roller. This roller is mounted on a spindle 42[a] supported in or on the walls of the ink trough 43 which is carried on a bracket 43[a] mounted on the subsidiary frames 5, 6. When the press is in operation, the roller 42 is kept in constant rotation; the rotation is effected by a belt 44 that passes around the shaft 13 and around a pulley on the spindle 42[a].

45 is a guide. There are two of these guides. They are spaced apart and are situated between the main and the subsidiary frames, being mounted on the horizontal rearwardly extending and slotted member of the casting 4. The one portion of each guide is horizontal and the other portion is

curved upwardly, the outer or free end of the curved portion extending to or adjacent the ink trough 43. The horizontal portion of each guide is made of two thicknesses. This construction is clearly shown in Figs. 5 and 6 which are respectively plan and side views to a larger scale than the other figures of the end parts of the horizontal portions of the guides and the part of the casting 4 on which they are mounted. The point at which the two portions of different thickness join is marked *a*. The guides are spaced at such a distance apart that flanges formed or provided on the ends of the die inking roller will engage and roll thereon. The radius of the curved portion of the guides is such that the springs in the arms 40 will, when the flanges on the die inking roller are in contact therewith, be under compression and the pins on the solid parts of the arms in such positions in the slots in the hollow parts that outward movement of the solid parts will be possible. As the arms 40 and die inking roller move downward relatively to the guides 45, the flanges of the die inking roller will come to the points *a* and will pass on to the parts of the horizontal portions of the guides that are of less thickness. The arms 40 will, under the action of their springs, be increased in length and the die inking roller will be moved nearer the casting 4. The alterations in the length of the arms 40 in the positions of the die inking roller are such that the die inking roller is enabled to ink the die as it passes thereunder. If it be desired to prevent the inking of the die, as is necessary when preparing to print and the "force" is being made, it will be seen that this can very easily be accomplished and is done by preventing the lengthening of the arms 40 after they have passed the point *a*. This is effected by means of two plates 55 that are attached by rods 56 to a handle 57 and are arranged to slide on the guides 45 and be moved either toward or from the point *a*. The thickness of the plates 55 is such that they prevent any lengthening of the arms 40 when they are moved up to the point *a* and the arms move over and beyond this point.

The crank wheel or disk 18 is connected through a connecting rod 27 to one end of an arm or lever 28, the other end of this arm or lever being fixed to one end of a spindle 29 mounted in bearings in the lower and rear portions of the main frames 1, 2. The end of the spindle 29 on which the arm or lever 28 is mounted, passes through its bearing to the outer side of the main frame 1; the arm or lever 28 is thus situated without the main frames 1, 2. On the spindle 29 is mounted one end of another arm or lever 47. This arm or lever 47 is disposed between the main frames 1, 2 and its free end is connected with one end of a connecting rod 48, the other end of which is connected with the die carrier 21. This die carrier is mounted and slides on the upper face of the horizontal rearwardly extending and slotted member, and across the upper face of the cross member of the casting 4. The cross member of the casting 4 is formed with a dovetailed groove 49, the dovetailing extending rearward and along the edges of the slot in the other part of the casting. The die carrier is formed to engage this dovetailing and is also on its lower side and at its rear end provided with a lug 61. This lug projects through the slot in the casting and the one end of the connecting rod 48 is connected thereto. It will be seen that when the shaft 17 is rotated, the arms or levers 28, 47 are rocked or oscillated, the die carrier 21 is thus reciprocated. The angle through which the arm or lever 47 rocks or oscillates is greater than necessary to reciprocate the die carrier between the limits of its motion. To allow of this greater movement it will be understood that some means must be provided to permit of relative motion on the line joining the pins connecting the connecting rod with the arm or lever 47 and the lug 61. The relative motion between these pins is allowed for by the construction of the connecting rod 48 which is of special construction or telescopic; this latter construction is illustrated in Fig. 4. The connecting rod will be seen to comprise a solid part 48^a and a hollow part 48^b within which the part 48^a can slide.

48^c is a spring placed within the part 48^b between the closed end thereof and the end of the solid part 48^a contained therein.

48^d is a slot cut in the part 48^b longitudinally thereof and 48^e is a pin carried by the part 48^a and engaging the slot 48^d. The slot 48^d and pin 48^e limit the relative movements of the parts 48^a and 48^b. As before stated the die carrier 21 has not a movement equal to the angular movement of the arm or lever 47; the shortening of its stroke is effected by means of stops 51 mounted on the casting 4. When the die carrier is moved toward or from the front end of the press, its resistance to motion is not sufficient to alter the stress on the spring 48^c. The stress is, however, altered as soon as the die carrier in its movement toward the front end of the press comes into contact with and is stopped by the stops; relative motion, in one direction, is set up between the parts 48^a, 48^b and the die carrier remains stationary until the end of the arm or lever 47 has moved through a distance in one direction equal to the length of the slot 48^d and in a reverse direction to a similar amount. The contact between the end of the slot 48^d and the pin 48^e prevents further relative motion between the parts 48^a, 48^b and the die carrier is accordingly

again set in motion and moved toward the rear of the press. As the die carrier is moved rearwardly and at or toward the end or beginning of the stroke, the die inking roller 41 is through the gearing, 12, 14, 15, 16 and arms 40 moved downwardly and comes to the point *a* when it moves further downwardly and comes into contact with the die which is accordingly inked. As the die carrier moves toward the front end of the press, the die passes under the plate 39 and the wiping paper 38 and the surplus ink is removed. While the die carrier is in contact with the stops 51 and the die is therefore stationary, the printing is effected. The die in its return movement passes under the plate 39 and wiping paper, but as the ink has been used up in the printing there is no ink to be wiped off.

The printing is effected as follows:—30, 30 are two projections or arms mounted on or formed in one with the shaft 17. These arms are separated a small distance apart and between them is mounted a roller 31. The arms 30 may be shaped otherwise than as shown so long as they will act as or form the impression depressing means. In effect they act as or are a cam. 62 is a cross bar or member supported at its ends by the main frames 1, 2 and arranged directly below the shaft 17. The pad or "force" is carried on the lower end of the member or part 50 mounted in or carried by the cross bar or member 62. The member or part 50 is normally maintained in a raised position by a spring, against the action of which it is depressed by the cam 30 so as to bring the pad or "force" onto the paper and press the same into contact with the face of the die on the die carrier 21. Some details of the part or member 59 are shown in Fig. 7. It comprises two parts 50^a, 50^b, one of which, 50^a, is hollow and contains the other part 50^b. The part 50^a has two laterally projecting pins or lugs 50^c which enter slots in casings 52 mounted on the cross bar or member 62. These casings 52 contain springs which act upon the pins or lugs 50^c and tend to press or hold the member or part 50 in its raised position. The parts 50^a, 50^b are capable of relative motion, but normally they move as one. 50^d is a slide that passes through the part 50^a below the lower end of the part 50^b which rests thereon. The slide 50^d is of greater thickness at one end than the other. When the slide 50^d is in the position shown in Fig. 7 the two parts 50^a, 50^b are maintained at a length that will bring the pad or "force" into action on each downward movement of the part or member 50, but if the slide be moved relatively to the parts 50^a, 50^b and the thinner portion thereof be moved under the end of the part 50^b the part 50^a will move relatively to the part 50^b and the length of the part or member 50 will be decreased. In Fig. 7 it will be noticed that the upper end of the part 50^b is provided with a box like part 50^e having one surface that is inclined and that an inclined wedge 53 lies upon this inclined portion and is provided with an adjustment wheel and screw 54. If the wheel and screw 54 be turned it will be understood that adjustment of the part or member 50 as a whole can be made and the lower end of this part or member moved toward or from the die. This adjustment is particularly necessary when making the "force". The roller 31 acts on the upper surface of the wedge 53 and depresses the part or member 50 against the action of the springs contained within the casings 52.

What I claim is:—

1. In a die printing press, a movable carrier with a die, rotary driving means, motion conversion mechanism connecting said driving means and die carrier, an impression plunger disposed in relation to the path of movement of said die carrier, said mechanism being of a character to impart reciprocatory motion to said die carrier and a stroke the length of which will carry the die carrier beyond the line of the impression plunger, a connecting rod and crank forming part of said motion conversion mechanism, said connecting rod being connected at one end with the die carrier and at the other end with said crank and said crank having an angular movement greater than that required for the reciprocation of the die carrier, means adapted to actuate the plunger and to move it toward the face of the die, means adapted to stop the travel of the die carrier when it comes in line with said plunger and to hold the same stationary while the plunger is in operation, and means adapted to compensate for the differences in motion of said crank and die carrier.

2. In a die printing press, a movable die carrier with a die, rotary driving means, motion conversion mechanism connecting said driving means and die carrier, an impression plunger disposed in relation to the path of movement of said die carrier, said mechanism being of a character to impart reciprocatory motion to said die carrier and a stroke the length of which will carry the die carrier beyond the line of the impression plunger, a connecting rod and crank forming part of said motion conversion mechanism, said connecting rod being connected at one end with the die carrier and at the other end with said crank and said crank having an angular movement greater than that required for the reciprocation of the die carrier, means adapted to actuate the plunger and to move it toward the face of the die, means adapted to stop the travel of the die carrier when it comes in line with said plunger and to hold the same stationary while

the plunger is in operation, said connecting rod being arranged to alter in length while the die carrier is stationary and thus to compensate for the differences in the movements of the die carrier and its driving crank.

3. In a die printing press, a movable die carrier with a die, rotary driving means, motion conversion mechanism connecting said driving means and die carrier, an impression plunger disposed in relation to the path of movement of said die carrier, said mechanism being of a character to impart reciprocatory motion to said die carrier and a stroke the length of which will carry the die carrier beyond the line of the impression plunger, a connecting rod and crank forming part of said motion conversion mechanism, said connecting rod being connected at one end with the die carrier and at the other end with said crank and said crank having an angular movement greater than that required for the reciprocation of the die carrier, means adapted to actuate the plunger and to move it toward the face of the die, means adapted to stop the travel of the die carrier when it comes in line with the plunger and to hold the same stationary while the plunger is in operation, said connecting rod being arranged to contract and expand in length while the die carrier is stationary and thus to compensate for the differences in the movements of the die carrier and its driving crank.

4. In a die printing press, a movable carrier with a die, rotary driving means, motion conversion mechanism connecting said driving means and die carrier, an impression plunger disposed in relation to the path of movement of said die carrier, said mechanism being of a character to impart reciprocatory motion to said die carrier and a stroke the length of which will carry the die carrier beyond the line of the impression plunger, a connecting rod and crank forming part of said motion conversion mechanism, said connecting rod being connected at one end with the die carrier and at the other end with said crank and said crank having an angular movement greater than that required for the reciprocation of the die carrier, means adapted to actuate the plunger and to move it toward the face of the die, means adapted to stop the travel of the die carrier when it comes in line with said plunger and to hold the same stationary while the plunger is in operation, said connecting rod being arranged to contract in length when the movement of the die carrier is stopped and up to the completion of the angular movement of the crank in one direction and to lengthen during the first part of the angular motion of the crank in the other direction and then to take up the drive and move the die carrier.

5. In a die printing press, an impression plunger, comprising two parts capable of relative movement and caused to occupy one or other of two positions, an endwise movable slide adapted to occupy one or other of two positions and comprising two portions of different thickness, said slide occupying a position between the said parts and so arranged that when moved to one position from its other position, relative motion of the two parts is set up and the length of the plunger altered.

6. In a die printing press, an impression plunger, comprising an outer containing part and an inner part, an endwise movable slide adapted to occupy one or other of two positions and comprising two portions of different thickness, said slide passing through said outer part and below an end of said inner part, and being adapted when moved to one position from its other position to set up relative movement between the two parts and alter the length of the plunger.

Dated this 19th day of January 1911.

HAROLD BLACK CROKER.

Witnesses:
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C. P. LIDDON.