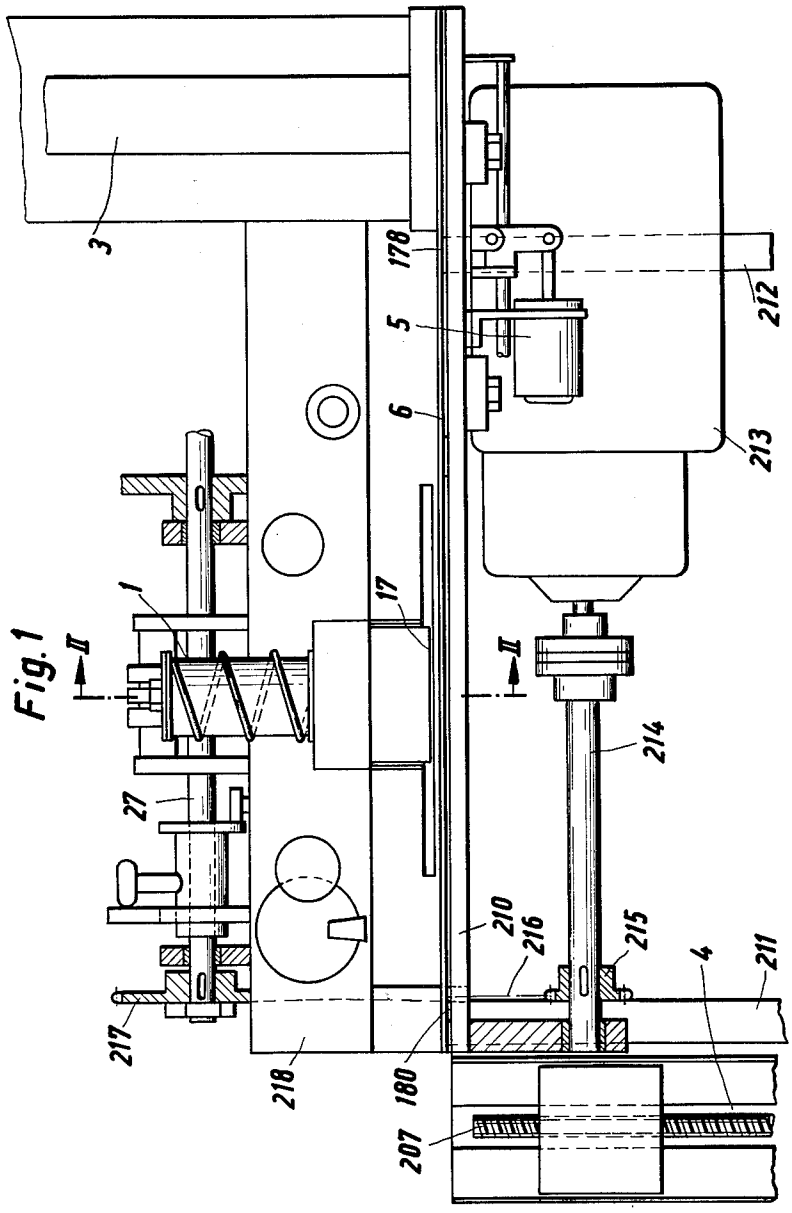
Dec. 28, 1965 G. SAEGER 3,225,690

PRINTING MACHINE

Filed May 7, 1964 4 Sheets-Sheet 1

Fig. 1



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PRINTING MACHINE

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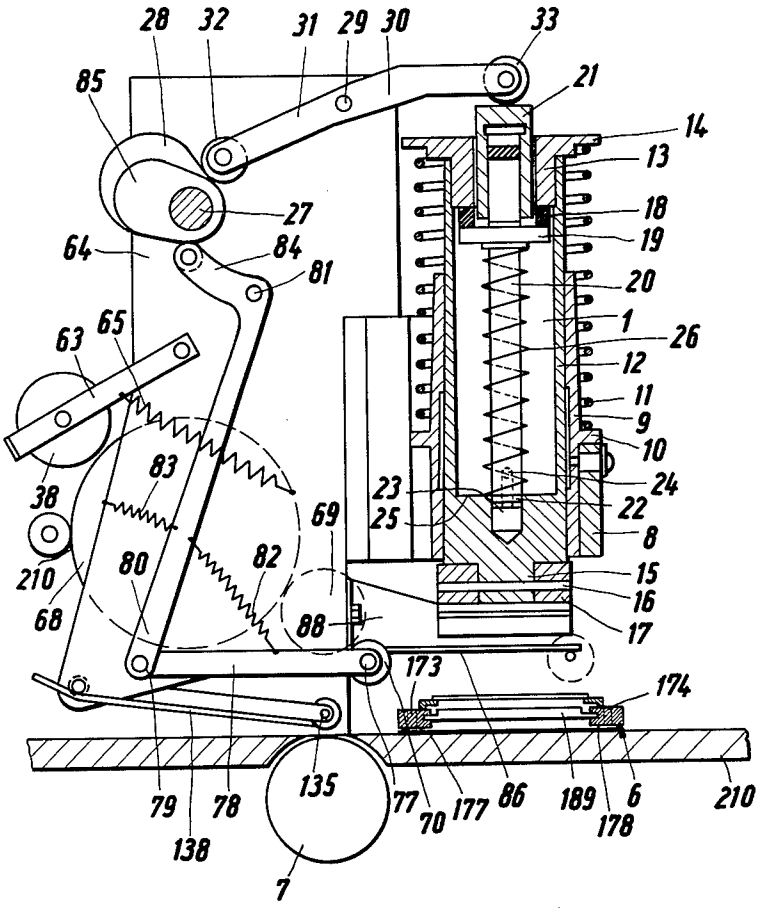
Fig. 2



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PRINTING MACHINE

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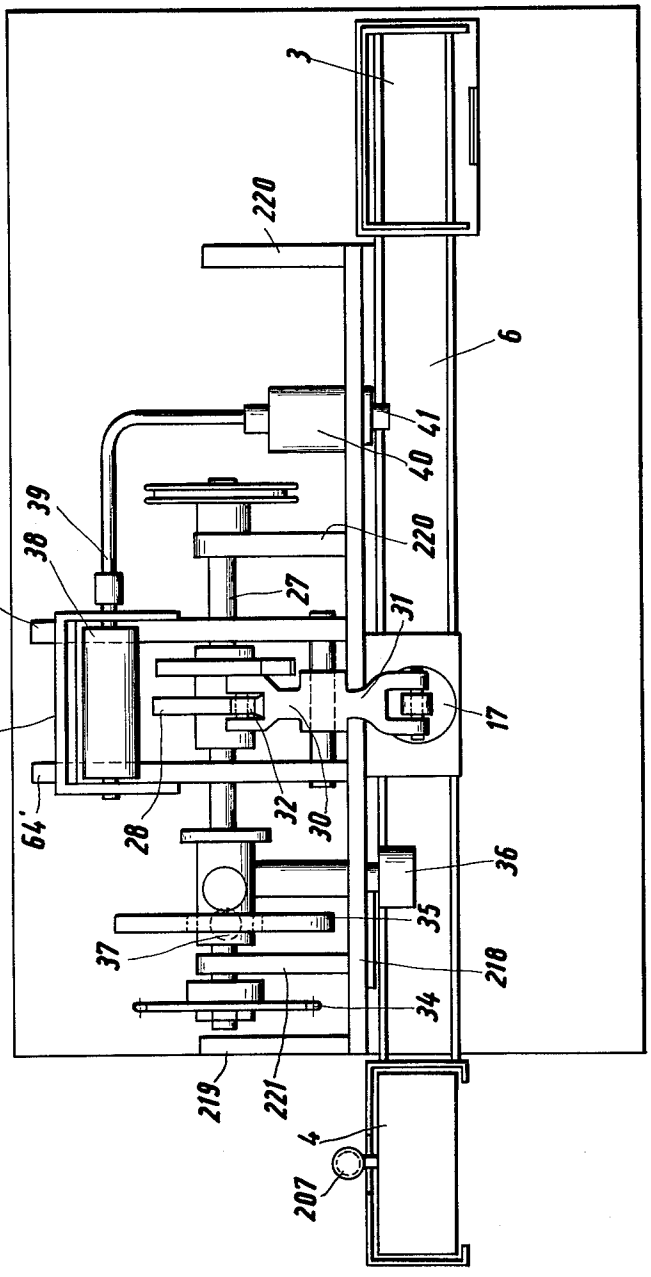
Fig. 3



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PRINTING MACHINE

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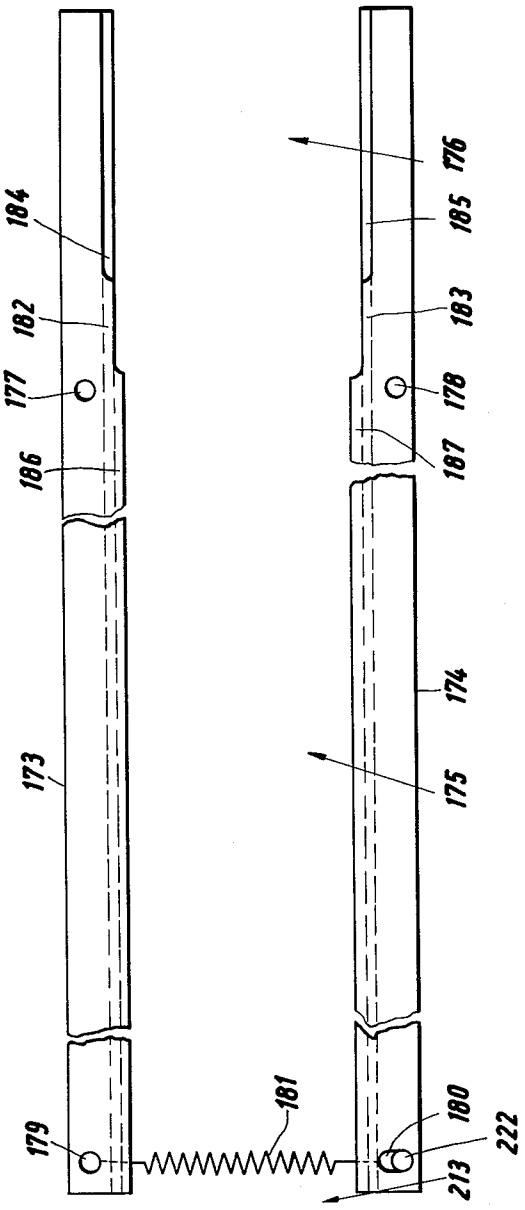
Fig. 4



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3,225,690

PRINTING MACHINE

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9 Claims. (Cl. 101—48)

The invention relates to a printing machine e.g. for addressing, which is provided with information printing plates or stencils, a collection magazine and a delivery magazine provided for these, which magazines are connected together by a guide for the printing plates and wherein a printing plate slide is associated with the guide, for conveying individual printing plates from the delivery magazine to the guide, and an inking device is associated with a printing ram.

It is known in such printing or addressing machines to move the printing ram by means of a pivot arm. Having regard to the fact that satisfactory operation is ensured only if the printing ram contacts the printing plate squarely and in a flat manner, it can be readily appreciated that guidance in an arcuate path leads to difficulties in arranging for a completely flat contact.

It is to be borne in mind that a printing plate or stencils is guided at a certain distance over above the sheet to be printed, both in order not to damage it and also to prevent disadvantageous expansions. For this reason, the printing plates must be pressed down by the printing ram to exceed the distance at which the sheet is guided. This is relatively difficult with a printing ram moved through an arcuate path, since during this pressing of the plates some lateral displacement and also lateral movement of the ram relative to the plates, corresponding to the magnitude of the last part of the stroke of the ram in depressing the plate, cannot be completely avoided. If it is also taken into account that the printing ram is constructed at the same time as an inking device in the form of an inked plate on the actual printing plate, it can be seen that these known constructions can lead to uneven inking of the printing plates. Also, if an inked operating table is, for example, hinged to the printing ram, in order to compensate for the displacements mentioned to a certain extent, there arises the disadvantages of uneven inking and additionally a certain play between the parts which produces a relatively slow movement.

These difficulties have not been completely avoided by rectilinear movements of the printing ram. Relatively complicated devices are known for lowering the printing plates during printing which, because of their constructions and arrangement of various kinds of parts, tend to become jammed, on the one hand, and also produce considerable operative resistances, on the other hand, which can even lead to tilting because of the elasticity involved. Jamming occurs particularly in connection with the arcuate guiding of the printing ram.

The invention is based on the problem of avoiding these disadvantages and providing a printing or addressing machine which is characterised by a high operative speed, due to the combination of various novel features, and by a reliable construction. This problem is solved in that an elastic printing ram, which is vertically movable, is provided with a support for the printing plates or stencils for effecting the printing process, which support is also elastic and consists of a downwardly movable rail guide arrangement elastically yieldable under the action of the printing ram.

It is essential to the invention to use the combination of an elastic and vertically-movable printing ram with an elastic and yieldable rail arrangement for the printing plates, in which the pivotable section is not limited to

the unobstructed region of the printing ram and also excludes elastic pivotability, since an inherent flexible guide means is provided in the form of strips or the like. The rail arrangement can fulfil a guiding function given a certain elasticity.

According to an advantageous feature, the printing ram consists of telescopically interfitting tubes, one of which carries a printing pad and is movable against spring pressure, whereas the printing ram is yieldably contacted by the tube carrying the printing pad by means of a stronger compression spring.

According to a further advantageous feature, an actuating projection of the printing ram is movable by means of an eccentrically-controlled pivot lever, which acts on the actuating member through a roller.

According to another feature, a noise damping member, which consists for example of nylon, is arranged between the printing ram and the tube carrying the printing pad, which member is provided as a stop for the return stroke of the printing ram.

In connection with the inking arrangement, a horizontal guide for an inking roller, arranged on either side of the printing ram device, is provided directly adjacent the vertically-movable printing ram, which roller, with the printing ram raised, is guided along the guide and preferably resiliently held thereon, in order to ink the printing ram.

According to an advantageous embodiment, two rails are provided, which include guide grooves for directing the printing plates and, in order to yield in their middle region, are held only at their ends. In this way, a very rapid working speed without complicated guiding and supporting means for the printing plates is achieved without special means. Preferably, the guide grooves for the rails have, at the ends facing the delivery magazine, upwardly open enlarged portions. Preferably, at least one rail is supported at least at one end by means of a longitudinal slot extending perpendicular to the longitudinal axis of the rails on a pin disposed perpendicular to the guide path defined by the rails and is under the action of a spring, which moves the one rail by pressing on or drawing on the other rail. The end of this rail away from the longitudinal slot can thus be pivotally mounted on a perpendicular pin or can be flexed by reason of its elasticity.

In order that the invention may be readily understood, preferred embodiments thereof are described below by way of example only in conjunction with the accompanying drawings.

In the drawings:

FIG. 1 shows a diagrammatic front view of the machine partly broken away and partly sectioned to illustrate the arrangement of the principal parts;

FIG. 2 shows a section along the line II—II of FIG. 1;

FIG. 3 shows a plan view of the machine of FIGS. 1 and 2;

FIG. 4 shows a partial view in plan of the guides for the printing plates.

The machine shown in FIG. 1 consists of a frame with a frame plate **210** resting on foot members **211**, **212**, shown in part. A driving motor/gear unit **213** is disposed under the frame plate **210** and drives a shaft **214** on which a sprocket **215** is located. This is connected with a transmission chain **216**, shown dotted, which passes through an opening in the frame plate **210** and is connected with a driving sprocket **217** on a main drive shaft **27** on which are arranged parts described below. Bearing projections and support members are also provided on the frame plate **210**, which are shown in FIGS. 1 and 3, for example at **218**, **219** and **220**, and serve to support various parts. The bearing projections for the shaft **27** are indicated for instance at **220**, **221**, **64** and **64'**.

The following description is substantially restricted to those parts which are involved in the invention.

The machine shown in FIG. 1 in front view has a printing ram 1 on which a printing pad 17 is located in its lower region. A delivery magazine 3 and a collection magazine 4 are provided with an ejector arrangement, which is actuated by a magnet 5. Individual printing plates or stencils are sent from the delivery magazine 3 by means of a delivery slide to a guide 6 and, after passing along this guide, are received by the collection magazine 4 (FIGS. 1 and 2). A support plate is arranged in this, which is movable step-by-step in dependence upon the working rhythm of the machine and the printing ram 1.

An inking device is associated with the printing ram 1 and is shown in detail in FIGS. 2 and 3. The printing plates are passed into the guide 6 from the collection magazine 3 by means of an ejector (not shown) and are guided into the delivery magazine 4 by subsequent stepwise movement of the ejector, the printing ram carrying out the necessary stroke in the operative cycle and being associated with a conveyor or advance roller arrangement 7 adjacent a counter-pressure roller 135 (FIG. 2), which ensures that the pages or sheets to be printed are guided along on the guide 6. The guide 6 consists of two rails which are held over the frame plate so that the material to be printed, e.g. pages or sheets, can pass under the guide.

The advancing roller arrangement 7 is mounted in an opening in the frame plate 210 on projections which are illustrated in FIG. 2. The drive is effected from a transmission either from the driving shaft 214 or from the main shaft 27.

The printing ram shown in general at 1 (FIG. 2) is arranged in a guide bush 8 secured to the frame, in which a sliding bush 9 is located which has an outwardly-directed flange 10. This flange serves as the lower support for a spring 11. The housing tube 12 of the ram is telescopically movable in the sliding bush 9. A guide sleeve 13 with an outwardly-projecting flange 14 is provided at the upper end of the housing tube 12 and forms the upper abutment for the spring 11.

The housing tube 12 is closed at the lower end and supports the printing pad 17 on a projection 15 by means of a pin and slot connection 16, so that its underside is capable of being inked.

The guide sleeve 13 engages via an elastic annular element 18, for example of rubber, plastics material or nylon, with a flange 19 on a plunger 20, on the upper end of which is screwed a cap member 21. The lower end 22 of the plunger 20 is adjustable in a drilling 23 in the lower closed end of the housing tube 12 so as to clear a slot arrangement 24 which would otherwise set up frictional resistance on movement of the plunger 20 in the drilling 23. Between the flange 19 and the shoulder 25 formed adjacent the drilling 23, a compression spring 26 is arranged which is stronger than the compression spring 11.

The driving shaft 27 of the machine is provided with a cam 28 for actuating the printing ram. A lever with arms 30, 31 is pivotally mounted in the frame about a spindle 29 and carries low-friction rollers 32, 33 at its two ends. The roller 32 rests on the cam 28, whereas the roller 23 contacts the upper surface of the cap member 21 in order to push the plunger 20 down on rocking of the lever 30, 31 in the clockwise direction, so that the housing bush 12 is urged downward by means of the spring 26 and the printing pad 17 is pressed down onto the printing plate or stencil 189. This movement is effected completely elastically, since the two springs 11 and 26 on the one hand and the weaker construction of the spring 11 compared with the spring 26 on the other ensure that there is damping of that stroke of the lever 30, 31 which is carried out at the higher velocity. In the return stroke, the recoil produced by the stronger spring 26 is largely taken up by the elastic ring element 18, whereas

the spring 11 causes a correspondingly gentle return of the housing bush 12 into its upper position and the pivot-free yielding of the unit connected with the flange 14 to the extent of the travel of the rail 33 also ensures quiet operation.

It can be seen from FIG. 2 that the printing ram 20 is moved in the vertical direction over the guide 6 without lateral displacement of the printing plate 189 occurring.

FIG. 3 illustrates parts of the arrangements shown in FIGS. 1 and 2. This figure shows the main drive shaft 27 which is continuously driven by sprocket 34. A control disc 35 described below is located on this shaft which is adjustable by means of a setting knob 36 in a way to be described about a shaft 37 arranged perpendicular to the plane of the drawing (FIG. 3). An ink drum 38 can also be seen, to which ink is supplied through a flexible tube 39 and a pump device 40 (to be described) which is actuatable by a button 41.

The ink drum 38 is also shown in FIG. 2. It is suspended from a bail arm or lever 63 which is secured to a frame member 64 and is urged by means of a spring 65 against a transfer roller 68. This roller 68 lies on a second transfer roller 69 which co-operates with an inking roller 70. The roller 70 is rotatable about a spindle 67 which is mounted in levers 78, one of which is shown in FIG. 2. The levers 78 are hingedly connected with the guide levers 80 by means of a pivot pin 79, which levers 80 are pivotable about a pin 81 in the frame 64. A tension spring 82 is connected between the lever 78 and the guide lever 80. A further spring 83 connected to the frame member 64 acts on the latter lever and presses a projection 84 on the guide lever 80 against a cam 85. This is arranged on the driving shaft 27 and ensures that the inked roller 70 is guided along the printing pad 17. For this purpose, a guide 86 is provided for the spindle 77. This guide 86 is formed by the lower edges of two guide plates 88 provided on either side of the printing ram 1 and runs substantially perpendicular to the direction of movement of the printing ram 1. By this rectilinear guide 86 for the inked roller 70, a device for inking the printing pad 17 is provided which permits high operative velocities.

FIG. 4 shows the guide 6. It consists essentially of two rails 173, 174 which are shown in plan view. These rails are flexible and consist, for example, of plastic material. They are free of any support in the region below the printing ram 1, i.e. substantially at 175. The delivery magazine is located in the region indicated at 176 and the collection magazine in the region indicated at 213. These guide rails 173, 174 are rotatable on the end of the delivery magazine 3 about pins 177, 178 at the side of the printing ram 1, but of fixed height relative thereto. The rail 173 is likewise mounted at the remote adjacent end about a pin 179, whereas the corresponding end of the rail 174 is supported by means of an elongated slot 180 about a pin 222 and is drawn towards the rail 173 by a spring 181. Tolerances in the widths of the printing plates 189 are therefore compensated, since the rail 174 can yield. The pins have shoulder surfaces, for example, which project into rails beyond the diameters of the openings or slots, so that support is given at these regions. For example, the pins 178 and 180 are partly shown in FIG. 1.

It can also be seen that the rails 173, 174 have grooves in two stages, namely the grooves 182, 183, which receive the edges of the printing plates 189, which fall into these grooves by means of the guidance of cut-away sections 184, 185.

The grooved edges 186, 187 disposed near the middle serve to ensure reliable guiding of the printing plates or stencils 189, so that these edges 186, 187 are provided only at the upper sides whereas the edges 182, 183 continue along the lower sides. The rails 173, 174 are elastic, so that they yield in the central region under the action of the printing ram 1.

The control disc 35 is inclinable relative to the axis of

shaft 27. Through cam follower means cooperable therewith, disc 35 controls the amplitude of the feed stroke of the work beneath the guide track 6. Control disc 35 and its cooperating means are fully described, as to construction and operation, in my copending application Serial No. 365,625, filed May 7, 1964, for "Printing Machine." As the control disc 35 forms no part of the invention of the present application, it has been deemed not necessary to illustrate and describe in detail the means associated therewith for controlling the work feed.

I claim:

1. A printing machine for indicating information arranged on information printing plates, which comprises in combination a frame, a frame plate, a guide path for the information printing plates, which guide path is directed over the frame plate, a delivery magazine arranged at one end of the guide path and secured to the frame, a collection magazine arranged at the other end of the guide path and secured to the frame, conveyor means arranged on the frame and adapted to move so as to convey a printing plate from the delivery magazine to the guide path and further successively to move information printing plates located therein and to guide them to the delivery magazine, a printing ram, means mounting said ram on the frame for reciprocation perpendicular to said guide path between a raised position relative to the guide path, and a lowered printing position wherein said ram contacts a printing plate in the guide path, driving means for moving the printing ram between said raised and lowered positions, guide means mounted on the frame and adapted to guide material to be printed over the frame plate and under the guide path in the region of the printing ram, to permit transfer of the information on a printing plate located in the guide path to the material to be printed by actuation of the printing ram, said printing ram consisting of first and second relatively movable parts which are guided together and a spring disposed between the parts and adapted to urge them apart, said guide path being constructed of elastic material yieldable at least in the direction of movement of the printing ram and consisting of first and second rails which are supported on the frame plate in downwardly yieldable manner at locations remote from the region of the printing ram.

2. The printing machine according to claim 1, in which the first and second parts of the printing ram comprise telescopically interfitted first and second tubular members, the outermost one of said tubes being supported in the guide arrangement and the inner tube being movable within the first-mentioned tube, the two tubes being provided with first and second flange-like abutments, spring means arranged between the abutments and adapted to urge the inner tube upwardly, a printing pad carried by the inner tube at its lower end and an end wall member at its upper end, a third printing ram part vertically movable within a central opening located in the upper end wall member, said third printing ram part having

one end projecting upwardly from the inner tube and having its other end vertically movable in a guide opening in the inner tube, an abutment on the third ram part inside the inner tube, a second spring stronger than the first-mentioned spring in engagement with said abutment and adapted to urge the third ram part upwardly, and resilient means supported by the upper side of the abutment and disposed in removable contact with the end wall region.

3. The printing machine according to claim 2, in which the resilient means are annular and are adapted to operate as a noise damping member which serves as a recoil abutment for the printing ram.

4. The printing machine according to claim 1, in which the driving means for the printing ram comprise a two-arm lever pivotably mounted on the frame, a driven eccentric co-operating with one end of the lever and adapted to move the other end of the lever in a substantially vertical direction, a roller on such other end co-operating with the upper end of the printing ram.

5. The printing machine according to claim 2, in which an inking device for the printing pad is provided, which comprises an inked roller reciprocally movable by link members and mounted in guide means disposed horizontally on either side of the printing ram for moving the inked roller in the horizontal direction on the printing pad when the printing ram is raised.

6. The printing machine according to claim 1, in which the two rails of the guide path are provided with guide grooves in which the printing plates can slide and the rails are supported only at their ends.

7. The printing machine according to claim 6, in which the guide grooves include upwardly-open cut-away portions at the ends adjacent the delivery magazine.

8. The printing machine according to claim 6, in which at least one rail has an elongated slot at least at one end at right angles to the longitudinal axis of the rail, a spring mounted between the ends of the rails serving to draw the rails resiliently together and to allow them to yield on movement of the printing ram.

9. The printing machine according to claim 8, in which at least the rail having the slot at one end is mounted at the other end on support means which allow pivoting of the rails in a horizontal plane.

References Cited by the Examiner

UNITED STATES PATENTS

1,550,893	8/1925	Elliot	101—48
1,594,129	7/1926	Stark	101—48
1,833,938	12/1931	Elliot	101—49
2,026,101	12/1935	Royster et al.	101—57

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