

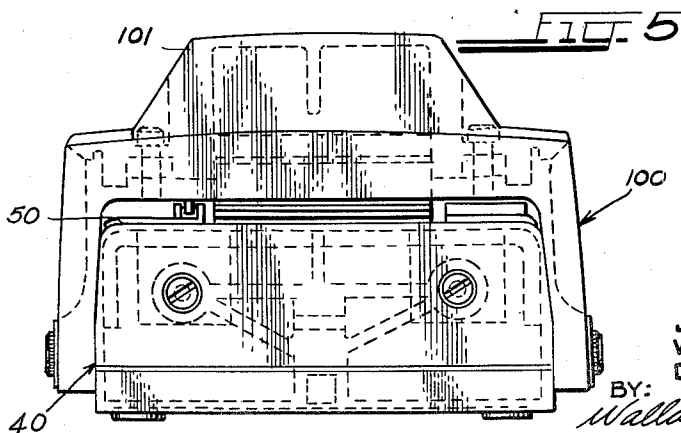
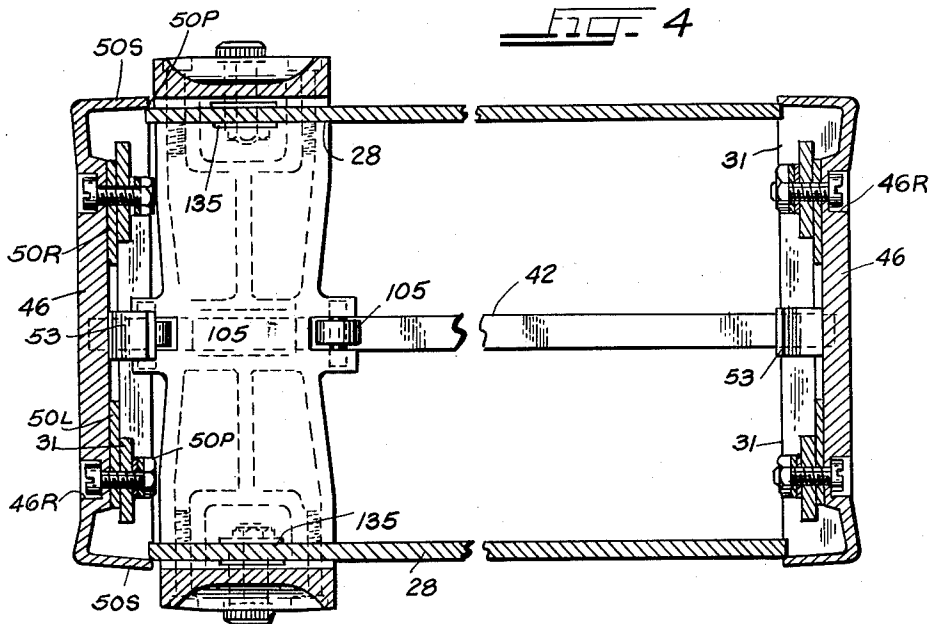
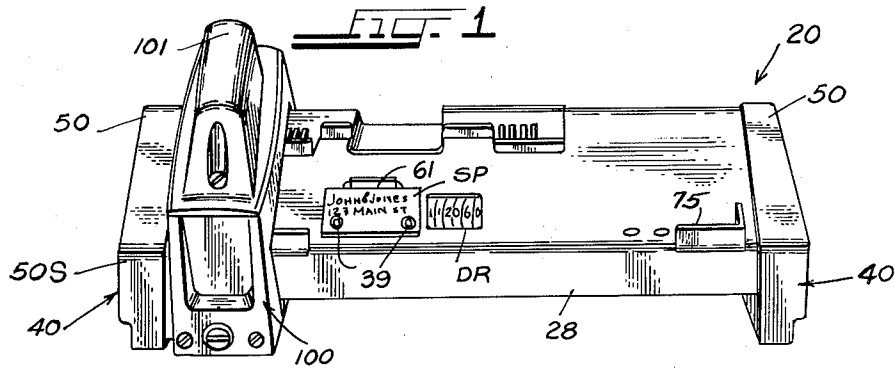
Jan. 30, 1962

J. A. MAUL ET AL
PRINTING MACHINES

3,018,725

Filed Feb. 10, 1960

7 Sheets-Sheet 1



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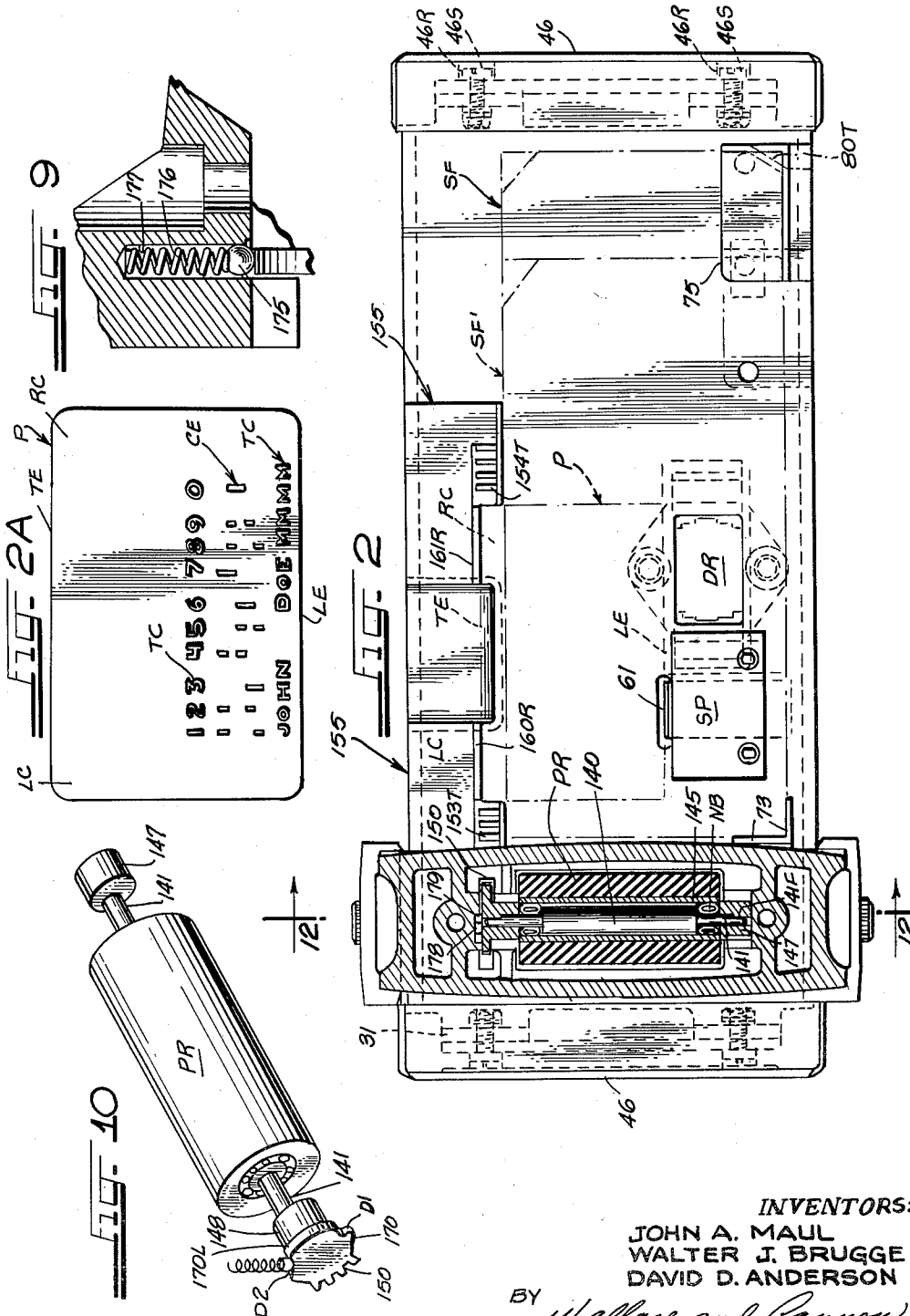
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3,018,725

Filed Feb. 10, 1960

7 Sheets-Sheet 2



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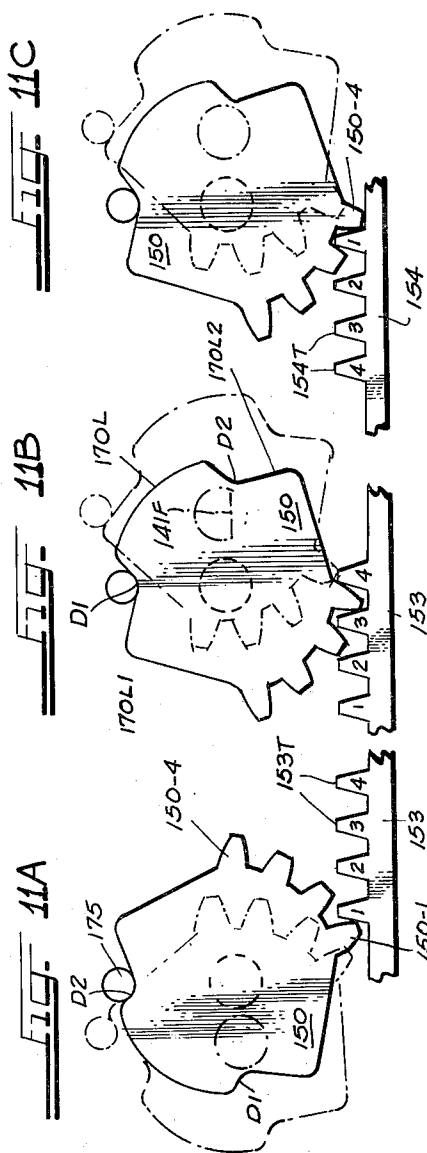
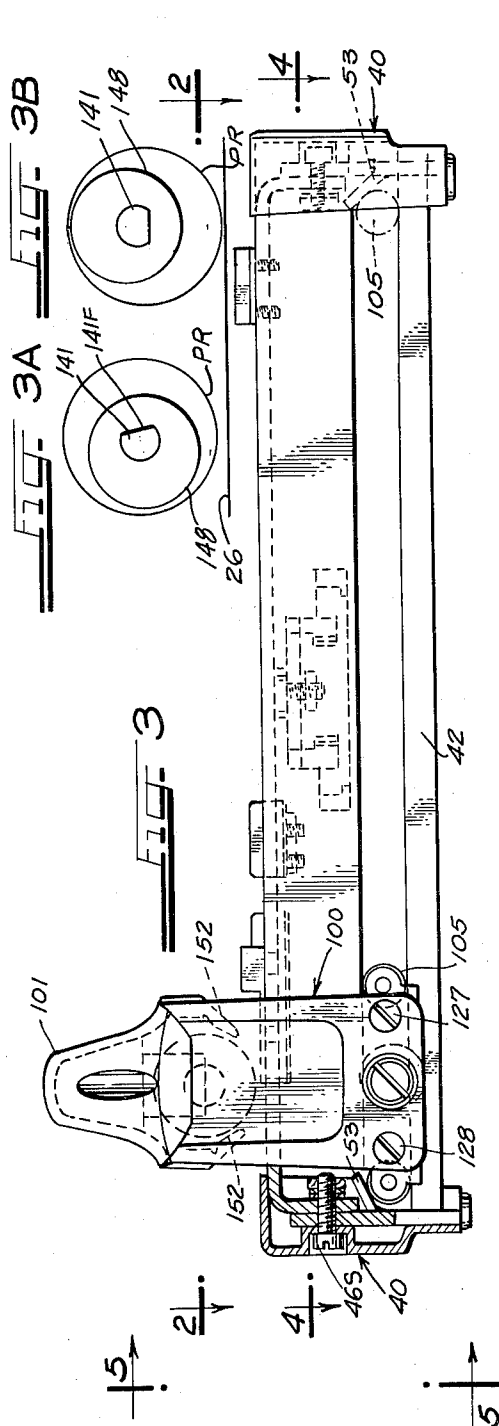
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J. A. MAUL ET AL
PRINTING MACHINES

3,018,725

Filed Feb. 10, 1960

7 Sheets-Sheet 3



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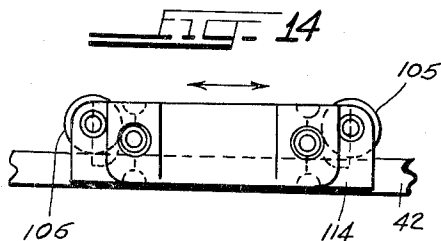
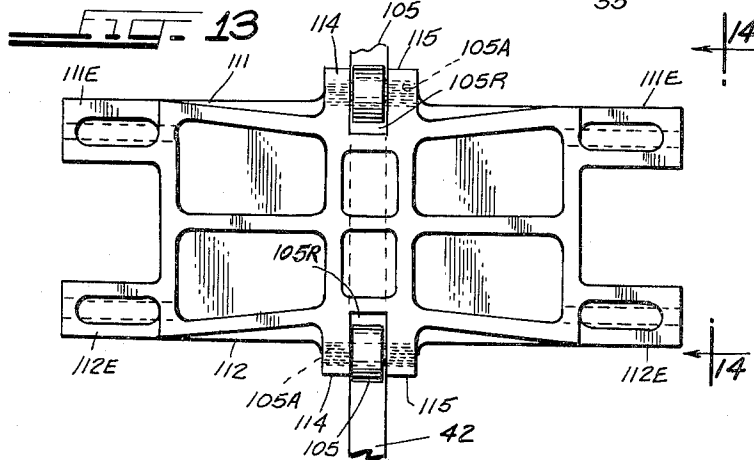
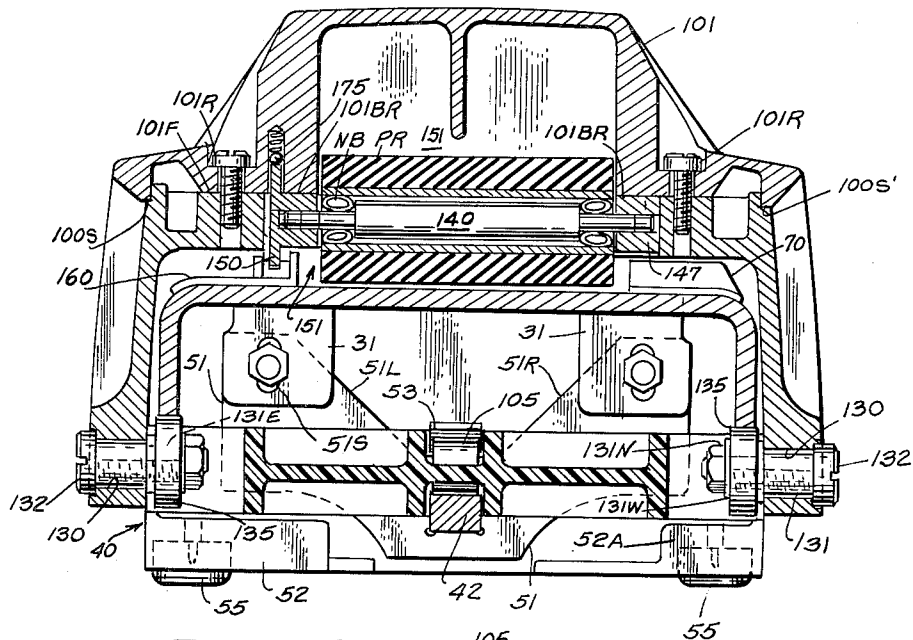
J. A. MAUL ET AL
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3,018,725

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7 Sheets-Sheet 5

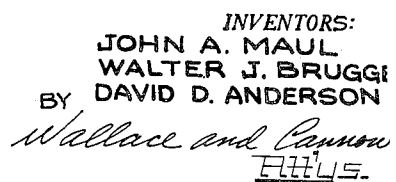
FIG. 12



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3,018,725

7 Sheets-Sheet 6



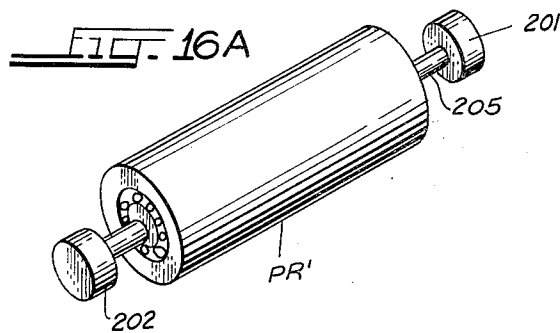
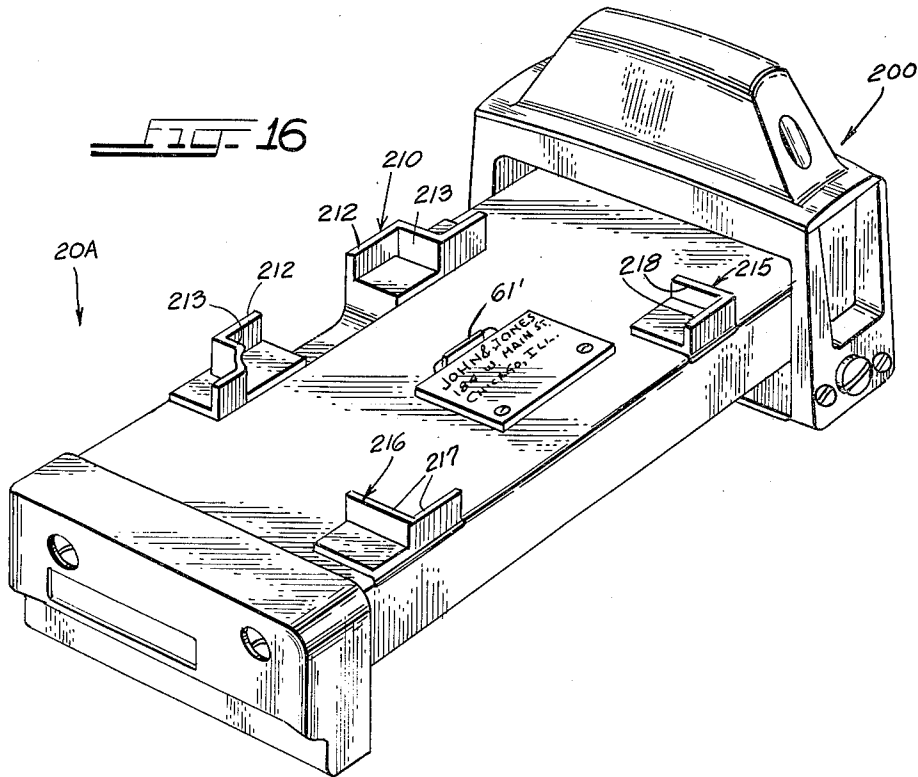
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J. A. MAUL ET AL
PRINTING MACHINES

3,018,725

Filed Feb. 10, 1960

7 Sheets-Sheet 7



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3,018,725

PRINTING MACHINES

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Filed Feb. 10, 1960, Ser. No. 7,877

31 Claims. (Cl. 101-269)

This invention relates to a hand operated printing machine and in particular to a machine of this kind wherein impressions are produced by rolling a platen across the face of a sheet which is disposed over the upwardly disposed face of a printing plate or other printing means bearing type characters.

Hand operated printing machines wherein impressions are produced from printing plates of relatively small size and bearing type characters have a wide variety of uses in connection with oil station services, library transactions and the like, and in most instances the machine is equipped with other printing means such as a plate embossed with the address of the oil station, settable dater wheels bearing raised numerals, and so on. It is desirable that the imprints be of good quality and that the platen move accurately in a constant plane during printing to assure against imperfect prints that might result from one or more of the type characters being missed during the time that the impression is being made. Moreover, machines of this kind are used numerous times during the course of a day with substantial forces being brought into play on each imprint, and hence must be able to withstand a great deal of abuse. Heretofore, these aspects of high quality imprints, accuracy in operation, and rugged construction have usually been attained only at relatively high production costs of the associated machines. Such constructions have usually entailed conventional expensive and cumbersome castings, precision machined parts, and the like, and the primary object of the present invention is to enable a machine of the foregoing kind to be easily assembled from fabricated parts such as stamped sheet material, light weight die castings, molded plastics and the like. A related object of the present invention is to so construct a machine while making provision for smooth and efficient movement and accurate guiding of a platen carriage.

The recordation and processing of data in connection with sales and services has been greatly facilitated in recent years by developments involving the printing of data with a magnetic ink and in particular the printing of numerical characters with type stylized to accentuate differences that are capable of being quickly scanned and converted into electrical impulses. Such data processing equipment utilizes forms or sheets such as tabulating cards and the like wherein the data are to appear in accurately oriented areas on the sheet. In view of this, another object of the present invention is to so arrange the machine that such a sheet can be located in the machine accurately with respect to an embossed printing plate likewise located with accuracy, and in particular to enable the printing plate and sheet to be accurately located without interfering with the effective operation of the platen.

As will be explained hereinafter, imprints are obtained under the present invention by having resort either to a carbon sheet or an ink impregnated platen roller. If a carbon sheet is present, this will be so disposed in the machine as to have the off-settable imaging material thereon facing toward the side of the sheet or form to be printed. The type characters used for prints may be either "direct reading" or "printing" type. If "direct reading" type is used, and since these underlie the sheet, the platen when effective will produce a directly readable

2

image if the carbon faces down. On the other hand, by using a transparent sheet as the top form, the carbon can face up and will produce a mirror image on the printed side of this top sheet but which is direct reading when read through from the back or unprinted side. In the instance of a platen roller impregnated with the imaging material, the platen roller will be rolled along the upwardly disposed face of an opaque sheet to be printed, and again the printing plate is oriented on the bed of the machine with the direct reading embossed type characters thereon facing upwardly and the opaque form or sheet to be printed is disposed thereover. In either event, several sheets may be printed simultaneously.

The platen, if it is of the unimpregnated or dry type will effect an imprint as the result of effecting a pressure off-set of the image material from the carbon sheet in accordance with the outline of the type characters on the printing plate. If the platen is impregnated with the image material, this material will be squeezed out of the platen roller in accordance with the outlines of the type characters on the printing plate. In view of the fact that the platen roller is carried by a reciprocal carriage having an idle or restored position, it is important to avoid superfluous over-printing that might be induced by the platen roller during the back or return stroke of the carriage. Accordingly, another object of the present invention is to associate with the platen and the carriage a toggle or platen shift mechanism which is effective on the backstroke of a platen roller to maintain the platen free of the sheet that was printed during the forward stroke of the platen. Since most users will specify that imprints are to be carbon copies, or a sharp copy obtained by use of an ink impregnated roller, another object of the present invention is to so construct the machine as to enable such alternative specifications to be met. Moreover, the machine can produce carbon impressions and an ink roller impression simultaneously, and so to do in a machine constructed along the foregoing lines is another object of this invention.

It will be appreciated that in recording certain types of business transactions, numerous copies are required for inventory and other bookkeeping purposes. These copies can represent a substantial thickness especially in view of interleaved carbon sheets where these are present together with a tabulating card and an opaque or bond top sheet. In other instances, fewer copies are required, and the height of the type characters afforded by the printing means may vary under some circumstances. Therefore, another object of the present invention is to construct a machine of the kind involved in such a manner that the axis of rotation of the platen roller can be easily adjusted to accommodate variations in type height or different thicknesses of forms or sheets to be printed. Specifically, it is an object of the present invention to do this by supporting the platen roller in a carriage that can be easily and accurately adjusted relative to fixed elements in the machine so as to dispose the platen for movement in a plane that is predetermined as the one required to produce the sharpest imprint for the total thickness of the form or sheets that are to be printed from type characters of a given height.

Specifically, other objects of the present invention are to accurately guide the platen carriage by elements that cooperate with a platen guide rail in the machine; to impart smooth riding action to the platen carriage by a novel arrangement of rollers and associated guide rail surfaces; to utilize eccentrics, associated with certain of the guide rollers, in providing for adjustments of the platen roller; to produce shifting of the platen roller to an ineffective plane during the course of a reciprocal stroke of the platen carriage by having resort to a cooperating rack and shift segment gear, and to associate with the

shift gear a control cam and holding detent; to construct the platen carriage and associated parts in such a manner that these can be easily assembled and disassembled; to enable adjustments of the platen carriage to be based on fixed guide rail structure in a novel way; and to enable the machine to be so constructed as to take into account a wide variety of conditions of use.

Other and further objects of the present invention will be apparent from the following description and claims and are illustrated in the accompanying drawings which, by way of illustration, show preferred embodiments of the present invention and the principles thereof and what is now considered to be the best mode contemplated for applying these principles. Other embodiments of the invention embodying the same or equivalent principles may be used and structural changes may be made as desired by those skilled in the art without departing from the present invention and the purview of the appended claims.

In the drawings:

FIG. 1 is a perspective view of a printing machine constructed in accordance with the present invention;

FIG. 2 is a sectional view taken substantially on the line 2—2 of FIG. 3;

FIG. 2A is a plan view of a printing plate to be used in the present machine;

FIG. 3 is a side elevation, broken away, of the machine illustrated in FIG. 1;

FIGS. 3A and 3B are end views and related positions of an eccentric associated with the platen roller in accordance with one form of the invention;

FIG. 4 is a sectional view taken substantially on the line 4—4 of FIG. 3;

FIG. 5 is a right-hand end elevation of the machine as shown in FIG. 1;

FIG. 6 is a top elevation of the bed of the machine and showing the gauges in allocated positions;

FIG. 7 is a rear elevation taken on the lines 7—7 of the bed as shown in FIG. 6;

FIG. 8 is a left-hand elevation taken on the lines 8—8 of the bed as shown in FIG. 6;

FIG. 9 is a detail sectional view on an enlarged scale showing details of the detent used to maintain the position of platen shift or toggling gear;

FIG. 10 is a perspective view of one form of platen roller and certain associated parts;

FIGS. 11A, 11B and 11C are fragmentary detail views showing certain actions that occur during a reciprocal movement of the platen roller in the form of the machine shown in FIG. 1;

FIG. 12 is a sectional view on an enlarged scale taken substantially on the line 12—12 of FIG. 2;

FIG. 13 is a top elevation of the platen carriage guide;

FIG. 14 is an end elevation of the carriage guide taken substantially on the line 14—14 of FIG. 13;

FIG. 15 is an exploded view showing the platen carriage and the cover and guide therefor in perspective as these are related to the bed of the machine;

FIG. 15A is a perspective of an eccentric assembly used to shift the shiftable member of the platen carriage;

FIG. 16 is a perspective view of another machine constructed along the lines of the present invention; and

FIG. 16A is a perspective view of the platen roller to be used with the machine shown in FIG. 16.

One form of the present invention is illustrated in FIG. 1 as embodied in a hand operated printing machine 20 which is adapted to produce impressions obtained from the direct reading embossed type characters TC of a printing plate P, FIGS. 2 and 2A. The plate P may be embossed with code embossures CE to print code representations simultaneously with associated numerals TC if these are present. As will be explained hereinafter, this printing plate will be disposed on the machine to have the type characters TC, FIG. 2A, disposed upwardly, and these type characters will underlie the first sheet to be

printed. For example, the first or lowermost sheet disposed on the machine over the printing plate may be in the form of an eighty-column tabulating card SF, FIG. 2 (or a fifty-one column card SF') and it will be assumed that the upwardly disposed side of this form (or a shorter form as will be explained) is overlaid by a carbon sheet having the carbon side facing downward, and further that an opaque sheet to be printed in turn overlies the bare or upper side of the carbon sheet.

Thus, in the form of the invention illustrated in FIG. 2 to be explained immediately hereinafter, an ink impregnated platen roller PR, FIG. 2, is to be rolled with pressure across the underlying forms and the printing plate (or other printing means to be described). The top sheet will be printed directly on its upper face by ink exuding from the platen roller due to the pressures established between the platen roller and the unyielding type characters, and at the same time the upper face of the underneath tabulating card SF will be printed by the carbon sheet. Of course, there may be other carbons and other sheets to be printed intermediate the sheet SF and the top-most or opaque sheet.

As will be explained hereinafter, the machine can be so modified as to have a dry or unimpregnated platen roller in which event printing is entirely one based on the carbon sheet principle, and under these circumstances the top-most sheet can be transparent in nature having disposed immediately therebeneath an upwardly disposed carbon or even a double faced carbon sheet. This transparent sheet will be printed on its underside, but these data will be directly readable through the back or top side of the transparent copy. It will be appreciated that while a printing plate bearing type characters of embossed form is specifically referred to herein for purposes of disclosure, other printing plates bearing type characters of different form can be used in the machine.

The machine 20 includes a bed 25, FIGS. 6, 7 and 8 afforded by a unitary one-piece sheet of stamped metal so stamped as to afford a top plate 26 having a planar upper surface of generally rectangular outline as will be apparent in FIG. 6. Thus, the top plate has side edges from which depend generally at right angles thereto a pair of downwardly bent, narrow elongated flanges or side portions 28, FIGS. 7 and 8. These flanges terminate in flat lower faces 28F that are disposed to terminate in a common horizontal plane, and the upper portions of the flanges merge neatly into the plane of the top plate at rounded corners 28R so that no sharp edges are presented to the user as will be apparent from the description to follow.

The opposed end edges of the bed 25 are stamped to afford outwardly directed ears or narrow projections 30 of relatively short dimension as shown in FIG. 6. These are paired in a rather widely spaced relation at each end of the top plate, and these projections are disposed inward of the four corners of the top plate 26. Thus, the projections 30 at each end of the top plate are separated by expansive U-shaped recesses 30R, and additionally each of the projections 30 is substantially of quarter-round nature as will be apparent in FIG. 7 and merges into depending lugs 31 which are disposed in vertical planes substantially at right angles to the top plate 26. The lugs 31 have lower edges 31F, FIG. 7, which terminate in planes spaced somewhat above the lower edges 28F of the flanges 28, and these lugs, as will be explained, serve to afford the supporting elements for the machine.

The top plate 26 is provided with an opening 35, FIG. 6, at a predetermined area where a dater wheel assembly DR, FIG. 1, is to be provided so as to enable, if desired, the date of a transaction to be printed on the form or sheet. The dater is supported at the underside of the top plate 26 and includes individually settable type wheels bearing in relief upwardly facing direct reading numerals, and these will be set at the start of each day to enable the date to be printed on a sheet. Additionally, the top plate

26 is provided with a pair of openings 37 and 38 which enable attaching members 39, FIG. 1, to be passed there-through to secure to the bed of the machine a so-called station plate SP, FIG. 1, embossed with upwardly facing, fixed or invariable data, comprising type characters of either the "direct reading" or "printing" kind, delineating the address of a service station or the like. The embodiment illustrated in FIG. 1 is adapted for use with "direct reading" type characters. Such auxiliary printing means will of course be present or not depending upon the nature of the business in which the present machine is used. The attaching members may be of the kind illustrated in the co-pending application of John A. Maul, Ser. No. 849,015, filed October 27, 1959.

Thus, it will be seen that the bed 25 is to be so oriented as to dispose the top plate 26 in a horizontal plane as will be evident in FIG. 1, and the top plate as thus disposed and oriented serves as the support for the sheet or sheets to be printed, the support for the customer printing plate P, the support for other printing means such as a dater wheel assembly DR and a station or location plate SP. In stabilizing and rigidly supporting the bed 25, resort is had to a pair of end cover caps 40, FIGS. 1 and 3. These cover plates are preferably light weight aluminum die castings, having reinforcing sections of different thicknesses, and are interchangeable.

The end caps afford the standards or legs for the machine 20 and at the same time serve to support an elongated carriage guide rail 42 as will now be described.

Thus, the end caps 40 are hollow in nature, being somewhat box-shaped in appearance, and each includes a transverse or intermediate section 46, FIGS. 2 and 4, having recesses 46R adapted to receive a pair of screws 46S in position to extend through aligned openings 31R, FIG. 7, formed in each of the downwardly bent lugs 31 at the opposite ends of the bed 25. As will be evident in FIGS. 1 and 4, each end cap 40 is formed with a generally rectangular rim 50 of such dimension as to have the inwardly disposed periphery 50P (FIG. 4) thereof in slight overlapping relationship with respect to the opposed ends of the bed 25 when the inner faces of the webs 46 abut the outer faces of end stop plates 51, FIG. 12 of strip steel, which are interposed between each end cap and the lugs 31 at the adjacent end of the bed. Each end stop plate is generally of V-form and thus includes a pair of upwardly and outwardly extending legs 51L and 51R, FIG. 12, which are formed adjacent the upper ends thereof with vertically elongated slots 51S adapted to be aligned with the openings 31R, FIG. 8, formed in the associated pair of attaching lugs 31. As will be evident in FIG. 3, the nut and washer assemblies associated with the attaching screws 46S are inwardly of the attaching lugs 31, and the elongated nature of the slots 51S in each end stop plate enable these to be vertically adjusted. This is so for the reason that each end plate 51 is provided with a rectangular opening in which the end of the like configured guide rail 42 is disposed and supported as will be evident in FIGS. 3 and 12, and hence the rail 42 is capable of adjustment in vertical planes to the extent permitted by the elongations embodied in the openings 51S. The guide rail 42 is in this manner disposed below and centered between the downwardly facing surfaces 28F of the bed side flanges 28. The surfaces 28F and the upper surface of the guide rail 42 in parallel, spaced opposed relation thereto cooperate, as will be explained, to afford fixed rail surfaces for rail roller elements carried by the platen carriage, and shifting adjustments for the platen carriage and shifting of the platen roller occurs with respect to the surfaces 28F as a fixed base.

A stop lug 53, FIG. 3, is struck from each stop plate 51 so as to extend inwardly over and above the roller supporting surface of the track 42. These stop lugs serve to limit the extent of reciprocal movement of the platen carriage, as will hereinafter be evident, since each such lug is in-

wardly canted at such an angle as to be engageable by lower rail rollers carried by a platen guide.

The rim 50 of each end cap includes a pair of side members 50S disposed in vertical planes, and inwardly directed legs 52 and 52A, FIG. 12, the latter being formed with recesses in which rubber blocks 55 are fastened as by screws or other means to provide good frictional contact with a table top or other supporting surface for the machine 20.

Thus, it will be seen that the machine as thus far described includes three essential elements which afford the main supporting framework and these include the bed 25, the two end caps 40, and the guide rail 42 which serves in part to guide and support the platen carriage as will be explained. Impressions are to be produced in part from embossed type characters on a printing plate properly located at printing position, and under the present invention a gauge is afforded in association with the bed of the machine so as to assure that the printing plate will be accurately located in printing position. In the present instance, the printing plate gauge is afforded by a strip of spring steel 60, FIG. 6, which has an upwardly directed lip 61 thereon aligned with a slot 62 formed in the top plate 26 of the bed 25. The lip 61 is aligned in the direction of movement of the platen roller and cooperates as will be described with another gauge to enable the plate P to be accurately located on the top plate 26.

It is of course important that the form to be printed be accurately located with respect to the printing plate, and in accordance with the present invention several gauges are advantageously afforded for properly positioning the form or sheet. At least one of these gauges is fixed in nature so that forms of different dimensions can be located with respect thereto, but in view of the fact that forms to be printed under the present invention are inclusive of tabulating cards the gauges for the sheet include an adjustable gauge which can be located in accordance with several different sizes of tabulating cards. Thus, as shown in FIGS. 6 and 8, a form gauge 70 of molded plastic or the like is disposed adjacent one of the corners of the bed plate 26, and the gauge 70 includes a plate 71 adapted to be disposed in flush engagement with the upper surface of the bed plate 26. A pair of right-angled shoulder elements 73 project upwardly from the plate 71 so as to neatly embrace the square corner of the form or sheet to be printed. Inasmuch as such form may be a tabulating card wherein it is important that the data printed thereon be printed in an arcuate disposition, a second gauge 75 of molded plastic or the like is disposed adjacent the right-hand corner of the bed 25 as viewed in FIG. 2. As with a gauge 70, the gauge 75 includes integrally molded screw studs 76 and 77, FIG. 7, which project from the underside thereof and these studs are disposed in openings in the top plate 26. The gauge 75 is held in proper position by spring-type nuts 78 and 79, FIG. 7, and like connections are afforded for the gauge 70.

The gauge 75 is a right-angle gauge and is employed in printing machines adapted for use with a station plate SP and a plate P having "direct reading" type characters. Where "printing" type characters are utilized, on the plates, the gauge 75 may include an angled lip which has a straight leg 80 corresponding to a portion of the straight edge of a tabulating card. The right end of the lip 80, as viewed in FIG. 6, is then tapered as indicated in phantom at 80T in accordance with the standard angle cut-off at the corner of a tabulating card, and the tapered portion 80T merges into an extension 80E which is disposed at right angles to the leg 80. The gauge lip thus afforded will neatly embrace the angled end of a tabulating card, and this in conjunction with the gauge element 70 constitutes an arrangement whereby a tabulating card has but one proper position in the machine 20.

The gauge construction described above and illustrated in bold lines in the drawings is for a tabulating card of

standard eighty column width, but inasmuch as tabulating cards are also of fifty-one column width, provision is made for locating the gauge 75 to accommodate a tabulating card SF', FIG. 2, of shorter dimension. Thus as shown in FIGS. 6 and 7, the opening 85 in the top plate 26 in which the stud 77 is located is of elongated nature. In alignment with the opening 85 is another opening 86, FIG. 6, in the top plate 26, and this opening is so located as to enable the gauge 75 to be shifted with the stud 76 at the underside thereof disposed in the elongated opening 85, and the stud 77 disposed in the opening 86. The parts and openings thus described are so dimensioned as to assure that when the gauge 75 is thus relocated, lips 80, 80T and 80E will be in position to neatly engage the angle corner of a tabulating card of fifty-one column width.

In any event, whether or not a tabulating card or associated tear sheet is to be printed in the present machine, it will be recognized that the gauge 70 enables the sheets of a salesbook or other record to be accurately located in printing position, and the form gauges are disposed out of the path of the platen roller as will be hereinafter apparent.

Impressions are produced by having resort to a platen roller PR rotatably supported in a carriage 100, FIG. 1, which is equipped with a handle 101 enabling the operator to easily move the carriage from the left-hand or inactive position shown in FIG. 1 through a printing stroke to the right, and during the course of the printing stroke, the platen roller, which can be of alternative forms, as will be described hereinafter, is brought to bear in a printing relation on the upper face of a sheet to be printed so as to cause the sheet to be printed in accordance with the embossed type characters on the printing plate and the type characters on the address plate and dater wheels if these be present.

The carriage 100 is guided and supported for movement by means including a pair of rollers 105 which are rotatably supported in a carriage guide 110, FIG. 15. Thus, the carriage guide 110 as shown in FIG. 15 includes arms 111 and 112 that are to extend outward of both sides of and at right angles to the guide rail 42. The central portion of the carriage guide is channeled or recessed at the fore and aft ends thereof as best shown in FIG. 13 to afford recesses 105R in which the rollers 105 are disposed. These recesses are defined by a pair of spaced lugs 114 and 115 at each end of the carriage in the central portion, and these lugs are formed with aligned openings in which a knurled axle or pin 105A is press fitted in each instance and on which the associated roller 105 is rotatably mounted.

The arms 111 and 112 referred to above have outwardly directed spaced extensions 111E and 112E so that the guide is somewhat H-shaped in outline as will be apparent in FIGS. 13 and 15, and the flat ends of these extensions are provided with tapped openings 111T and 112T as shown in FIG. 15 to enable the platen roller support member of the carriage to be affixed thereto as a unitary assembly as will now be described.

The carriage 100 is generally U-shaped in appearance as shown in FIG. 15 and includes a top transverse or bight portion 120 and a pair of depending legs 121 which are spaced one from another somewhat more than the distance that separates the outer faces of the flanges 28. In this connection, it will be noted in FIGS. 14 and 15 that the lugs 114 and 115 of the platen carriage guide are of such dimension as to embrace opposite sides of the guide rail 42, and in this manner the platen carriage as a whole including the guide is limited against lateral shift.

The vertically extending side members 121 of the platen carriage 100 are provided at the lower ends thereof with spaced openings 125 and 126 in the form of countersink holes for receiving flat head screws, these openings extending from the outer faces to the inner faces of the side members 121 as will be apparent in FIG. 15. The

openings 125 and 126 are adapted to register with the tapped openings 111T and 112T of the carriage guide, and when these openings are thus brought into registry flat head screws as 127 and 128, FIG. 3, are passed therethrough with the slotted heads disposed outwardly.

Located centrally between the openings 125 and 126 at each side of the platen carriage is an opening 130, FIG. 12, in which is disposed the shank 131 of a stud having a slotted cap end 132 which faces outwardly of the side member of the platen carriage. Thus, the studs having the heads 132 can be turned in the openings 130 by a screw driver. The inner ends of these studs are each provided with an eccentrically located stub, FIG. 12, on which a rail roller 135 is mounted for free rotation in each instance and in position to run along the rail surface 28F of the associated bed side flange 28. Suitable washers 131W, FIG. 15A, and the rollers are retained in position by nuts 131N that are run up on threaded ends of the eccentrically located stubs 131E.

In adjusting the vertical position of the platen roller PR, the screws 127 and 128 are first tightened to hold the carriage 100 in rigid relationship with respect to the carriage guide 110. Next, the screws 46S are loosened and the platen carriage 100 is moved to the extreme left-hand position as seen in FIG. 3. In this way, the roller 105 rides under the angle member 53, raising the end-stop plate 51 and, of course, causing the rail 42 to be raised accordingly. When the proper setting is achieved, the screws 46S are tightened. This same adjustment, of course, is done at both ends of the machine and the eccentrics are properly set.

The platen carriage assembly is completed by the handle 101 which includes a generally rectangular base plate 101B having depending guide lugs 101G at the opposite ends thereof. These lugs are adapted to engage shoulders 100S, FIG. 12, exposed at top of the carriage 100. The handle is recessed at 101R, FIG. 12, downwardly from the top to enable cap screws to be disposed therein for tightening in threaded openings 100T, FIG. 15, which open at the top of the carriage 100. The openings 100T are provided in bosses 100B that project upwardly from ledge elements 100L at the top of the carriage 100, and the bosses 100B have flat upper faces which are engageable by corresponding flats 101F which face downwardly from the underside of the handle 101 as shown in FIG. 12. The platen roller is supported within a relatively large space afforded by recessing the platen carriage and its handle as will hereinafter be mentioned.

The platen roller PR is of the porous type capable of being impregnated with a large quantity of fluid marking material available throughout an extended period of use, but as will be explained hereinafter, modified rollers of the dry or unimpregnated type may also be employed in a machine of the kind under consideration. Referring to FIG. 2, the platen roller PR is formed with an elongated bore that extends therethrough from one end to the other, and a quill or shaft 140 is disposed within the bore of the platen roller. This supporting shaft is formed with a pair of end stubs 141 which project outwardly therefrom beyond the ends of the platen roller, and the free ends of these stubs are flattened at faces 141F that lie in a common plane for a purpose to be described hereinafter. The bore of the platen roller is lined with a solid sleeve 145 having a knurl fit to the bore of the platen roller, and needle bearing assemblies NB are disposed between the inner portions of the stubs 141 and the opposed cylindrical surface of the sleeve 145 at the two ends thereof, whereby the platen roller is supported for free rotation relative to the supporting shaft 140.

One of the stubs 141 is pressed into an opening which is eccentrically located on a cylindrical bushing 147 of molded plastic, FIGS. 2 and 10, and the other stub 141 is pressed into a like bushing 148 which is molded integral with a segment gear 150. The bushings thus afforded are supported for free turning movement in split bearing

surfaces, such including 180° downwardly facing surfaces 101BR, FIG. 12, at spaced locations within the platen carriage handle 101, and mating upwardly facing arcuate bearing surfaces 150, FIG. 15, which are at the inner margins of the ledges 100L exposed at the top of the platen carriage 100. These bearing surfaces are separated by an open space 151 afforded by recessing the carriage and handle, as will be apparent in FIG. 12, of sufficient dimension to enable the operating surface of platen roller PR to be freely disposed for rotation therein, and advantageously platen roller guards in the form of inwardly directed fingers 152 are formed in the carriage 100 to be located along the two sides of this space in which the platen roller PR is disposed.

Thus, it will be seen that the supporting shaft or axle 140 is eccentrically mounted with respect to the bushing elements 147 and 148, and the flats 141F face toward the "high" part of the eccentric in each instance as shown in FIG. 3A. Hence, by rotating these bushings, the axis of the platen roller can be shifted or toggled in a vertical plane, and this shifting movement is independent of the vertical adjustment of the carriage including the above referred to eccentric elements 131E associated with the rail surfaces 28F. This independent shifting action of the platen roller PR is afforded in order that the platen roller will be disposed in an effective or imprinting plane only during the forward or printing stroke of the platen carriage 100. In other words, as will be explained in detail hereinafter, the platen roller PR is to be shifted to an ineffective plane during the return stroke of the platen carriage to skip and thereby avoid excessive inking or overprinting of the sheet that was printed during the forward or printing stroke of the platen carriage. While such skipping is primarily of advantage in connection with an ink impregnated platen roller as PR, such can also be used advantageously in connection with the form of the machine hereinafter described using a dry or standard platen roller. Such independent shifting of the platen roller during the course of a reciprocating stroke thereof is under control of the segment gear 150. This gear is associated with a pair of spaced rack elements 153 and 154, FIGS. 2 and 6, so as to be driven or oscillated thereby during the reciprocal strokes of the platen carriage, and such oscillation turns the bushings 147 and 148 which eccentrically support the axis of rotation of the platen roller. The two end teeth 150-1 and 150-4 (FIGS. 11A and 11C) are made longer than the inner teeth to assure good engagement of the racks and gear when the platen PR is adjusted for extremely thick forms.

The rack elements 153 and 154 are part of a one-piece plastic molded rack and gauge member 155, FIG. 6, which is removably mounted on the bed top plate in the same manner as the form gauges described above. The member 155 is so shaped and oriented as to cooperate with the gauge leg 61 in affording the gauge for the printing plate P. Thus, the rack and gauge member 155 is formed to provide a pair of legs 157 and 158, FIG. 6, on which, respectively, rack teeth 153T and 154T are located, and these elements are formed as projections on related left and right hand flanges 160 and 161 which have the lower surfaces thereof disposed in flush engagement with the upper face of the top plate 26. The flanges 160 and 161 have rounded outer margins as 160R, FIG. 8, shaped complementary to the rounded upper portions of the flanges 28 so as to afford a neat appearance therewith. As shown in FIG. 7, one of the side flanges 28 of the bed is recessed downwardly from the top at 28R, and a U-shaped joining portion 155U, FIG. 7, integrally joins the side flanges 160 and 161 and is disposed in the recess 28R. The U-shaped joining portion 155-U is open at the top and back, thus affording a pocket in which the fingers can be inserted from the back of the machine in positioning and removing the printing plate.

As shown in FIGS. 2 and 6, the projections 157 and 158 which are associated with the rack teeth have their

inner edges spaced one from the other to afford spaced gauge shoulders 157E and 158E spaced in accordance with the corresponding dimension of the printing plate P. Additionally, the flanges 160 and 161 are provided with aligned gauge ribs 160R and 161R, FIG. 6, which are located rearward of the shoulders 157E and 158E. These ribs are parallel to the gauge 61. The dimensioning is such that the printing plate P is accurately located in printing position with one edge LE, FIGS. 2 and 2A disposed against the gauge element 61 and with the corner portions LC and RC at the opposite edge thereof embraced respectively by the shoulders 157E-160R and 158E-161R. In effect, the printing plate is inserted in place from the back of the machine as viewed in FIG. 1 with the edge LE leading and with the type characters thereon directly readable by the user at the front of the machine. It will be observed that the trailing edge TE of the printing plate, FIG. 2, is disposed well over the pocket defined by the part 155-U and hence the rear marginal portion of the plate can be easily gripped for removal. By interchanging rack and gauge members as 155 having differently spaced gauge shoulders and ribs, different sized printing plates can be accommodated.

The start or idle position of the platen carriage is shown in FIGS. 1, 2 and 3, and it will be recognized that when in this position, the bed of the machine is exposed to enable the printing plate P to be properly positioned in association with the station plate SP and the dater DR in those instances where such additional printing means are provided, and as explained above, the printing plate will be inserted with the edge LE thereof in a leading or forward position. After the printing plate has been thus positioned, the form to be printed is next located thereover, utilizing the gauges 70 and 75 in those instances where a tabulating card is included among the forms.

The segment gear 150, as shown in FIG. 2, is disposed in alignment with the rack teeth 153T and 154T, and in this form of the machine the eccentrics 147-148 are so related to the shaft 140 that the platen will be disposed in an elevated or ineffective position at the commencement of a printing stroke, and this disposition is determined and completed during the return stroke of the platen carriage as will be explained hereinafter.

Formed integral with the gear 150 and related substantially 180° thereto is a symmetrically shaped cam 170 which includes a pair of spaced dwells D1 and D2 that are separated by a lobe 170L. In the specific embodiment, this lobe is 106° in extent, and this corresponds to the arc through which the gear 150 is stepped by the rack teeth 153T and 154T. A spring detent holds gear 150 in the last of its actuated or driven positions. Thus, a holding detent including a ball 175 is retained in the handle of the platen carriage, and the ball 175 is spring urged toward the cam 170 so as to in effect ride on the cam surface in a tensioned state. The ball 175 will be spring urged into one or the other of dwells D1 or D2 when the lobe 170L passes off the ball 175. The ball 175 is, as shown in FIG. 9, engaged by a coil spring 176 which is disposed in an elongated, vertically oriented recess 177 formed in the platen carriage handle 101 as best shown in FIG. 12, and it should be further pointed out in this connection that a guide stud 178, FIG. 2 projects outward from the face of the gear and cam assembly 150-170 in position to revolve in a receiving recess 179 formed within the handle 101 as shown in FIGS. 2 and 12.

The start or home position of the platen carriage is illustrated in FIGS. 1, 2 and 3 as being at the left-hand end of the machine as viewed in these figures with the left-hand one of the guide rollers 105 in engagement with the left-hand one of the platen carriage stops 53 as shown in FIG. 3. This disposition of the bushings 147 and 148 and the related eccentric support for the axle of the platen roller PR are indicated in FIGS. 3A and 11A, but it should be pointed out in connection with FIG. 11A that the gear 150 in the start or home position of the platen

carriage is spaced to the left of the rack 153 as will be evident in FIG. 2. Consequently, as the platen carriage is shifted to the right no movement of the gear 150 occurs until the leading tooth of this gear strikes the rack teeth 153T, and until this engagement occurs the platen roller PR is disposed in its uppermost position, that is, in its ineffective plane. As the leading tooth 150-1, FIG. 11A, of the gear 150 engages the first or No. 1 tooth to the left on rack 153T (FIG. 11A), gear 150 tends to be driven or stepped in a clockwise direction as viewed in FIG. 11A, and as the platen carriage is advanced further to the right as viewed in FIGS. 2 and 3, the gear teeth are stepped around one-by-one gradually oscillating gear 150 clockwise and lowering the axis of rotation of the platen roller. Such lowering of the platen roller is due to the gradual lowering of the eccentrically located openings in the bushings 147 and 148 which carry the platen roller shaft stubs 141 and which are turned concentrically in their bearing supports by and with gear 150. During this stepping action, the ball detent in effect rides out of the holding dwell D2 and up onto the lobe 170L. However, as the trailing gear tooth 150-4 commences to pass off the last or No. 4 tooth of the rack teeth 153T (full lines, FIG. 11B) the platen roller is already in its effective plane as will be evident from the location of the flat surface 141F, and the ball detent 175 drops into the dwell or holding recess D1 to maintain this printing position of the platen roller PR. This occurs as the platen roller commences to pass into the area of the printing plate P or other printing means. The platen roller is now in printing position to bear forcefully on the uppermost one of the sheets to be printed. There is some over-travel of the detent 175 up onto a flat biasing lobe 170L1 of the cam 170 as gear tooth 150-4 finally passes along the top of the last or No. 4 tooth of rack 153 (dotted lines, FIG. 11B) but as gear 150-4 frees itself of tooth No. 4 on rack 153, the detent 175, engaging the sloped dwell 170L1, re-positions cam 170 so that the detent is in effect returned to the dwell D1.

Further movement of the platen carriage to the right is now characterized by an effective printing stroke with the nadir line of the platen roller tracing out an effective pressure plane. Ink is exuded if the platen roller is impregnated, or "carbon" is off-set image-wise if carbon sheets are used in conjunction with a dry platen roller of the kind hereinafter to be mentioned. The spring gauge 61 for the printing plate will be depressed by and hence does not interfere with the action of the platen roller. As gear 150 passes away from the printing means and into the path of the rack teeth 154T, these rack teeth merely nudge gear 150 clockwise as viewed in FIG. 11C causing a repeat of the above described over-travel of the detent 175 (dotted lines, FIG. 11C) and as gear tooth 150-4 is finally located to the right of the first or No. 1 tooth of rack 154 (FIG. 11C) detent 175 will again be disposed in recess D1 of cam 170 to position gear 150 in the second of its limit positions, this being the limit position after completion of a printing stroke. Hence, on the return or idle stroke of the platen carriage, gear 150-4 is in a lower position to strike the first or No. 1 tooth on rack 154.

The end of the stroke in which printing is effected is characterized by the right-hand roller 105, FIG. 3, striking the right-hand one of the carriage stops 53 as indicated by dotted line in FIG. 3, and referring to FIG. 2 it will be realized that when the forms being printed are tabulating cards or other large forms, the carriage in this right-hand limit position interferes with removal of such forms. In view of this, the platen carriage is to be returned to its home position to facilitate removal of the form or forms printed, and in order to prevent over-printing, especially if an ink-impregnated platen roller is used, the platen roller under the present invention is shifted or toggled back to its ineffective plane during the

return stroke of the platen carriage to thereby skip the previously printed form. Consequently, during the return or idle stroke of the platen carriage, what was previously the trailing gear tooth 150-4 now becomes the leading tooth, FIG. 11C, and as the gear 150 reaches the rack 154 (full lines, FIG. 11C) gear 150 is stepped or oscillated counterclockwise from the limit position shown in FIG. 11C. Such counterclockwise stepping of the gear 150 rotates the bushings 147 and 148 and the eccentrically related axle for the platen roller is carried counterclockwise as viewed in FIG. 11C to raise the platen roller to its ineffective or start position. The detent 175 travels out of the pocket or limit dwell D1, over the top of the lobe 170L and eventually drops into the home dwell D2 as the last tooth of the gear 150, during the course of the left-hand or return movement of the platen carriage, commences to pass off the most left-hand one or No. 4 tooth of the rack teeth 154T as viewed in FIG. 11C. Over-travel of detent 175 will occur along the bias lobe 170L2, but detent 175 will reposition the cam to engage in dwell recess D2 as No. 4 tooth of rack 154 is finally passed. The gear will be nudged as tooth 150-1 hits tooth No. 4 on rack 153, and over-travel of detent 175 again takes place on lobe 170L2 (dotted lines, FIG. 11A), but when gear tooth 150-1 is finally disposed to the left of tooth No. 1 of rack 153, detent 175 is effective in co-operation with the bias lobe 170L2 to relocate gear 150 in its starting limit position shown in full lines in FIG. 11A. It will be recognized from this that gear 150 has two limit positions respectively indicated by full lines in FIGS. 11A and 11C, these being the limit positions respectively for instituting lowering of the platen roller (FIG. 11A) and raising of the platen roller (FIG. 11C) and gear 150 is biased to these limit positions by the detent 175 active between the dwells or recesses D1 and D2 and the related bias lobes 170L1 and 170L2.

A modified form of hand operated printing machine constructed in accordance with the present invention is illustrated in FIG. 16. This form of the machine, 20A, is one wherein the platen roller PR', FIG. 16A, need not be toggled or shifted during the course of a reciprocal movement of the platen carriage for reasons to be explained. The platen carriage, 200 in this instance, and its handle, will be provided internally with split bearings in accordance with the construction referred to above, and these will support bushings 201 and 202, FIG. 16A, which concentrically carry the axle or supporting shaft 205 of the platen roller PR'. Furthermore, since a gear as 150 is not utilized in this instance, there need be no rack teeth on the bed of the machine, and consequently, a printing plate gauge 210, devoid of associated rack teeth, is located along the rear edge of the top plate of the machine 20A. The gauge 210 is formed with right-angled shoulders 212 and 213 that are paired one with another so as to embrace the corners at the trailing edge of a printing plate of the kind described above, and the opposite edge of this plate will be engaged by a spring type gauge 61' of the kind described above. In view of the form of the gauge 210, the printing plate in this instance is more or less dropped downwardly into position, but there is a relatively wide space between the shoulders 212 such as to enable the fingers to be easily disposed therebetween incidental to inserting and removing the printing plate.

The form of the invention illustrated in FIG. 16 serves to demonstrate the wide variety of forms which a machine of the present invention is capable of handling. Thus, a pair of form or sheet gauges 215 and 16 are removably secured to the top plate of the bed of the machine 20A, and these gauges are formed with right-angled or L-shaped gauge shoulders 217 and 218 which are so located as to enable these shoulders to embrace the corners along one edge of relatively short forms of the sales or receipt book type, and it will be recognized that variations in

gauge formation and location can be utilized in both forms of the machine described herein.

Otherwise, the machine 20A is substantially identical to the machine described above, which is to say that the bed construction and guide rail and rail roller elements are identical to those embodied in the machine 20, the relation of the end caps to the bed of the machine is the same including the guide rail supports and end stops for the platen carriage, and the platen carriage member which is adapted to be shifted with the platen carriage guide in the manner described above in connection with FIGS. 15 and 15A of the drawings.

The platen carriage 200 is shown in FIG. 16 at one end of the machine in position to be moved to the opposite end of the machine through a printing stroke. However, in this form of the invention, the platen roller PR' will be located in its pressure printing position plane at all times by having pre-set the necessary adjustment to the eccentrics above described which position the platen carriage relative to the rail surfaces in accordance with the thickness of the forms to be printed. Thus, since the forms to be printed by the machine 20A are of short dimension, the platen carriage will be located free thereof at either end of its reciprocal stroke. This enables the form or forms to be removed after a stroke of the platen irrespective of the end of the machine where the platen carriage happens to be. There is, therefore, no need to return the platen carriage 200 to a start or home position which would cause over-printing.

It will be seen from the foregoing that under the present invention there is afforded a hand-operated printing machine constructed from inexpensive molded, shaped or die-cast parts which can be mass produced to enable the machine to be constructed at low cost. Thus, the bed of the machine is essentially a one-piece stamped part wherein side portions depending from a top plate afford rail surfaces, and wherein separately formed end caps are removably attached to the bed of the machine and serve to support the member affording a third rail surface spaced below and centered between the first-named rail surfaces. These rail surfaces afford the essential guides and supports for the platen carriage which has rail rollers associated with the aforementioned rail surfaces, and advantageously end stops are disposed adjacent the ends of the last named rail element to limit and define the terminal position of reciprocal movement of the platen carriage.

The platen carriage is constructed from parts which are easily assembled and disassembled, and these include a separately fabricated platen carriage guide equipped with rail rollers, a separately fabricated carriage member in which the platen roller is rotatably supported, and a handle which is removably secured to the top of the carriage member in which the platen roller is supported. By removing the handle, the platen roller can be removed for repair or replacement and an interchange between impregnated or unimpregnated platen rollers can be made. This also facilitates adjustments such as can be effected on the gear 150 or the eccentrics 147 and 148 to relate these for precision movement of the platen roller in the toggled form of the machine, and in any event it will be recognized that the platen carriage is constructed from a minimum number of parts which afford a maximum number of optimum platen carriage adjustment characteristics. Thus, as has been mentioned, repair, replacement and adjustments to the platen carriage and associated parts are easily effected, and quite importantly, it is a relatively simple matter to adjust the platen carriage for forms of different thicknesses or printing means having type characters of variant form, such being accomplished by adjustment of the screws 46S as described hereinafter.

In this connection, it will be recognized that such adjustments to the platen carriage are directly tied into the platen carriage guide rollers 135 which ride on the rail surfaces 28F, and hence all adjustments in the platen carriage and vertical shifting movement of the platen roller

occurs with respect to this rail surface as a predetermined fixed based plane.

Depending upon the size of the forms to be printed, the machine may or may not be equipped to toggle the platen roller. Thus, lone forms require a return of the platen carriage to its home position to enable the printed form to be removed, and during such return over-printing is prevented by raising the platen roller to its ineffective position to skip the previously printed form. With short forms, this is not required, since the printed forms can be removed irrespective of the end of the machine whereat the platen carriage is located after effecting an imprint.

Finally, it is to be stressed that over-printing during the back stroke of the platen carriage when required is effected under the present invention in a highly unique manner, such emanating from rack teeth on the bed of the machine engageable by an oscillatable segment gear, which in turn when driven or rotated, re-locates the axis of the platen roller, and specifically this is accomplished by causing bushings, which eccentrically carry the axle of the platen roller, to be turned simultaneously with the aforementioned gear.

Thus, while we have illustrated and described the preferred embodiments of our invention, it is to be understood that these are capable of variation and modification, and we therefore do not wish to be limited to the precise details set forth, but desire to avail ourselves of such changes and alterations as fall within the purview of the following claims.

We claim:

1. In a hand operated printing machine wherein an impression is to be made on a sheet disposed over printing means having type characters thereon and which is supported in position to enable an impression to be made as aforesaid, a bed formed of rigid one-piece sheet material and affording a generally rectangular planar top plate adapted to support said printing means in position to have an imprint made therefrom, elongated side portions integral with and bent downwardly from spaced opposite sides of said top plate and terminating in downwardly facing surfaces that are spaced one from another to afford a pair of fixed rail surfaces for a platen carriage, lugs integral with and bent downwardly from each of the remaining opposite sides of said top plate at spaced locations to serve as elements which afford the supporting leg structure of the machine, end caps removably attached to the outer faces of said lugs and having portions overlapping the adjacent ends of said bed and other portions disposed below the terminal edges of said lugs to afford the legs for the machine, and individual elements on said bed having upstanding shoulders respectively affording a gauge for an individually positionable printing plate and a gauge for an individually positionable sheet to be printed, and a platen carriage and associated platen roller related to said bed for reciprocal movement relative thereto.

2. In a hand operated printing machine wherein an impression is to be made on a sheet disposed over printing means having type characters thereon and which is supported in position to enable an impression to be made as aforesaid, a bed formed of rigid one-piece sheet material and affording a generally rectangular planar top plate adapted to support said printing means in position to have an imprint made therefrom, elongated side portions integral with and bent downwardly from spaced opposite sides of said top plate and terminating in flat downwardly facing surfaces that are spaced one from another and which terminate in substantially the same place to afford a pair of fixed rail surfaces for a platen carriage, attaching lugs integral with and bent downwardly from each of the remaining opposite sides of said top plate at spaced locations to serve as elements which afford the supporting leg structure of the machine, and a platen carriage and associated platen roller related to the bed for reciprocal movement.

3. In a hand operated printing machine wherein an

impression is to be made on a sheet disposed over printing means having type characters thereon and which is supported in position to enable an impression to be made as aforesaid, a bed formed of rigid sheet material and affording a generally rectangular planar top plate adapted to support said printing means in position to have an imprint made therefrom, elongated side portions integral with and bent downwardly from spaced opposite sides of said top plate and terminating in flat downwardly facing surfaces that are spaced one from another and which terminate in substantially the same plane to afford a pair of fixed rail surfaces for a platen carriage, attaching lugs integral with and bent downwardly from each of the remaining opposite sides of said top plate at spaced locations, end caps removably attached to the outer faces of said attaching lugs and having portions disposed below the terminal edges of the attaching lugs to afford the legs for said machine, and a third platen carriage rail having ends supported adjacent said end caps below and substantially centered between the first-named rail surfaces.

4. In a hand operated printing machine wherein an impression is to be made on a sheet disposed over printing means having type characters thereon and which is supported in position to enable an impression to be made as aforesaid, a bed formed of rigid sheet material and affording a generally rectangular planar top plate adapted to support said printing means in position to have an imprint made therefrom, elongated side portions bent downwardly from spaced opposite sides of said top plate and terminating in downwardly facing surfaces that are spaced one from another and which terminate in substantially the same plane to afford a pair of fixed rail surfaces for a platen carriage, end caps removably attached to said bed and having portions disposed below the terminal edges of said side portions to afford the legs for said machine, a guide rail extending between said end caps substantially parallel to and below said fixed rail surfaces and affording another rail surface, a platen carriage rotatably supporting a platen roller and having rail rollers disposed to engage said rail surfaces, and means for shifting the platen carriage and platen roller in directions normal to said fixed rail surfaces.

5. In a hand operated printing machine wherein an impression is to be made on a sheet disposed over printing means having type characters thereon and which is supported in position to enable an impression to be made as aforesaid, a bed affording a generally rectangular planar top plate adapted to support said printing means in position to have an imprint made therefrom, elongated side portions joined to and depending from spaced opposite sides of said top plate and terminating in surfaces that are spaced one from another and which terminate in substantially the same plane to afford a pair of fixed rail surfaces for a platen carriage, means affording leg elements secured to said bed, means disposed below said rail surfaces and affording another rail surface extending parallel thereto, a platen carriage rotatably supporting a platen roller and including rail rollers disposed in engagement with said rail surfaces, and means for shifting the platen carriage and platen roller normal to said fixed rail surfaces.

6. In a hand operated printing machine wherein an impression is to be made on a sheet disposed over printing means having type characters thereon and which is supported in position to enable an impression to be made as aforesaid, a bed formed of rigid sheet material and affording a generally rectangular planar top plate adapted to support said printing means in position to have an imprint made therefrom, elongated side portions bent downwardly from spaced opposite sides of said top plate and terminating in downwardly facing surfaces that are spaced one from another and which terminate in substantially the same plane to afford a pair of fixed rail surfaces for a platen carriage, means vertically adjustable and supporting a guide rail extending parallel to and below said fixed rail surfaces and affording another rail surface, a platen

carriage rotatably supporting a platen roller and having rail roller means disposed to engage said fixed rail surfaces and other rail roller means disposed to engage said other rail surface, and eccentric means affording the axis of rotation for the first-named rail roller means.

7. In a hand operated printing machine wherein an impression is to be made on a sheet disposed over printing means having type characters thereon and which is supported in position to enable an impression to be made as aforesaid, a bed affording a planar top plate adapted to support said printing means in position to have an imprint made therefrom, elongated side portions joined to and depending from spaced opposite sides of said top plate and terminating in surfaces that are spaced one from another and which afford a pair of rail surfaces for a platen carriage, means affording leg elements secured to said bed, means affording another rail surface spaced a predetermined distance from the first-named rail surfaces and extending parallel thereto, a platen carriage rotatably supporting a platen roller and including rail rollers disposed to travel on said rail surfaces, means for changing said predetermined distance between the rail surfaces, and means for accommodating said rail rollers to changes in distance as aforesaid.

8. In a hand operated printing machine wherein an impression is to be made on a sheet disposed over printing means having type characters thereon and which is supported in position to enable an impression to be made as aforesaid, a bed affording a generally rectangular planar top plate adapted to support said printing means in position to have an imprint made therefrom, elongated side portions joined to and depending from spaced opposite sides of said top plate and terminating in surfaces that are spaced one from another and terminating in substantially the same plane to afford a pair of fixed upper rail surfaces for a platen carriage, means affording leg elements secured to said bed, means disposed below said upper rail surfaces and affording a lower rail surface extending parallel thereto, a platen carriage including a guide having rail roller means engaging said lower rail surface, a platen roller carried by said platen carriage, other rail roller means carried by said platen carriage and engaging said upper rail surfaces, and eccentric means associated with said other rail roller means and having a path of eccentricity normal to said rail surfaces.

9. In a hand operated printing machine wherein an impression is to be made on a sheet disposed over printing means having type characters thereon and which is supported in position to enable an impression to be made as aforesaid, a bed affording a generally rectangular planar top plate adapted to support said printing means in position to have an imprint made therefrom, elongated side portions joined to and depending from spaced opposite sides of said top plate and terminating in surfaces that are spaced one from another and terminating in substantially the same plane to afford a pair of fixed rail surfaces for a platen carriage, means affording leg elements secured to said bed, means disposed below said rail surfaces and affording another rail surface extending parallel thereto, a platen carriage having spaced rail rollers disposed in engagement with said rail surfaces, a platen roller carried by said platen carriage, and adjustable eccentric means affording the axis of rotation for the rail rollers which engage said fixed rail surfaces.

10. In a hand operated printing machine wherein an impression is to be made on a sheet disposed over printing means having type characters thereon and which is supported in position to enable an impression to be made as aforesaid, a bed formed of rigid sheet material and affording a generally rectangular planar top plate adapted to support said printing means in position to have an imprint made therefrom, elongated side portions bent downwardly from spaced opposite sides of said top plate and terminating in downwardly facing surfaces that are spaced one from another to afford a pair of fixed rail surfaces for a

17

platen carriage, means supporting a rail member affording another rail surface facing the first-named rail surfaces in spaced relation thereto, a platen carriage rotatably supporting a platen roller, a guide secured to said platen carriage and having portions slidably embracing said rail member to prevent lateral shifting of the platen carriage relative to the rail structure, and rail rollers on said carriage engaging said opposed rail surfaces.

11. In a hand operated printing machine wherein an impression is to be made on a sheet disposed over printing means having type characters thereon and which is supported in position to enable an impression to be made as aforesaid, a bed formed of rigid sheet material and affording a generally rectangular planar top plate adapted to support said printing means in position to have an imprint made therefrom, elongated side portions bent downwardly from spaced opposite sides of said top plate and terminating in downwardly facing surfaces that are spaced one from another to afford a pair of downwardly facing fixed rail surfaces for a platen carriage, means supporting a rail member affording a single other upwardly facing rail surface facing the first named rail surfaces in opposed spaced relation thereto, said rail member being substantially centered between the first-named rail surfaces, a platen carriage rotatably supporting a platen roller, rail rollers on said carriage engaging said opposed rail surfaces, and means to shift the axis of the platen roller in a direction normal to the rail surfaces while the rail rollers are so engaged.

12. In a hand operated printing machine wherein an impression is to be made on a sheet disposed over printing means having type characters thereon and which is supported in position to enable an impression to be made as aforesaid, a bed formed of rigid sheet material and affording a generally rectangular planar top plate adapted to support said printing means in position to have an imprint made therefrom, elongated side portions bent downwardly from spaced opposite sides of said top plate and terminating in downwardly facing surfaces that are spaced one from another to afford a pair of fixed rail surfaces for a platen carriage, lugs bent downwardly from each of the remaining opposite sides of said top plate at spaced locations to serve as elements which afford the supporting leg structure of the machine, a platen carriage and associated platen roller related to said bed and top plate for reciprocal movement relative thereto, a gauge for a sheet to be printed disposed on said top plate out of the path of movement of said platen roller, a spring element serving as a gauge for a printing plate and disposed in the path of movement of the platen roller but depressible by the platen roller.

13. A machine according to claim 12 wherein the first-named gauge is adjustable to accommodate sheets of different size.

14. In a hand operated printing machine wherein an impression is to be made on a sheet disposed over printing means having type characters thereon and which is supported in position to enable an impression to be made as aforesaid, a bed including a generally rectangular planar top plate adapted to support said printing means in position to have an imprint made therefrom, elongated side members depending from spaced opposite sides of said top plate and terminating in flat downwardly facing surfaces that are spaced one from another and which terminate in substantially the same plane to afford a pair of fixed rail surfaces for a platen carriage, means supporting beneath said top plate an elongated member affording a single rail surface facing toward the first-named rail surfaces in opposed spaced relation thereto and centered therebetween, a reciprocal platen carriage rotatably supporting a platen roller, rail rollers on said carriage engaging said opposed rail surfaces, and a guide secured to the carriage and having portions slidably embracing sides of said elongated member to prevent lateral shift of said carriage.

18

15. In a hand operated printing machine wherein an impression is to be made on a sheet disposed over printing means having type characters thereon and which is supported in position to enable an impression to be made as aforesaid, a bed affording a planar top plate adapted to support said printing means in position to have an imprint made therefrom, elongated side members depending from spaced opposite sides of said top plate and terminating in downwardly facing surfaces that are spaced one from another and which terminate in substantially the same plane to afford a pair of fixed upper rail surfaces for a platen carriage, a platen carriage extending transversely relative to said top plate and including means rotatably supporting a platen roller for movement in a plane spaced from the plane of said top plate, rail rollers carried by said platen carriage and disposed in engagement with said rail surfaces, means supporting beneath said top plate an elongated member affording a lower rail surface facing the first-named rail surfaces in spaced opposed relation thereto, a platen carriage guide, rail rollers carried by said guide and disposed in engagement with said lower rail surface, and means to so shift relative to said upper rail surfaces the means which rotatably support said platen roller.

16. A machine according to claim 15 wherein said elongated member affording the other rail surface is centered between the first-named rail surfaces and extends parallel thereto.

17. A machine according to claim 16 wherein said platen guide has side elements disposed substantially in engaged relation with opposed sides of said elongated member which affords the other rail surface.

18. In a hand operated printing machine wherein an impression is to be made on a sheet disposed over printing means having type characters thereon and which is supported in position to enable an imprint to be made as aforesaid, a bed including a top plate adapted to support printing means as aforesaid, gauge means on said top plate to locate accurately a sheet to be printed and a printing plate, said gauge means including an adjustable gauge element, means affording a guide rail surface spaced from said top plate and said bed including elements which afford a pair of laterally spaced guide rail surfaces facing toward and spaced from the first-named guide rail surface, a platen carriage having a guide extended transversely of said guide rail surfaces, said guide having rail roller means arranged to travel on the first-named guide rail surface, said platen carriage having rail roller means arranged to travel along the second-named guide rail surfaces whereby said platen carriage is mounted for reciprocal movement relative to said top plate, and a platen roller rotatably supported by said platen carriage on an axis spaced a predetermined distance above the plane of the top plate.

19. A machine according to claim 18 having means affording a rack on the top plate, a gear carried by the platen carriage and disposed in alignment with said rack so as to be driven by the rack when in mesh therewith during a reciprocal movement of the platen carriage, and means actuated by said gear to shift the axis of said platen roller.

20. In a hand operated printing machine wherein an impression is to be made on a sheet disposed over printing means having type characters thereon and which is supported in position to enable an impression to be made as aforesaid, a bed formed of rigid material and affording a planar top plate adapted to support said printing means in position to have an imprint made therefrom, elongated side portions joined to a pair of spaced opposite sides of said top plate and terminating in downwardly facing surfaces that are spaced one from another and which terminate in substantially the same plane to afford a pair of fixed rail surfaces for a platen carriage, means supporting a member affording a single other rail surface facing the first-named rail surfaces in spaced

19

relation thereto and centered therebetween, a reciprocal platen carriage rotatably supporting a platen roller, rail roller means supported by the carriage at the outer extremities thereof and engaging the first-named rail surfaces, and rail roller means supported by the carriage inwardly of the first-named rollers and engaging said other rail surface.

21. In a hand operated printing machine wherein an impression is to be made on a sheet disposed over printing means having type characters thereon and which is supported in position to enable an impression to be made as aforesaid, a bed formed of rigid material and affording a planar top plate adapted to support said printing means in position to have an imprint made therefrom, elongated side portions joined to a pair of spaced opposite sides of said top plate and terminating in a pair of flat downwardly facing surfaces that are spaced one from another and which terminate in substantially the same plane to afford a pair of fixed rail surfaces for a platen carriage, caps removably attached to the opposed ends of said bed and having portions disposed below said rail surfaces to afford the legs for said machine, an elongated rail member extending between said end caps and being centered between said first-named rail surfaces and affording a third rail surface below and facing the first-named rail surfaces, a reciprocal platen carriage rotatably supporting a platen roller, a pair of rollers supported by the carriage and engaging said paired rail surfaces, and a pair of aligned rollers supported by the carriage and engaging said third rail surface.

22. A machine according to claim 21 wherein adjustable means support said elongated rail member for adjustment toward and away from said paired rail surfaces.

23. A machine according to claim 22 wherein carriage stops are afforded at the opposed ends of said elongated rail member to engage one or the other of the rollers which ride on said third rail surface.

24. A machine according to claim 21 wherein the platen carriage includes spaced opposed surfaces engaging spaced opposed surfaces of said elongated rail member to limit lateral shift of the platen carriage.

25. In a hand operated printing machine wherein an impression is to be made by a platen roller when in printing position on a sheet disposed over printing means having type characters thereon, means affording a top plate adapted to support said printing means in position to have an imprint made therefrom as aforesaid, a platen carriage and an associated platen roller mounted for reciprocal movement with respect to said plate, a rack on said top plate, a gear supported by the platen carriage and disposed in alignment with said rack so as to be driven when in mesh with the rack during reciprocal movement of the platen carriage, and means interconnecting said gear and the platen roller to shift the platen roller normal to said top plate when said rack and gear are drivingly meshed as aforesaid.

26. In a hand operated printing machine wherein an impression is to be made by a platen roller when in printing position on a sheet disposed over printing means having type characters thereon, means affording a top plate adapted to support said printing means in position to have an imprint made therefrom as aforesaid, a platen carriage and an associated platen roller mounted for reciprocal movement with respect to said plate, a rack on said top plate, a gear supported for oscillation by the platen carriage and having the teeth thereof disposed in alignment with said rack so as to be driven when in mesh with the rack during reciprocal movement of the platen carriage, and eccentric means driven by and with said gear and supporting the platen roller to shift the platen roller normal to said top plate when said rack and gear are drivingly meshed as aforesaid.

27. In a hand operated printing machine wherein an impression is to be made by a platen roller when in printing position on a sheet disposed over printing means

20

having type characters thereon, means affording a top plate adapted to support said printing means in position to have an imprint made therefrom as aforesaid, a platen carriage and an associated platen roller mounted for reciprocal movement with respect to said plate, a pair of spaced racks on said top plate, a gear supported by the platen carriage for oscillation between first and second limit positions and having the teeth thereof disposed in alignment with said racks so as to be driven when in mesh with the racks during reciprocal movement of the platen carriage, a cam associated with said gear and movable therewith between said limit positions, a holding detent in the platen carriage engageable with limit surfaces on said cam to bias the gear in its limit positions, and eccentric means driven by and with said gear and supporting the platen roller to shift the axis of the platen roller respectively into and out of printing position when said gear is meshed respectively with said racks as aforesaid.

28. In a hand operated printing machine wherein an impression is to be made by a platen roller when in printing position on a sheet disposed over printing means having type characters thereon, means affording a generally rectangular planar top plate adapted to support said printing means in position to have an imprint made therefrom as aforesaid, a platen carriage and an associated platen roller mounted for reciprocal movement with respect to said plate, a pair of spaced racks on said top plate, a gear supported by the platen carriage for oscillation between first and second limit positions and disposed in alignment with said racks so as to be driven in one direction into one such limit position when in mesh with one of the racks and driven in the opposite direction and into the other limit position when in mesh with the other rack during reciprocal movements of the platen carriage in opposite directions, and means interconnecting said gear and the platen roller to shift the platen roller from a non-printing to a printing position when meshed with one of said racks and vice versa when meshed with the other of said racks as aforesaid.

29. In a hand operated printing machine wherein an impression is to be made by a platen roller when in printing position on a sheet disposed over printing means having type characters thereon, means affording a generally rectangular planar top plate adapted to support said printing means in position to have an imprint made therefrom as aforesaid, a platen carriage and an associated platen roller mounted for reciprocal strokes with respect to said plate, a pair of spaced racks on said top plate, a gear supported by the platen carriage for oscillation between first and second limit positions and disposed in alignment with said racks so as to be driven in one direction into one such limit position when in mesh with one of the racks and driven in the opposite direction and into the other limit position when in mesh with the other rack during respective strokes of the platen carriage in opposite directions, and eccentric means adapted to be turned with said gear and supporting the platen roller so as to shift the platen roller from a non-printing to a printing position when the gear is meshed with one of said racks and vice versa when the gear is meshed with the other of said racks during reciprocal strokes of the platen carriage as aforesaid.

30. A machine according to claim 29 wherein the gear has a tooth disposed in position to strike the first of the teeth in the related one of the racks when the gear is in one limit position, and wherein the gear has another tooth disposed in position to strike the first of the teeth in the other rack when the gear is in its other limit position, and wherein the platen carriage is provided with a spring element engageable with the member affording the gear to bias the gear in its limit positions with the gear teeth disposed in such limit positions as aforesaid.

31. In a hand operated printing machine wherein a platen carriage and platen roller supported thereby are to be reciprocated relative to a bed affording a planar sur-

21

face on which a printing means is to be located, and when the platen roller is to be shifted in a direction normal to said planar surface, means supporting and guiding the platen carriage for reciprocal strokes in opposite directions, means rotatably supporting the platen roller in the platen carriage, a rack supported by said bed and a gear carried by said platen carriage for oscillating motion, said gear being disposed to mesh with said rack and be oscillated thereby in the course of a stroke of the platen carriage, and means operated by said gear for shifting vertically the means which rotatably support said platen roller.

5

10

22

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