

Dec. 25, 1945.

W. T. GOLLWITZER

2,391,777

EMBOSSING MACHINE

Original Filed May 31, 1938

7 Sheets-Sheet 1

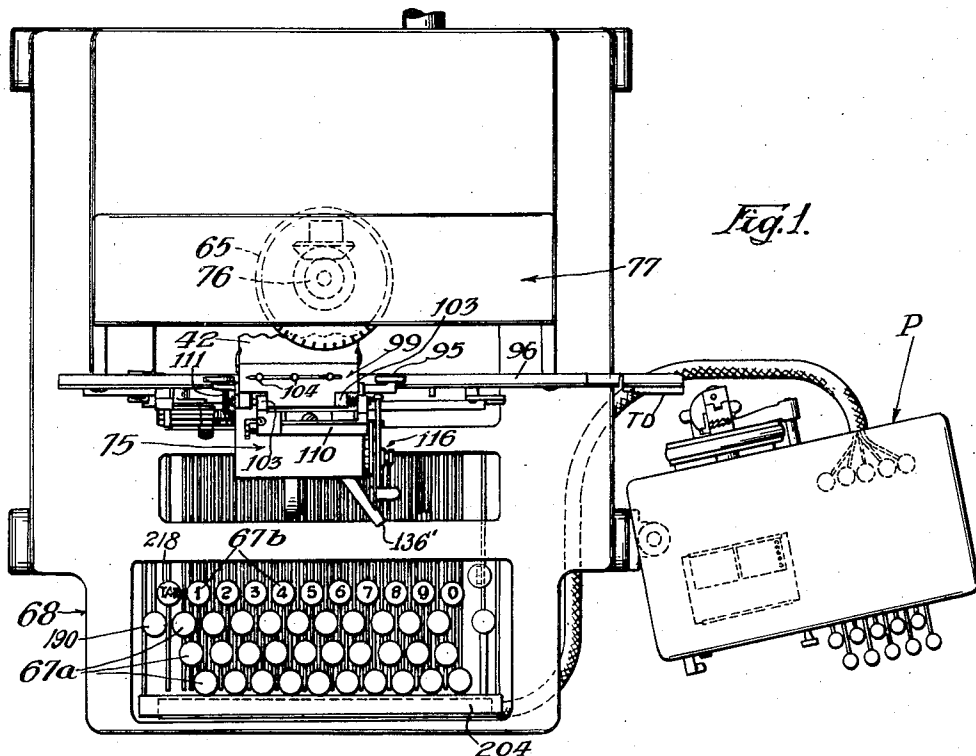


FIG. 2.

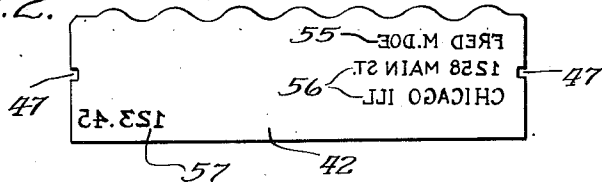
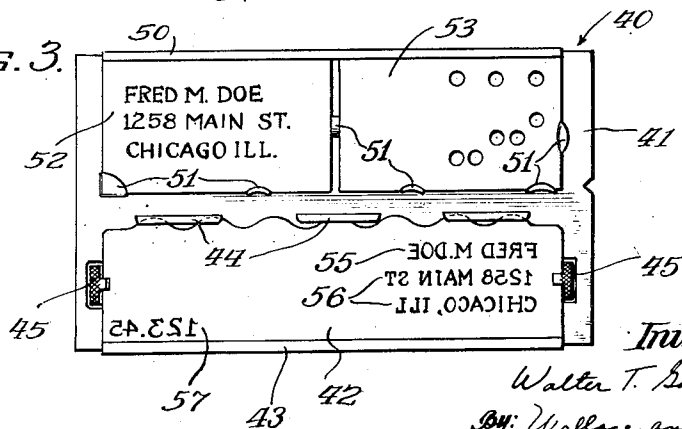


FIG. 3.



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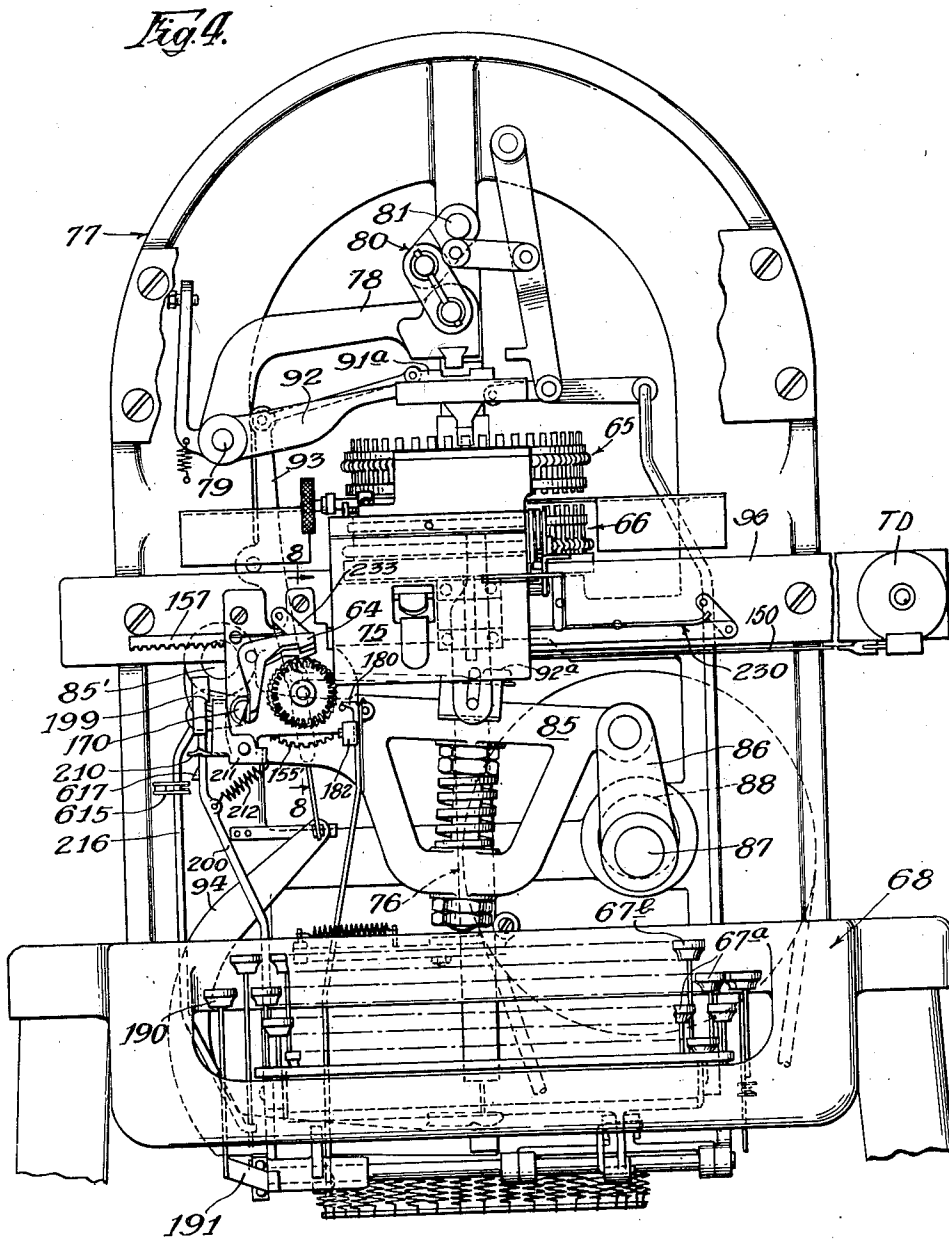
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7 Sheets-Sheet 2



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7 Sheets-Sheet 3

Fig. 5.

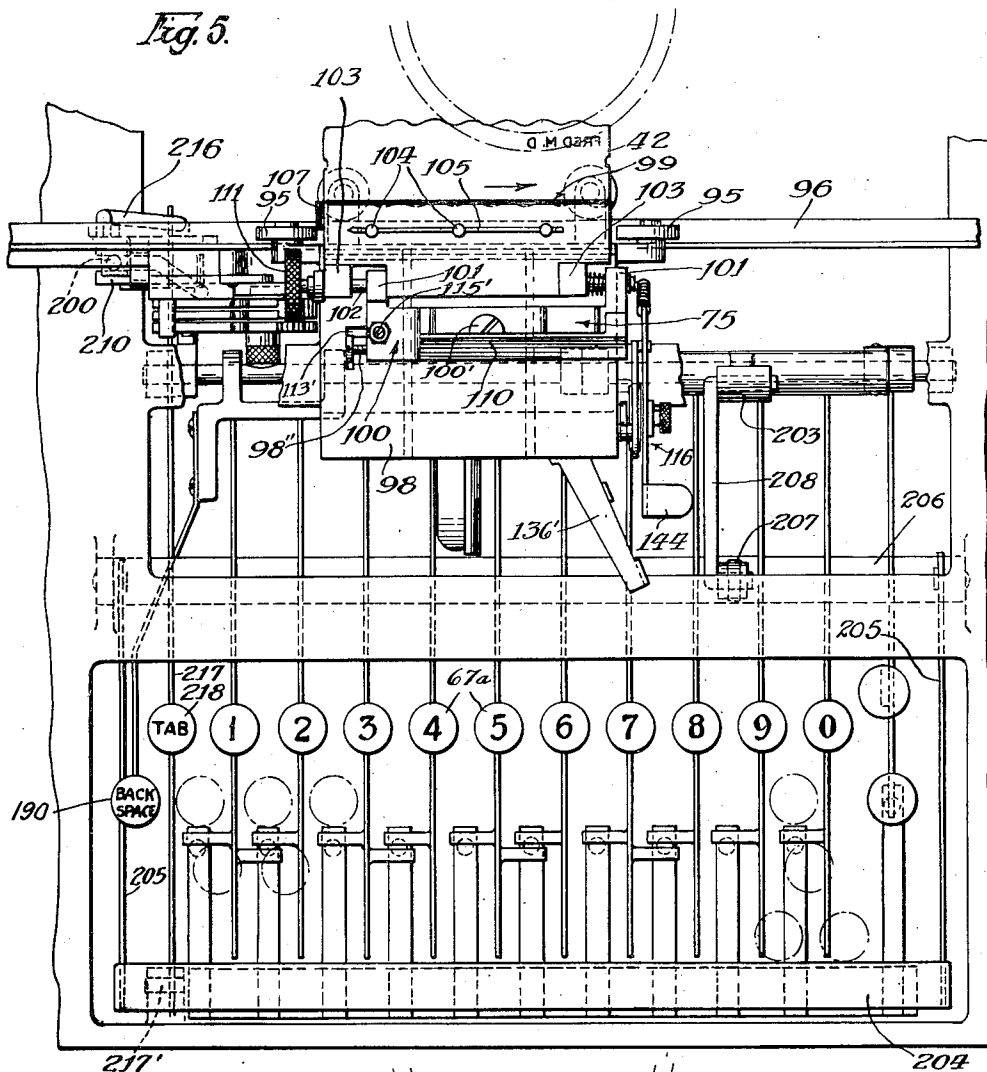
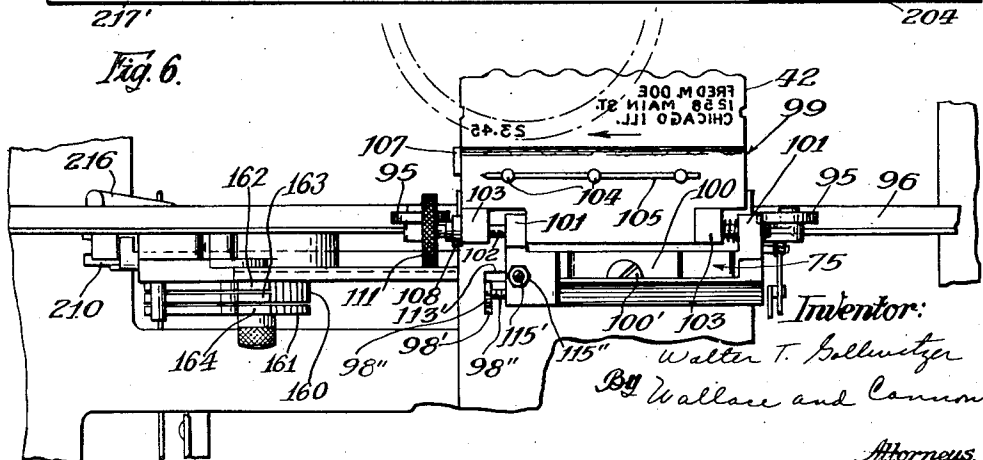


Fig. 6.



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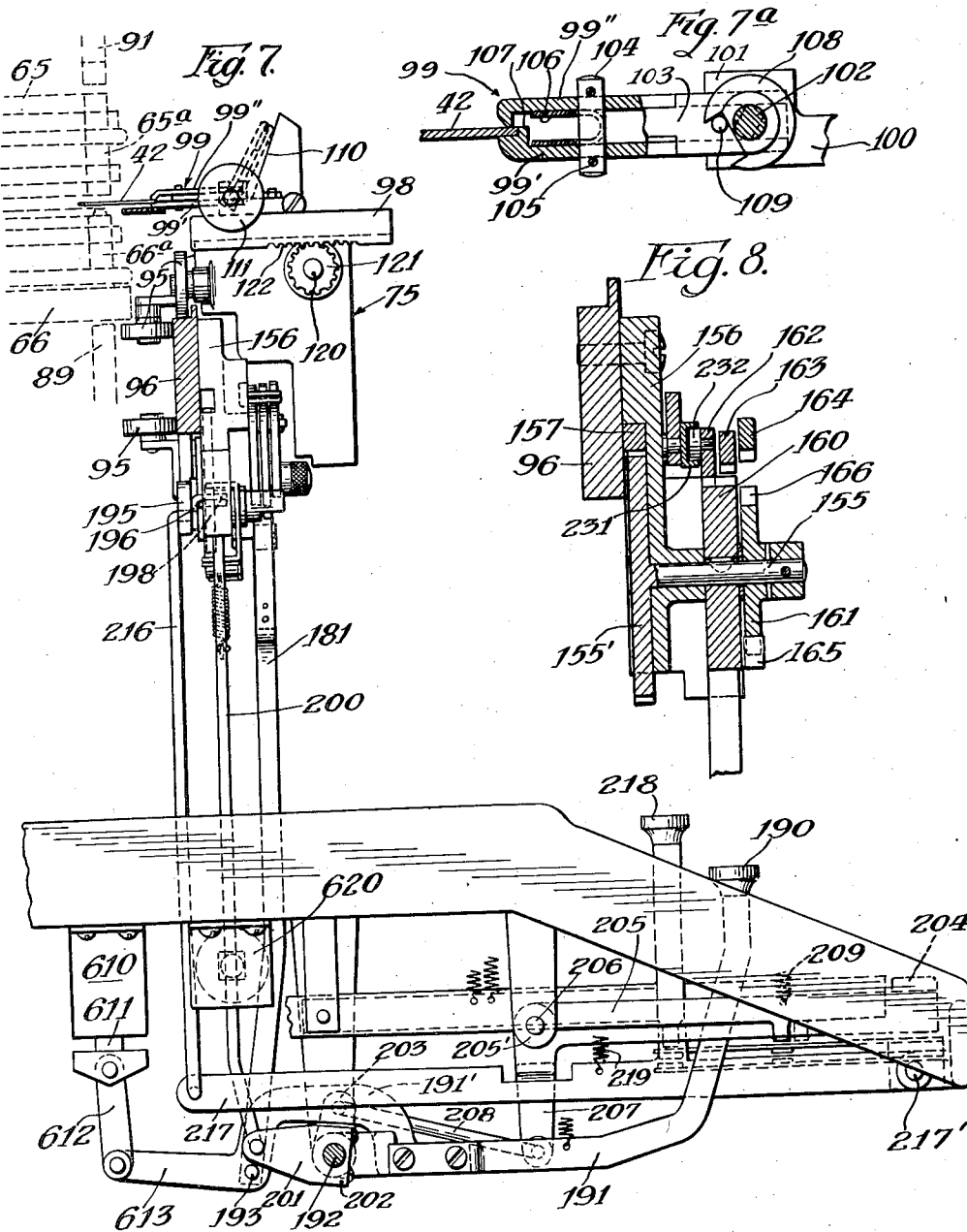
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EMBOSSING MACHINE

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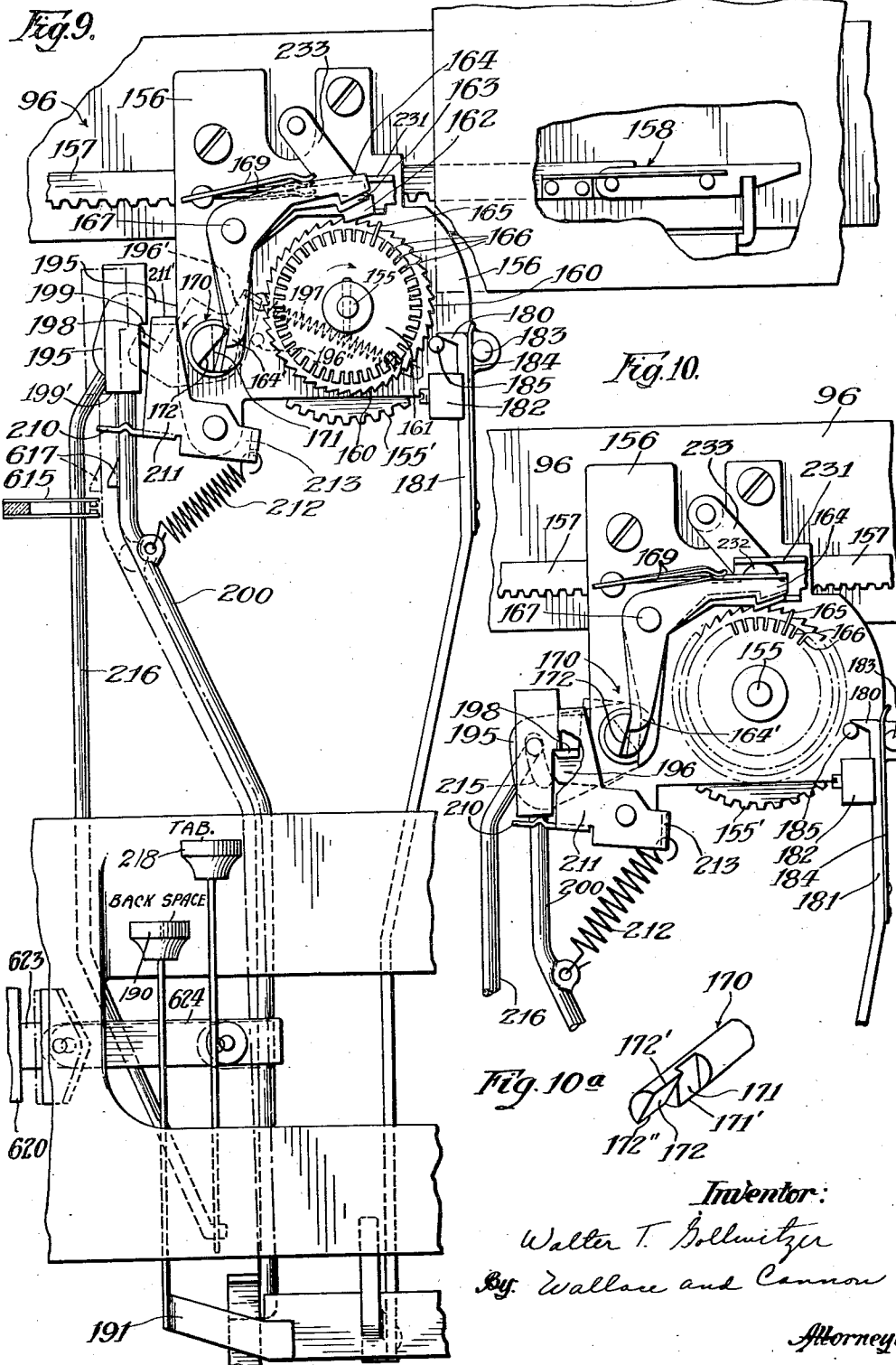
W. T. GOLLWITZER

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EMBOSSING MACHINE

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7 Sheets-Sheet 5



Dec. 25, 1945.

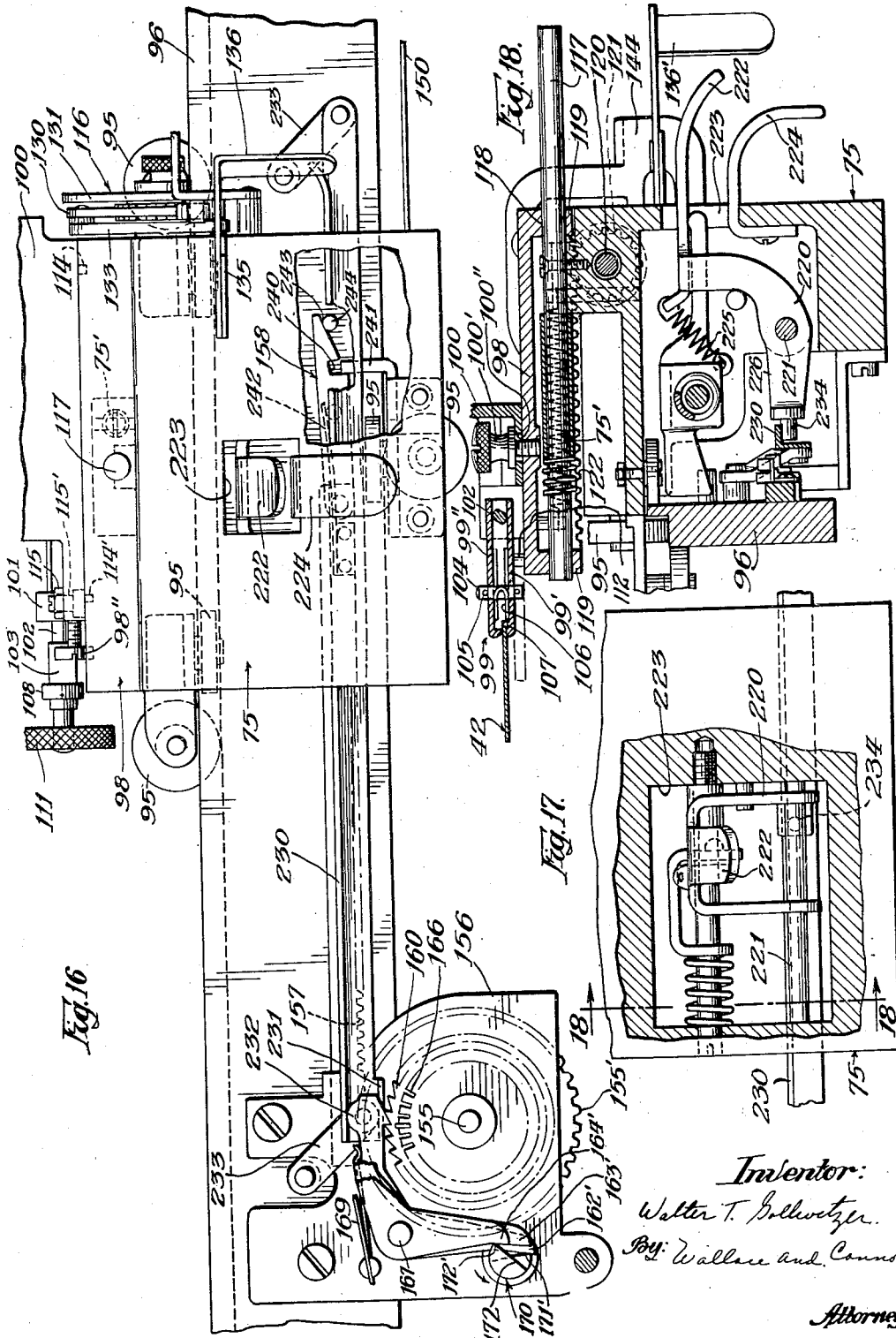
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EMBOSSING MACHINE

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7 Sheets-Sheet 7



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UNITED STATES PATENT OFFICE

2,391,777

EMBOSSING MACHINE

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Original application May 31, 1938, Serial No.
210,897, now Patent No. 2,265,229, dated De-
cember 9, 1941. Divided and this application
October 25, 1941, Serial No. 416,547

5 Claims. (Cl. 197—6.6)

This application is a division of my co-pend-
ing application, Serial No. 210,897 filed May 31,
1938, now issued as Patent No. 2,265,229, De-
cember 9, 1941 which is directed to the punching
mechanism.

The divisional application 489,112, filed May
31, 1943 is directed to line spacing mechanism
for the work supporting cross slide.

The present invention relates to preparing
printing devices and the like, and particularly
to embossing machines for forming type charac-
ters on printing devices as on plates or like ele-
ments of such devices.

One of the objects of my invention is to facili-
tate the mounting and retention of printing plates
and the like on the carriage of an embossing or
like machine, as well as to expedite removal of
such plates from the carriage.

Heretofore some difficulty has been experienced
in the handling of printing plates in embossing
machines because the dies which operate upon
these plates sometimes tend to so jar the plates
as to loosen the grip of the plate retaining means
so that the type characters sometimes are not
formed in their proper relative positions on the
plates. Moreover, many prior clamping devices
have required considerable skill to operate and
repair. Hence, the present invention embodies
a novel plate clamping means which obviates
the aforesaid and other disadvantages and is
moreover of simple and economical construc-
tion and reliable in operation.

More specifically, it is an object of the inven-
tion to arrange a pair of gripping jaws on the
carriage of an embossing machine in such a man-
ner that a printing plate may be inserted down-
wardly into the bite of these jaws whereupon
the jaws may be swung to bring the plate into a
horizontal position so that it may be operated
upon by the embossing dies, the plate moreover
being tightly clamped by the jaws so as to be
properly retained against slippage, all in a sin-
gle continuous movement of a jaw-operating
member which is adapted to rock back and forth
between clamping and releasing positions. Fur-
thermore, it is an object to so arrange the work
or plate retaining means or jaws that the print-
ing plate may be swung from its horizontal or
working position to a substantially vertical load-
ing position and released from the grip of the
jaws by a reverse rocking movement of the jaw-
operating member.

Another object of the invention is to enable
the carriage of an embossing machine to be back
spaced with a minimum of effort on the part of

the operator. Heretofore, machines of this char-
acter have made provision for indexing the car-
riage in the direction of its normal character
spacing movement with very little effort on the
part of the operator, but in order to back space
the carriage the operator has had to manually
effect the back spacing movement and in so do-
ing needed to overcome the normal tendency of
the carriage to move forwardly. In some types
of work it is desired to progressively back space
the carriage instead of imparting normal char-
acter spacing movement thereto, and in such in-
stances it is not always convenient to perform
the numerous manually effected back spacing
operations. The present invention aims to re-
lieve the operator of this undue inconvenience
by providing a power-operated back spacing
movement which enables the carriage to be back
spaced as readily as it would normally be indexed
in a forward direction.

Other objects are to so arrange the carriage
indexing means that substantially all parts of
the escapement mechanism included therein are
located clear of the carriage guideway so as not
to unduly complicate the construction of the car-
riage and associated parts and to enable greater
freedom of movement thereof; to so arrange the
escapement mechanism that a single member
may control both normal character spacing and
tabulating movements of the carriage, such mem-
ber preferably being supported for rocking mo-
tion and receiving different amounts of rocking
movement in accordance with the type of oper-
ation as to be effected; and, in a mechanism of
the aforesaid character, to enable selection of the
positions to which the carriage may be tabulated.

Other and further objects of the present inven-
tion will be apparent from the following descrip-
tion and claims and will be understood by refer-
ence to the accompanying drawings which, by
way of illustration, show a preferred embodiment
and the principle thereof and what I now con-
sider to be the best mode in which I have con-
templated applying that principle. Other em-
bodiments of the invention embodying the same
or equivalent principle may be used and struc-
tural changes may be made as desired by those
skilled in the art without departing from the
present invention and the purview of the ap-
ended claims.

In the drawings,

Fig. 1 is a plan view of an embossing machine
embodying the present invention;

Fig. 2 is an elevational view of a printing plate

of the character produced by a machine as illustrated in Fig. 1;

Fig. 3 is an elevational view of a printing and control device in which such a printing plate may be used;

Fig. 4 is a fragmentary front elevation, in which certain parts are broken away, of the embossing machine shown in Fig. 1;

Fig. 5 is a fragmentary plan view of the keyboard and carriage of the machine illustrated in Fig. 4;

Fig. 6 is a fragmentary plan view of the carriage illustrated in Fig. 5;

Fig. 7 is a fragmentary side elevational view drawn to an enlarged scale and looking in at the left-hand side of the machine as shown in Fig. 4;

Fig. 7a is an enlarged detail view of a printing plate gripping mechanism employed on the carriage of the machine;

Fig. 8 is a vertical sectional view taken on the line 8—8 on Fig. 4;

Fig. 9 is a view, drawn to an enlarged scale, of a portion of the mechanism near the left-hand side of Fig. 4;

Figs. 10 and 11 are views of portions of the mechanism shown in Fig. 9 but showing the parts in different positions;

Fig. 10a is a detail perspective view of a shouldered pin employed in the apparatus illustrated in Figs. 9 and 10;

Fig. 12 is a fragmentary plan view of the carriage illustrated in Figs. 5 and 6, with the gripping jaws removed therefrom;

Fig. 13 is a horizontal sectional view taken in the direction of the arrows on the line 13—13 on Fig. 12;

Fig. 14 is a fragmentary detail view of a ratchet employed in the arrangement illustrated in detail in Fig. 13;

Fig. 15 is a sectional detail view taken substantially on the line 15—15 on Fig. 14;

Fig. 16 is a front elevational view of the carriage arrangement;

Fig. 17 is a view partly in elevation and partly in section of a portion of the carriage arrangement shown in Fig. 16; and

Fig. 18 is a sectional view taken substantially on the line 18—18 on Fig. 17.

An embossing machine embodying the present invention is illustrated generally in Figs. 1, 4 and 5, while a printing plate of the character which such a machine is adapted to produce is shown in Fig. 2. This printing plate, designated 42, is provided with printing characters which are formed thereon by the embossing machine, such printing characters appearing in relief on one face of the plate 42 and in intaglio on the opposite face of this plate. These characters may be arranged in individual lines as shown in Fig. 2, for example, to enable printing of the various lines of a name 55 and address 56 and supplemental data as 57.

Printing plates such as 42, Fig. 2, are adapted to be mounted on printing and control devices as 40 shown in Fig. 3. As commonly constructed such printing and control devices as 40 comprise a frame 41 having along its lower edge a bead 43 against which the lower edge of the printing plate 42 is fitted. Retaining devices 44 struck from the frame 41 are disposed in spaced relation to the bead 43 and cooperate therewith to retain the printing plate 42 on the lower half of the frame 41, the devices 44 engaging the upper or serpentine edge of the plate 42. To restrain the plate 42 against endwise movement

relative to the frame 41, the frame 41 is provided with yieldable tongues 45 disposed at opposite ends of the plate 42 and having projections which seat in notches 47, Fig. 2, formed in the adjacent ends of the plate 42. When it is desired to remove the plate 42 from the frame 41, either of the tongues 45 may be depressed to enable the plate 42 to be slid endwise from the frame.

A bead 50 is formed along the upper edge of the frame 41 and cooperates with retaining devices 51 struck from the frame 41 to removably secure separate index and control cards 52 and 53 in position on the upper half of the frame. The index card 52 has an impression thereon of the data represented by the printing characters constituting the name 55 and address 56 embossed on the printing plate 42, thereby affording a convenient visible indication of such data. The control card 53 and the underlying portion of the frame 41 are adapted to be perforated as shown in Fig. 3 to represent, according to a predetermined code, for example, supplemental data such as the numerical amount printed from the characters 57.

It will be understood, of course, that while I have described the printing plate 42, Fig. 2, as being incorporated in a printing and control device as 40, Fig. 3, this is merely illustrative of the manner in which such a printing plate may be utilized for, as is well understood by those skilled in the art, printing plates such as 42 may be equally well employed in printing devices which are not equipped with control areas such as 53, Fig. 3. In fact, insofar as the present invention is concerned, the use to which a printing plate such as 42 may be put is immaterial and has been described hereinabove only as a matter of general interest.

The embossing machine is so arranged that the die heads 65 and 66, Fig. 4, may be rotated on a vertical axis to bring any selected pair of complementary dies 65a and 66a, Fig. 7, into operative relation with a blank plate 42 carried along the forward side of the machine frame by a carriage 75. The die heads 65 and 66, as herein shown, are fixed in vertically spaced relation on a rotatable vertical shaft 76, Figs. 1 and 4, journaled at its lower end in the machine frame 68 and at its upper end in an upstanding arch-like frame element 77. The pairs of complementary dies 65a and 66a are mounted in opposed vertically shiftable relation about the periphery of the die heads 65 and 66 so that any pair, selected and shifted by rotation of the die heads to an embossing position at the forward side of the machine, may be brought together to emboss the selected character on the plate 42 positioned between the selected pair of dies as shown in Figs. 5 and 7.

Actuation of the selected pair of dies 65a and 66a is preferably effected by means which drive the two dies toward each other so as to engage the plate 42 and form the desired character therein without vertically shifting the plate from the full-line position of Fig. 7. In the form illustrated this means, for the upper die 65a, comprises an upper rocker arm 78, Fig. 4, pivoted at 79 on the frame element 77 and operated by a toggle 80, interposed between said arm 78 and an actuating shaft 81 mounted adjacent to the top of the frame element 77.

The lower die 66a is actuated by a lower rocker arm 85 which has one end pivoted at 85' to the frame 77, while a pitman 86 operated by a crank 87 on a horizontal operating shaft 88 is connected to its other end. A lower die stock 89, Fig. 7, is

mounted for sliding movement in the frame between the lower rocker arm 85, Fig. 4, and the lower die 66a located in embossing position. A similar upper die stock 91, Fig. 7, is provided between the upper rocker arm 78 and the upper die 65a, the die stock 91 being supported for vertical movement on a carrier arm 92 pivoted at 79.

When the shaft 88 is rotating, the two rocker arms 78 and 85 are constantly actuated in unison by the pitman 86 and an operating connection between said shaft 88 and the toggle shaft 81, such operating connection being located at the back of the machine and being shown in detail in the patent to Joseph S. Duncan and Henry E. Hubbard, No. 1,831,103.

As described in the patent to Joseph S. Duncan, No. 1,518,904, the rocking movement of the arms 78 and 85 is normally ineffective to actuate the dies 65a and 66a. To this end shiftable die shuttles 91a and 92a, Fig. 4, are mounted for movement into the path of the arms 78 and 85 only when an embossing operation is desired. The shuttles 91a and 92a are connected by links to opposite ends of a lever 93, which is rocked by means of a bell crank lever 94. This bell crank lever 94 is associated with the die selecting mechanism in the manner disclosed in said Patent No. 1,518,904 so as to render said rocker arms 78 and 85 operable only after selection and proper positioning of a pair of dies.

The selection of the desired pair of dies 65a and 66a is, in the present embodiment, effected by the keys 67a and 67b, Fig. 1, the die-carrying shaft 76 being normally rotated at a high rate of speed and being stopped in any selected position by suitable stop or abutment means operated by said keys. The mechanism for effecting such selective positioning of the die heads forms no part of the present invention, and therefore it will suffice to point out that its specific structure is described in the aforementioned Duncan et al. Patent, No. 1,831,103. It may be stated, however, that as disclosed in said patent, the die-actuating rocker arms 78 and 85 are rendered effective automatically during one rocking cycle of these arms immediately after and as an incident to the stopping of the die heads in any selected position.

The carriage 75, Figs. 4 and 5, upon which the plate 42 is supported during the performance of the embossing operations, is so constructed and related to the die-actuating mechanism as to effect automatic step-by-step or character spacing movement, as well as providing for tabulating and back spacing movement and manually effected line spacing of the plate 42. To this end the carriage 75 has its main body portion mounted by means of a plurality of guide rollers 95, Figs. 5, 6, 7 and 16, on a transverse rail or track 96 which extends across the front of the frame 77. The rollers 95 are so related to the track 96 as to permit movement of the carriage across the front of the machine during, for example, character spacing movement of the carriage, while on the top of the carriage a cross slide 98, Figs. 16 and 18, is provided for movement transversely with respect to the track 96, or toward and away from the die heads. Thus, the cross slide 98 provides for line spacing movement, the plate 42 being supported on the cross slide 98 by releasable clamping means such as the clamping jaws 99, Figs. 6, 7, 7a and 18.

As shown in Figs. 5, 6 and 18, the jaws 99 are carried on a mounting member 100 which is detachably secured to the cross-slide 98 by means described hereinafter, the member 100 having up-

standing bearing lugs 101 thereon in which a jaw-supporting shaft 102 is journaled. The two jaws 99' and 99'', Fig. 7a, are in the nature of opposed plates, the lower one 99' of which carries lugs 103, Fig. 6, through which the shaft 102 rotatably extends, and the upper jaw 99'' has a pivotal connection with the lower jaw 99' by means of pins 104 extending loosely through the two plates 99' and 99''. These pins 104 have securing wires 105 extending therethrough on the outer sides of the two plates, 99' and 99'' and the pins 104 and these plates are so fitted as to permit slight pivotal movement for clamping and unclamping of a printing plate 42.

To provide for clamping of the jaws 99, the plates 99' and 99'' extend at their rear ends so as to embrace opposite sides of the shaft 102, and the shaft is flattened on opposite sides thereof as shown in Figs. 7a and 18. Thus when the shaft 102 is rotated in one direction nearly 90° relative to the plates 99' and 99'' and into a position like that shown in Fig. 18, the adjacent rear edges of the plates are separated so as to clamp the forward or outer edges of the plates or jaws upon the printing plate 42. It will be seen in Fig. 7a that a substantially U-shaped spring 106 is provided adjacent the central pin 104 and between the plates 99' and 99'' to separate said plates or jaws to the maximum extent. Preferably the forward end of the upper jaw 99'' is hooked and cooperates in pincers fashion with a flat portion or ledge on the forward end of the lower jaw 99' to firmly clamp the printing plate 42 in position, as shown in Fig. 7a. To facilitate accurate positioning of the printing plates between the jaws, a shoulder 107 is formed on the lower jaw 99' slightly inwardly of the flat part thereof, thereby affording a stop for limiting insertion of a printing plate as 42 between the jaws.

In the operation of the jaws 99 to clamp a printing plate 42, the jaws are first rocked toward the operator to the broken-line position of Fig. 7, wherein they rest against a loading abutment 110 formed on the member 100. Such movement of the jaws is effected by the shaft 102 which has a 90° rotative lost motion connection with the lower jaw 99', sufficient to enable the shaft 102 to accomplish its jaw-clamping function in addition to its function in moving the jaws between loading and working positions. The desired lost motion is attained by means of a notched collar 108, Fig. 7a, fixed on the shaft 102 and arranged so that the shoulders at the ends of the notch therein may alternatively engage a projecting pin 109 on the jaw 99' as shown in Fig. 7a. To facilitate the operation of the jaws 99, the shaft 102 has a knurled operating disk or knob 111 on its projecting left end, Fig. 6. When the jaws 99 have been shifted to their upright or loading position, the shaft 102 is turned to the full extent permitted by its lost-motion connection of Fig. 7a so as to thereby present the flattened surfaces thereon to the jaws 99' and 99'' and thereby enable the spring 106 to separate the plate clamping portions of the jaws so as to fully release or unclamp the jaws. The printing plate 42 is then inserted between the jaws 99 which grip the plate sufficiently firmly to enable the jaws to be rotated back to their horizontal position shown in Figs. 7 and 18 without releasing the plate, so as to thereby enable the plate to be carried to its working position. This movement of the jaws is limited by an abutment pin 112, Fig. 18, on the cross slide 98, and to securely clamp the printing plate, the operator

continues the turning of the shaft 102 to the full extent permitted by its lost motion connection which results in retracting the flattened portions of the shaft 102 from the jaws 99' and 99'' so as to dispose these portions in the position shown in Fig. 7a and since the rounded portions on the shaft then engage the jaws they are forced into tight engagement with the plate. It will be understood that such rocking movement of the jaws 99 to and from the loading position takes place in the normal use of the machine while the carriage 75 is located at one side of the embossing position.

As herein shown the mounting member 100, Figs. 5, 16 and 18, is secured on the cross slide 98 by means which provides for adjustment of the mounting member parallel to the path of the carriage, and also which provides for adjustment of the mounting member so that the plate 42 carried thereby is positioned with its axis parallel to said path of the carriage 75. To this end the top face of the cross slide 98 has aligned slots 113 and 113', Fig. 12, formed therein generally parallel to the carriage path, and a fixed depending pin 114, Figs. 12 and 16, projects from the mounting member 100 into the slot 113. For cooperation with the other slot 113' a pin 114' is provided which is fixed eccentrically on a small disk 115 mounted in the bottom of the member 100. By means of a stub shaft 115', Figs. 12 and 16, projecting upwardly through the member 100, the eccentric pin 114' may be shifted so as to adjust the mounting member into the desired parallel relation to the carriage path, and by a lock nut 115'', Fig. 6, threaded onto the stub shaft 115', this adjustment may be maintained.

A headed screw 100', Figs. 6 and 18, extends through an aperture 100'' in the member 100 and is threaded into the cross slide 98 to secure the mounting member 100 onto the cross slide 98 and, as shown in Fig. 18, the aperture 100'' is somewhat larger than the screw 100' so as to permit the desired horizontal adjustment of the member 100.

To afford longitudinal adjustment of the mounting member 100, a transverse slot 98', Fig. 12, is formed in the cross slide 98 and a headed screw 98'', projecting from the left end of the member 100, Fig. 6, has the lower edge of its head positioned in the slot 98'. Thus, by adjustment of the screw 98'' the positioning of the mounting member longitudinally of the direction of movement of the carriage 75 is determined.

For the purpose of imparting the desired line spacing movement to the printing plates, the cross slide 98 is normally urged to a retracted position by springs 75', Fig. 18, and is advanced line by line by means of a ratchet mechanism 116, Figs. 12 and 13. In the form shown, the cross slide 98 is partially supported and guided on the carriage 75 by a rod 117, Figs. 17 and 18, which is secured to the carriage 75 and is slidably fitted in bearing apertures 118 in depending flanges 119 along the front and rear edges of the cross slide 98.

A rotatable shaft 120, Figs. 7 and 18, is mounted transversely of the carriage 75, and pinions 121 fixed on this shaft mesh with racks 122 formed on depending flanges at opposite ends of the cross slide 98. The shaft 120 carries a ratchet wheel 125, Fig. 13, at one end thereof, and this ratchet is fixed in a rotatively adjustable relation to the shaft 120 through the medium of a non-rotatable collar 126 and two adjusting screws 127, as shown in Figs. 14 and 15 of the drawings. An actuating pawl 130, Figs. 12, 13 and 16, and

a control pawl 131 are associated with the ratchet wheel 125 to actuate the shaft 120. As shown in Fig. 13, the actuating pawl 130 is of an inverted U-form and is pivoted intermediate its ends, at 132, on one end of a carrier arm 133. The pawl 130 has a tooth 134 at one end thereof and this tooth is urged into operative engagement with the teeth of the ratchet wheel 125 by a spring 135 extended between the pawl 130 and its carrier arm 133. The carrier arm 133 is pivotally mounted on the shaft 120 for rotative movement relative to said shaft, so that by rocking said arm from the position of Fig. 13 in a counter-clockwise direction the cross slide 98 may be advanced. The carrier arm 133 is normally urged by a spring 134' to its normal position as shown in Fig. 13.

A bell crank 135, Fig. 12, pivoted on the carriage 75 has an actuating arm 135' which engages the downwardly extending end of the carrier arm 133, as shown in Fig. 13, and this bell crank 135 is operated by a second bell crank 136 which is pivoted on the same axis as bell crank 135. One arm of the bell crank 136 extends outwardly from the carriage 75 and constitutes a line space lever 136', Fig. 12, while the other arm has a return spring 137 connected thereto and has a stop shoulder 137' formed thereon which cooperates with an abutment 140' on the carriage 75 to determine the initial position of the line space lever 136'. An operating connection between the line space lever 136' and the transmitting bell crank 135 is provided by a downturned lug 138 on the bell crank lever 136' which overlies the bell crank 135 so that actuation of the lever 136' serves to impart operating movement to the arm 135' of bell crank 135 for thereby actuating the pawl 130. The extent of movement of the lever 136' is limited by abutment faces 140, Fig. 12, on the pawls 135 and 136 which engage the abutment 140' on the carriage 75 so that a full stroke of said lever advances the cross slide 98 one line-space. Having been given such a line spacing movement the cross slide is retained in its advanced position by the control pawl 131, Fig. 13, which is pivoted on the carriage beneath the shaft 120 on a pivot pin 141 and has a tooth 142 operable to engage the ratchet wheel 125. The tooth 142 and the teeth of the ratchet wheel are so related that the yielding force of the springs 75', Fig. 18, tending to produce return movement of the ratchet wheel 125 acts to hold the cooperating teeth in their operative relation and thereby fixes the cross slide 98 in the desired position. As shown in Figs. 12 and 13, the control pawl 131 has a finger piece 144 by which it may be depressed to disengage the pawl 131 from the ratchet wheel 125, and the pawl 131 also has a tail piece 145 which, in the disengaging movement of pawl 131, engages a roller 146 on the pawl 130 to shift said pawl 130 out of engagement with the ratchet 125 to thereby release the cross slide 98 to the restoring action of the springs 75', Fig. 18. A spring 147 acting between the tail piece 145 and the carriage 75 tends to maintain the control pawl 131 in operative engagement with the ratchet wheel 125.

The requisite step-by-step character-spacing movement of the carriage 75 is effected by means provided to control a spring-biased tendency of the carriage 75 to shift toward the right, as viewed in Fig. 4. Such a spring bias may be imparted to the carriage by a conventional tensioning drum TD Figs. 1 and 4, mounted on the extending right end of the rail 96 and operatively

connected to the carriage 75 by a flexible band 150 as shown in Fig. 16.

The means herein provided for controlling the spring-biased right-hand movement of the carriage 75 is preferably such as to simplify and cooperate in part in attaining a tabulating control of the carriage as well as affording a back spacing movement when desired. To this end there is provided a carriage control shaft 155 rotatably mounted on a horizontal axis, as shown in Fig. 8, in a bearing member 156 carried on the guide rail 96 adjacent the left-hand side of the machine frame, Fig. 16. On its rear end the shaft 155 has a pinion 155', Fig. 8, which on its upper side engages a horizontal rack 157 that is guided in the mounting or bearing member 156 and has its right-hand end, Figs. 9 and 16, releasably engaged with the carriage 75 by means of a latch member 158. Thus, the spring tension on the carriage 75 tends, through the rack 157, to rotate the control shaft 155 in a clockwise direction, Figs. 9, 10, 11 and 16, and means is therefore provided for governing such rotation of the control shaft 155 to attain the desired tabulating and character spacing movements or for producing reverse or back spacing movement thereof.

The control shaft 155, forwardly of the bearing member 156, has a relatively wide-toothed ratchet wheel 160 keyed thereto as shown in Figs. 8 and 9, and outwardly of the ratchet wheel 160 a notched tabulating disk 161 is fixed on the shaft 155. Two escapement pawls 162 and 163 are provided for cooperation with the ratchet wheel 160 while a tabulating pawl 164 is provided for cooperation with the tabulating disk 161, this tabulating pawl 164 being arranged for engagement with a tabulating stop 165 which may be manually positioned in any selected one of a plurality of radial slots 166 formed in the disk 161, Fig. 9.

The two escapement pawls 162 and 163 and the tabulating pawl 164 are generally similar in form, as shown in Figs. 9 to 11, and are provided on corresponding arms of similar bell cranks. These bell cranks are pivotally mounted on a common shaft 167 projecting from the mounting member 156, so that the arms upon which the pawls are provided project over the control shaft 155, while the other arms of the bell cranks project downwardly from the pivot shaft 167.

In accordance with the present invention the three pawls 162, 163 and 164 are normally urged toward effective positions by leaf springs 169 and are governed by a single actuating member 170, Fig. 10a, which acts on the depending arms of the bell cranks upon which these pawls are formed. In the present embodiment the common control or actuating member 170 is in the form of a rock shaft which is mounted in the bearing member 156 to the left of the depending bell crank arms, Fig. 16, and is provided with cam surfaces arranged to act on these adjacent bell crank arms to effect character spacing movement of the escapement pawls 162 and 163 in certain movements of the rock shaft 170, and to effect release of the pawls 162 and 163 with a simultaneous operation of the tabulating pawl 164 in other movements of the rock shaft.

Thus, as shown in Figs. 9, 10 and 10a, the rock shaft 170 has two flat cam surfaces 171 and 172 formed thereon for operation on the depending bell crank arms. Each of these surfaces 171 and 172 is in the present instance formed by cutting away one-half of the shaft 170 on a diameter thereof, as shown in Fig. 10a, so that these sur-

faces lie in different diametric planes of the shaft, the two diametric planes in the present case being angularly displaced about 60° from each other.

In Figs. 9 and 16 of the drawings the rock shaft 170 is shown in its normal position, and the depending bell crank arm or tail piece 162' of the pawl 162 rests against the lower corner 171' of the cam surface 171, and when thus positioned the pawl 162 is engaged with the ratchet wheel 160. Similarly the pawl 163 has its depending bell crank arm formed to provide a tail piece 163' which in the normal position of the rock shaft 170 rests against the upper corner 172' of the surface 172, and is so related to the pawl 163 that this pawl is then out of engagement with the ratchet wheel 160 as shown in Fig. 9. As shown in Fig. 16, the tail piece 163', normally projects downwardly in angular relation to the surface 172; however, a relatively slight counterclockwise rocking movement of the shaft 170 retracts the upper corner 172' sufficiently to enable the tail piece 163' to swing against the surface 172 and causes the pawl 163 to move into engagement with the ratchet 160. It should be noted, Fig. 9, that the nose of the pawl 163 is slightly in arrear of the nose of the pawl 162 so as to engage the succeeding tooth of the ratchet wheel 160 when the pawl 162 is released, as will be explained.

The above described rocking movement of the shaft 170 from the normal position of Fig. 16 in a counterclockwise direction to a position wherein the opposing face of the tail piece 163' is substantially parallel to the surface 172, constitutes a character spacing movement of said shaft 170, and causes the lower corner 171', Fig. 10a, to act on the tail piece 162' and thereby release the pawl 162 while simultaneously the upper edge 172' moves away from the tail piece 163' and allows the pawl 163 to move into the path of the succeeding tooth of the ratchet. When the shaft 170 is subsequently returned to the position of Fig. 16, the pawl 163 is withdrawn so as to be conditioned for the next operation and the pawl 162 engages said succeeding tooth.

During such a character spacing operation the tabulating pawl 164 is maintained at all times out of the path of the tabulating stop 165, for as shown in Figs. 9 and 16, the pawl 164 has a tail piece 164' which rides on the upper corner 172' and which is so related to its pawl 164 that when the shaft 170 is in its normal position the pawl 164 is spaced from the path of the tabulating stop 165 a substantial distance. This clearance is such that in a character spacing movement of the rock shaft 170 the pawl 164 merely approaches but does not reach the path of the stop 165.

As shown in Figs. 9 and 16, the tail piece 164' of the tabulating pawl 164 is relatively short, being terminated short of the central axis of the rock shaft 170, whereas the tail piece 163' of the pawl 163 extends downwardly to the lower edge of the shaft 170. Thus, if the shaft 170 is rocked in excess of its above described character spacing movement, the lower edge 172'' of the surface 172 engages the tail piece 163' so as to withdraw the pawl 163, while the tabulating pawl 164 by its continuing contact with the upper edge 172' is allowed to move to its effective position of Fig. 11. During such tabulating operation, the pawl 162 is maintained out of operation by the continued advancing movement of the lower cam

edge 171'. The ratchet 160, rack 157 and carriage 75 are thus freed to the action of the tensioning drum TD, Figs. 1 and 4, causing the carriage 75 to move to the right, Fig. 16, until arrested by engagement of the adjustable stop 165, Fig. 11, with the pawl 164. Upon return of the rock shaft 170 to its initial position the pawl 163 is first re-engaged with the ratchet wheel 160 prior to withdrawal of the tabulating pawl 164, after which the pawl 162 takes precedence over the pawl 163 in the same manner as in a character spacing operation.

To provide for back-spacing of the carriage 75, a back spacing pawl 180 is mounted for vertical movement along the right-hand side of the ratchet wheel 160, Figs. 9 to 11, the pawl 180 being formed on the upper end of a back spacer link 181 which rides between a guide block 182 and a backing pin 183 both carried by the mounting member 156. A spring 184 is mounted on the link 181 so as to act against the backing pin 183, and during upward movement of the link 181 this spring urges the pawl 180 into engagement with the ratchet wheel 160 whereby the pawl 180 moves the ratchet 160 counterclockwise, as viewed in Fig. 9, and a back spacing movement of the control shaft 155 is effected. The return or downward movement of the link 181 is limited by a stop pin 185 on the member 156, which stop pin cooperates with a cam surface 186 on the pawl 180 to insure withdrawal of the pawl 180 from the teeth of the ratchet wheel 160.

The back spacing pawl 180 may be operated manually by means of a back space key 190, Figs. 4, 5, 7 and 9, mounted at the left side of the keyboard, as viewed in Fig. 4, on a supporting lever 191 which is pivoted on a shaft 192, Fig. 7. A rigidly connected arm 191', to which the lower end of the back spacer link 181 is pivoted at 193, projects rearwardly from the lever 191 and over the shaft 192. Thus, by depression of the back space key 190, the control shaft 155 may be reversely actuated so as to shift the carriage 75 one space to the left, Figs. 4 and 5.

For the purpose of actuating the rock shaft 170 selectively through its tabulating or character spacing movements, separately formed arms 195 and 196 are fixed on the rock shaft 170 adjacent to the rear end thereof, as shown in Figs. 5, 7 and 11. The lever 196 is of bell crank form to provide an upwardly extending arm 196', Figs. 9 and 11, and by means of a spring 197 extended between the arm 196' and the bearing member 156, the rock shaft 170 is urged toward its normal position shown in Fig. 9, such normal position of the rock shaft 170 being determined by a stationary stop pin 196'', Fig. 9, lying in the path of the arm 196'.

As shown in Figs. 7, 9 and 11, the member 196 has a forwardly turned lug 198 at its end which may be engaged by a shoulder 199 formed near the upper end of a downwardly shiftable spacing rod 200 to actuate the rock shaft 170 through a character-spacing movement. The spacing rod 200, which is best shown in Figs. 7 and 9, has its lower end pivoted on one arm 201 of a bell crank 202 mounted on the shaft 192, the arm 201 projecting rearwardly in a generally horizontal direction from the shaft 192, while the other arm 203 of the bell crank 202 extends upwardly from said shaft, near the right-hand side of the machine as viewed in Fig. 5. A spacing bar 204 is provided along the front of the keyboard 67, this bar being mounted on the

forward ends of supporting arms 205 which project forwardly from a mounting sleeve 205', Fig. 7, carried on a cross shaft 206. From the mounting sleeve 205', a rigidly formed arm 207 projects downwardly as shown in Figs. 5 and 7, and is operatively connected to the bell crank arm 203 by a link 208. A spring 209 acting on one of the arms 205 normally maintains the spacer bar 204 in its elevated position; and when the bar is depressed, a downward movement is imparted to the spacer rod 200. In such downward movement, the upper end of the spacer rod 200 is guided laterally by spaced guide fingers 210, Figs. 5 and 9, formed on a rocker element 211 pivoted on the member 156, and the rod 200 is urged toward the lug 198 of the actuating arm 196 by a spring 212 acting upwardly and laterally between the rod 200 and the tail 213 of the rocker element 211, whereby normally to insure operative engagement of the shoulder 199 with the lug 198.

After the desired character-spacing movement of the arm 196 has been completed, a lower shoulder 199' on the character spacing rod 200 strikes the guide fingers 210 so as to shift the rocker member 211 in a counterclockwise direction, Fig. 9, thus causing a rearwardly bent lug 211' on an upper part of the member 211 to engage the upper portion of the rod 200 and disengage its shoulder 199 from the lug 198 of the arm 196. Thus the actuating rock shaft 170 has a quick return movement to its normal position, whereby to be conditioned for other operations.

Character spacing is effected automatically near the end of each embossing operation by suitable means such as that shown and described in Patent No. 1,831,103, patented November 10, 1931.

As shown in Figs. 10 and 11, the tabulating arm 195 has an arcuate, generally vertical, slot 215 formed therein through which the laterally bent upper end or head 215' of a tabulating rod 216 extends. This rod 216 is pivoted at its lower end to the rear end of a lever 217, Fig. 7, which lever is pivoted at its other end 217' adjacent to the front edge of the machine frame. An upstanding tabulating key 218 is provided on the lever 217 adjacent the keys 67b, Fig. 5, the lever 217 and the key 218 being normally elevated by a spring 219 so that the head 215' of the tabulating rod 216 is normally positioned at the lower end of the slot 215. Thus the cam shaft 170 may be rocked through a character spacing movement without disturbing the tabulating mechanism, as is evident from Fig. 10.

When the tabulating key 218 is depressed, the head 215' of the rod 216 is drawn downwardly to the position shown in Fig. 11 so as to move the arm 195 downwardly beyond the position of Fig. 10, whereby to cause a tabulating operation of the pawls 192, 193 and 194 in the manner described hereinabove.

In order that the operator may manually shift the carriage 75 back and forth, as for the loading and unloading operations, means is provided whereby the carriage may be released from the controlling action of the character spacing escapement. This means preferably includes a manually operable release means located on the carriage 75, and as shown herein, comprises a bell crank lever 220 mounted on a shaft 221, Figs. 17 and 18, within the carriage 75 and having one arm 222 thereof projecting forwardly through an opening 223 in the forward side of the carriage.

The arm 222 constitutes a carriage release lever and is positioned directly over a fixed gripping piece 224 so that an operator may conveniently depress the release lever 222. A spring 225 urges the release lever 222 to an elevated position and as shown in Fig. 18, means is provided in association with the rearwardly projecting arm 228 of the bell crank 220 to release the pawl 162 from the ratchet wheel 160 when the release lever 222 is depressed.

This last-mentioned means is preferably operable in any position of the rack 157 and the carriage 75, and as herein shown comprises a horizontally positioned angle bar 230, Figs. 11, 16, 17 and 18, mounted on the rail 96 for transverse or vertical shifting movement by the arm 226, and arranged, when elevated from its position of Fig. 16, to release the escapement pawl 162 and thereby permit free traversing movement of the carriage. To this end the angle bar 230 has a forwardly facing channel portion 231 at its left end, Figs. 8 and 16, into which a roller 232, Fig. 18, on the rear face of the pawl 162 projects, and the bar 230 is suspended on parallel links 233 from the rail 96. Thus the bar 230 is maintained in a horizontal position at all times and it is of such a length that the carriage 75 may be shifted a substantial distance to the right, as viewed in Figs. 4 and 16, while still maintaining the roller 232 on the arm 226 beneath the forwardly projecting flange of the bar 230. Hence, when the carriage is located at any point within this range, the release lever 222 may be depressed and the carriage traversed freely back and forth, and upon return of the lever 222 to its normal position the escapement pawl 162 again becomes effective to hold the carriage in its new position.

As shown in Fig. 16, the rack 157 is releasably connected to the carriage 75 by means of the latch member 158 carried by the rack 157, which latch has a notch 240 that is normally maintained in engagement with a lug 241 on the carriage 75 by means of a leaf spring 242 acting upon the latch 158. In some instances it is desirable to move the carriage 75 to the right beyond the range of movement of the rack 157 for the purpose of smoothing the embossed letters by means of a plate roller attachment (not shown). When such rolling of the plate 42 is desired, the carriage 75 is moved to the right, Fig. 16, until a beveled surface 243 on the latch member 158 strikes a pin 244 on the rail 96, so that the latch 158 is disengaged from the tooth 241. The rack 157 then remains in substantially the position of Fig. 16 while the carriage 75 is shifted farther to the right. In the return movement of the carriage the tooth 241 engages the left side of the notch 240 so as to shift the rack 157 to the left, Fig. 16, and to cause re-engagement of the latch 158 with the tooth 241.

In certain operations, particularly where the embossing machine is to be used in conjunction with a punching machine as P, Fig. 1, of the character disclosed in my aforesaid application, Serial No. 210,897, now issued as United States Letters Patent No. 2,265,229, patented December 9, 1941, it may be desired to so arrange the character spacing mechanism that the carriage 75 travels in a reverse manner (that is, to the left, Fig. 5) intermediate the character embossing operations. To this end, a solenoid 620, Figs. 7 and 9, is stationarily mounted on the frame of the machine near the spacing rod 200, and the core 623 of this solenoid is connected by a link 624 to the spacing rod 200. Energization of

solenoid 623 effects retraction of the rod 200 into its broken-line position, Fig. 9, so that the shoulder 199 cannot engage the lug 198, and hence the normal character spacing operations cannot take place so long as the solenoid 620 remains energized. The spacing rod 200 is actuated downwardly in the usual manner at the end of each character embossing operation, and a lug 617 thereon engages and closes a normally open switch 615 which is located near the broken-line position of the rod 200. Such closure of the switch 615 brings about the energization of a solenoid 610, Fig. 7, which has a plunger 611 connected by a link 612 to a rearward extension 613 of the arm 191'. Since the back spacer rod 181 is connected to the arm 191', this rod is actuated by energization of the solenoid 610 to thereupon effect a back spacing operation. Thus, the carriage 75 is progressively back-spaced instead of receiving the usual character spacing movement in this type of operation.

It will be apparent from the foregoing description that I have provided an arrangement which materially expedites the handling of printing plates or the like in embossing machines of the character set forth hereinabove.

Thus, the work-supporting means on the carriage 75 includes jaws 99, Fig. 7a, which are mounted on a shaft 102 that not only affords a pivot center for the jaws so that they may be rocked to move the printing plate between its working and loading positions, but which also serves to actuate the jaws for positively clamping and releasing the jaws at these two positions, respectively, such clamping and releasing movements of the shaft 102 being continuous with the aforesaid rocking motion thereof.

Further advantages are afforded by the novel escapement mechanism, Figs. 9 to 11, which may be selectively conditioned to index the carriage 75 in normal character spacing movements thereof or to tabulate the carriage to a selected position determined by the location of the adjustable stop 165 on the toothed wheel 161. Such selective conditioning of the escapement mechanism for performing either normal character spacing or tabulating operations is effected by a rock shaft 170, Fig. 10a, which is operative under control of the spacing rod 200 or the tabulating rod 216, Fig. 9, to operate the escapement pawls 162 and 163 and the tabulating pawl 164. Back spacing may be effected either manually by depression of the back space key 190, Figs. 5 and 7, or automatically under control of the solenoid 620, Figs. 7 and 9, in which latter event the back spacing movement of the carriage 75 occurs in lieu of the normal character spacing movement thereof upon each actuation of the spacing rod 200.

The carriage 75 may be released at any position within its normal working range by means of the release mechanism illustrated in Figs. 17 and 18 which is manually operable to disable the escapement pawls, Fig. 10. An automatic release mechanism 158, Fig. 16, is also provided to disconnect the escapement rack 157 from the carriage 75 when the latter is moved beyond its normal range and to re-connect the carriage to the rack when the carriage is moved back into such range.

While I have illustrated and described a selected embodiment of my invention, it is to be understood that this is capable of variation and modification and I therefore do not wish to be limited to the precise details set forth but desire

to avail myself of such changes and alterations as fall within the purview of the following claims. I claim:

1. In a machine for embossing printing plates, the combination of a carriage for supporting and traversing such a printing plate, said carriage having a pair of releasable clamping jaws in which a printing plate to be embossed may be secured and means for mounting said jaws on said carriage including a mounting member, means for securing said mounting member against a flat surface on said carriage, said last mentioned means being arranged to permit limited adjustment of said mounting member to position said jaws parallel to the path of movement of said carriage, means for effecting such adjustment, said means comprising a fixed pin projecting from said mounting member adjacent to one end thereof and into a slot in said surface of the carriage, a second pin on said mounting member adjacent to the other end thereof and adapted to project into a second slot in said surface of said carriage, said second pin being mounted on an adjustable eccentric, means for rotating said eccentric and for fixing the same in adjustable position, and means for effecting adjustment of said mounting member longitudinally of said path including a headed screw threaded into one end of said mounting member substantially parallel to said bar and having one edge of said head engaging a transverse slot in said surface of the carriage.

2. In a machine for embossing printing plates, the combination of a carriage for supporting and traversing such a printing plate, said carriage having a pair of releasable clamping jaws in which a printing plate to be embossed may be secured and means for mounting said jaws on said carriage including a mounting member, means securing said mounting member against a flat surface on said carriage and arranged to permit limited adjustment of said mounting member to position said jaws parallel to the path of movement of said carriage, means for effecting such adjustment, said last-mentioned means comprising a fixed pin projecting from said mounting member adjacent to one end thereof and into a slot in said surface of the carriage, a second pin on said mounting member adjacent to the other end thereof and adapted to project into a second slot in said surface of said carriage, said second pin being mounted on an adjustable eccentric, means for rotating said eccentric and for fixing the same in adjustable position, and means for effecting adjustment of said mounting member on said carriage longitudinally of said path.

3. In a machine for embossing printing plates, the combination of a carriage for supporting and traversing such a printing plate, said carriage having a pair of releasable clamping jaws in which a printing plate to be embossed may be secured, and means for mounting said jaws on said carriage including a mounting member, means on said carriage affording a flat mounting surface having a pair of slots therein extended generally parallel to the reciprocating path of said carriage, a fixed pin projecting from said mounting member adjacent to one end thereof and into one of said slots in said surface, a second pin on said mounting member adjacent to the other end thereof and adapted to project into said second slot in said surface, said second pin being mounted on an adjustable eccentric, means for rotating said eccentric and for fixing the same in adjustable position to adjust said mounting member so

as to locate said jaws parallel to the path of movement of said carriage, and means for securing said mounting member in such an adjusted position.

4. In an apparatus for embossing type characters on a printing plate or similar element, embossing means, and means for supporting and advancing such a plate or element in an operative relation to said embossing means comprising a carriage mounted for character spacing movement relative to said embossing means, a cross slide mounted on said carriage, a rock shaft mounted on said cross slide substantially parallel to the path of character spacing movement of said carriage, a first clamping jaw having clamping surfaces thereon adjacent one of its edges and mounted adjacent its opposite edge on said rock shaft for relative rocking movement thereon, an opposed clamping member having clamping surfaces disposed in opposed relation to said clamping surfaces of said first clamping jaw and having an operating tail portion disposed in abutment with one side of rock shaft, means disposed intermediate said tail portion of said second jaw and the clamping surfaces thereof and pivotally supporting said second jaw on said first jaw, spring means acting between said jaws to maintain said tail portion against said rock shaft and thereby to tend to separate said clamping surfaces of said jaws, cam surface means on said rock shaft engaged with said tail portion and operable upon predetermined rocking movement of said shaft on one direction relative to said jaws to impart clamping movement to said jaws against the action of said spring means, and operable upon predetermined rocking movement of the shaft in the other direction relative to said jaws to release said jaws for unclamping movement by said spring means, abutment means lying in the path of movement of said jaws to define operative and loading positions respectively for said jaws, co-operating means fixed on said rock shaft and one of said jaws to limit rocking movement of said rock shaft relative to said jaws, and manually engageable means on said rock shaft for rocking said shaft to shift said jaws between said positions and apply clamping or unclamping movement thereto.

5. In an apparatus for embossing type characters on a printing plate or similar element, embossing means, and means for supporting and advancing such a plate or element in an operative relation to said embossing means comprising a carriage mounted for character spacing movement relative to said embossing means, a cross slide mounted on said carriage, a rock shaft mounted on said cross slide substantially parallel to the path of character spacing movement of said carriage, a first clamping jaw having clamping surfaces thereon adjacent one of its edges, spaced mounting lugs formed on said jaw adjacent its opposite edge and embracing said rock shaft for relative rocking movement thereon, an opposed clamping member having clamping surfaces disposed in opposed relation to said clamping surfaces of said first clamping jaw and having an operating tail portion disposed in abutment with one side of rock shaft between said mounting lugs, means disposed intermediate said tail portion of said second jaw and the clamping surfaces thereof and pivotally supporting said second jaw on said first jaw, spring means acting between said jaws to maintain said tail portion against said rock shaft and thereby to tend to separate said clamping surfaces of said jaws, cam surface means

on said rock shaft engaged with said tail portion and operable upon predetermined rocking movement of said shaft on one direction relative to said jaws to impart clamping movement to said jaws against the action of said spring means, and operable upon predetermined rocking movement of the shaft in the other direction relative to said jaws to release said jaws for unclamping

5 movement by said spring means, abutment means lying in the path of movement of said jaws to define operative and loading positions respectively for said jaws, a manual operating handle fixed on said rock shaft for rocking the same, and means providing a limited lost motion connection between said shaft and said first jaw.

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