Dec. 26, 1939. H. F. M. GRAMANN 2,184,914

PHONOGRAPH

Filed Oct. 29, 1937 2 Sheets-Sheet 1

Fig. 1

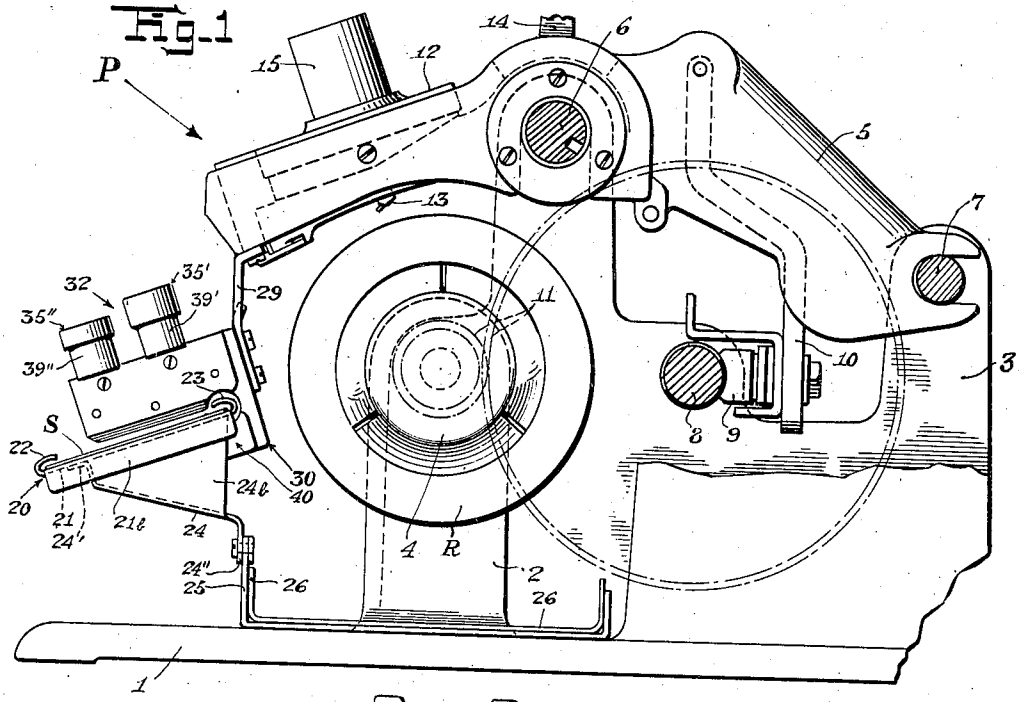


Fig. 2

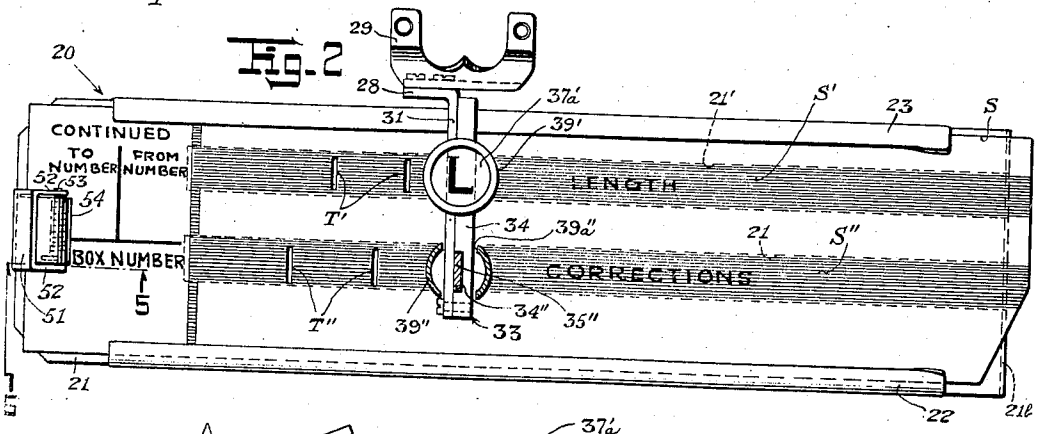


Fig. 3

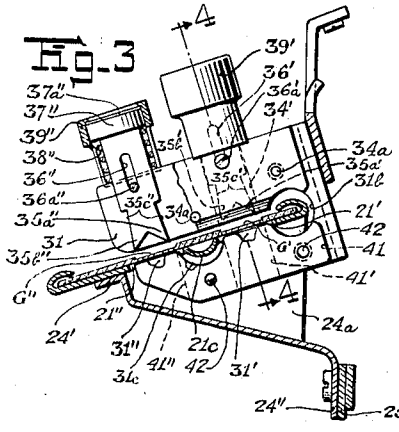


Fig. 4

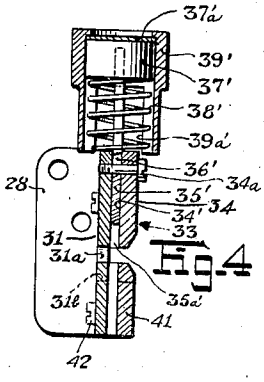
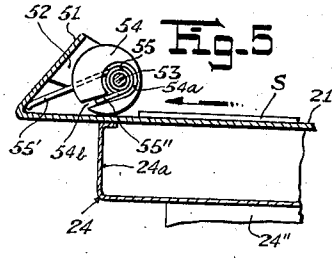


Fig. 5



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Fig. 11

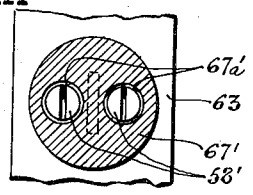


Fig. 6

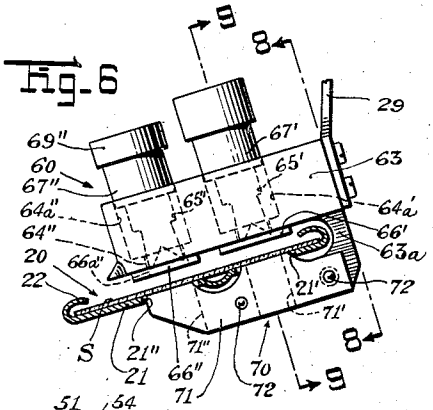


Fig. 10

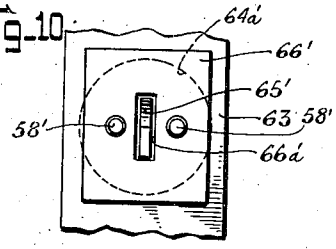


Fig. 7

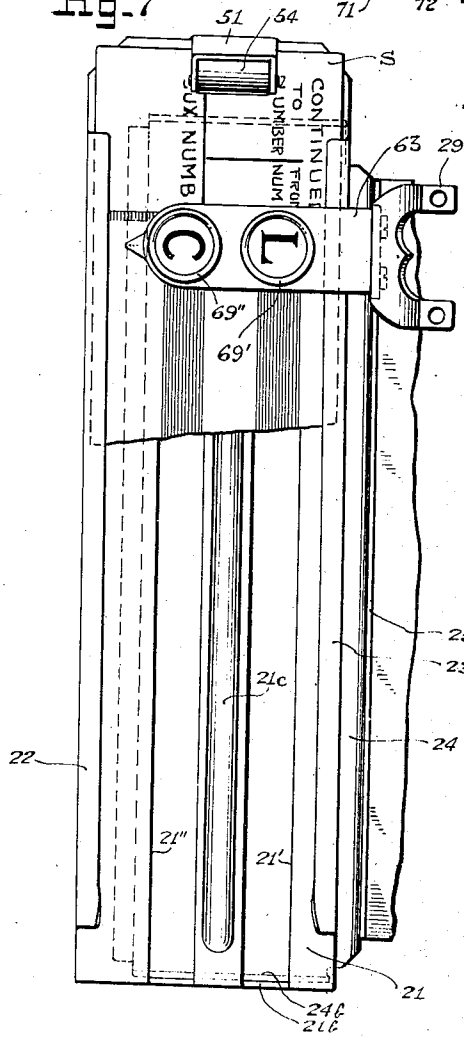


Fig. 8

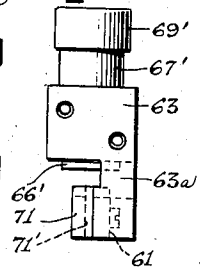
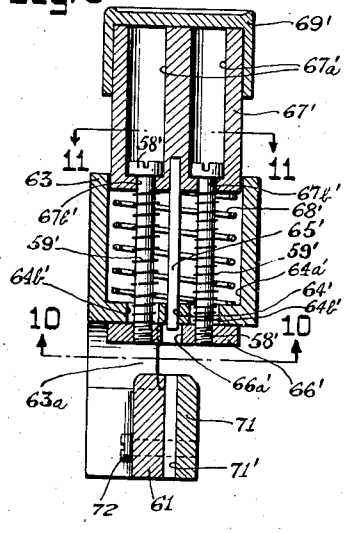


Fig. 9



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UNITED STATES PATENT OFFICE

2,184,914

PHONOGRAPH

Heinrich F. Max Gramann, Orange, N. J., assignor to Thomas A. Edison, Incorporated, West Orange, N. J., a corporation of New Jersey

Application October 29, 1937, Serial No. 171,653

5 Claims. (Cl. 164—112)

This invention relates to phonographs, and more particularly to phonographs of the type adapted for the recordation of dictation or the like.

It is well known that in the use of such phonographs there is frequent necessity for the effective annotation of the record—i. e., the identification or indication of points whereat errors in the recorded matter have been made and/or whereat those errors have been corrected, points whereat individual sequences of dictation (letters or the like) begin and end, etc. It has been common practise to provide, for use with each record, an individual index slip—i. e., a piece of paper or other suitable material—which may be held in some predetermined relationship to the record during recordation on the latter and on which these annotations for that record may be made. This slip may be suitably employed and referred to in later transcription from the record.

It is an object of my invention to provide improved means, characterized by simplicity of use and uniformity of operation, for making the annotations on the index slip held in the phonograph.

It is another object to provide improved arrangements of the index slip holder and annotation-making means in such a machine.

It is another object to provide improved means for making the annotations by perforating or punching the so-held index slip, characterized by uniformity of operation and perfection of action over long periods of use.

It is another object to provide improved such means which locally clamp the index slip at the region of punching.

It is another object to provide an improved punch assembly for operation upon a so-held index slip, characterized both by excellence of operation and ease of assembly.

It is another object to provide an improved and simplified arrangement for the disposal of the punchings from the index slip in a machine of the character described.

It is another object to provide an improved form of index slip for use with punching means in a phonograph, characterized at once by ruggedness and by ease of perforation by those means.

It is another object to provide improved means for retaining the slip in proper place in the phonograph, characterized both by proper ease of insertion and removal of the slip and by effectiveness of holding.

Other and allied objects will more fully appear from the following description and the appended claims.

In the description reference is had to the accompanying drawings, of which:

Figure 1 is a vertical cross-sectional view of a phonograph wherein my invention has been embodied in one form, taken along a front-and-back plane very near the right-hand end of the machine so that most portions appear in elevation;

Figure 2 is a plan view of the index slip holder, with a slip held therein, and of the annotation-making means, a small portion of the latter appearing in section;

Figure 3 is an enlarged elevational view of the annotation-making means, certain exterior portions being broken away for the better illustration of interior portions;

Figure 4 is a cross-sectional view taken along the line 4—4 of Figure 3;

Figure 5 is a cross-sectional view taken along the line 5—5 of Figure 2, illustrating particularly the slip-retaining means;

Figure 6 is a view generally similar to Figure 3 but illustrating a modified form of annotation-making means according to my invention;

Figure 7 is a view generally similar to Figure 2, but illustrating that modified form of annotation-making means;

Figure 8 is a cross-sectional view taken along the line 8—8 of Figure 6;

Figure 9 is a cross-sectional view taken along the line 9—9 of Figure 6;

Figure 10 is a cross-sectional view taken along the line 10—10 of Figure 9; and

Figure 11 is a cross-sectional view taken along the line 11—11 of Figure 9.

In Figure 1 appear the principal portions of a phonograph P. These may include a base plate 1 having a central standard 2 and end standards, one of which latter appears as 3. Rotatably journalled in the standard 2 is a cylindrical mandrel 4, onto which may be removably mounted a cylindrical record R (the term "record" being used in a broad sense to include a blank before the recordation of matter thereon). The mandrel 4 and any record mounted thereon is adapted to be rotated in a clockwise direction by a motor (not shown), the rotation being controlled as by an electrically actuated clutch mechanism (not shown). A carriage 5, slidably supported on guide rods 6 and 7 which in turn may be supported by the end standards, is caused to move longitudinally with respect to the record along those rods as the mandrel is rotated; such

carriage movement is effected by a feeding mechanism comprising a feed screw 8 journalled in the end standards, and a feed nut 9 carried by an arm 10 secured to the carriage, the feed screw being rotarily driven by the mandrel rotation through a gear train 11 schematically illustrated.

In the forward portion of the carriage 5 is carried the sound box 12, provided with the recording stylus 13, and if desired with a reproducing stylus as well (not shown). A control lever fractionally shown as 14 may be provided at the top of the carriage, rockable forward and backward from a neutral position to selectively engage either the recording stylus 13 or the reproducing stylus with the record; when in neutral position it may disengage the feed nut 9 from the feed screw 8, to then stop the carriage movement. A neck 15 may extend upwardly from the sound box, forming a means, connectable with a speaking tube (not shown), for the conveyance of sound to and from the sound box.

Parallel with the path of the carriage 5, and preferably in front of and below that path, is mounted a holder 20 for an index slip S; this holder may comprise a base 21 having upwardly folded-over flanges 22 and 23 respectively along its front and back edges—a slip S being inserted therein by longitudinally sliding it under those flanges. The holder may be inclinedly disposed so that the top surface of a slip S held therein will face somewhat forwardly as well as upwardly. An index slip holder as so described will be recognized as known. I prefer, however, to support the same in a particular manner: that is, so as to leave free of support connection the rear edge and both the top and bottom of the holder for a substantial width forwardly from that rear edge, for substantially the full length of the holder. This I do as by securing a supporting plate 24 (e. g., by a flange 24′ thereon) to the bottom of the holder base 21 along a line near the front of the latter; the plate 24 may extend rearwardly and downwardly from flange 24′ to terminate in another flange 24″, which latter may be secured to an up-standing strip 25 in turn secured to the base 1. The plate 24 may if desired have the up-turned ends 24*a* and 24*b* secured to the bottom of holder base 21 along or near the ends of the latter; these ends, however, will of course not interrupt the freedom of support connection particularly mentioned above. The right-hand end of the holder base 21, from which end a slip S is slipped into place in the holder, may be folded downwardly to form the end flange 21*b*.

For making the annotations on a slip S held in the holder 20, I punch holes—preferably in the form of transverse narrow slits such as T′ and T″—through the slip. For doing this I employ a punch assembly 30 secured to the carriage 5 as by bracket 29 down-hanging from the latter. This assembly may comprise punch means 32 and cooperating die means 40, connected together in back of the rear edge of holder 20, extending forwardly respectively above and below the holder and slip held therein, and of course moved longitudinally of the holder and slip in accordance with the longitudinal travel of the carriage relative to a record R on mandrel 4. In the illustration and description the punch means have been made to include two punches, respectively arranged for travel over two distinct paths such as S′ and S″ on a slip S, annotations in which two paths may have respectively different significances—for example, those in the rear path S′ indicating length of dictation sequences and those in the front path S″ indicating points of error and/or correction—but it will be understood that no unexpressed limitation to any particular number of punches or significance of annotations is intended. For permitting the cooperation of the punch means and die means, the holder base 21 is longitudinally apertured under the paths S′ and S″—as indicated by the apertures 21′ and 21″ in Figure 3—so that not only is the top surface of a slip S held in the holder immediately exposed to the punch means, but also the bottom surface of the slip under the punch is immediately exposed to the die means. The portion 21*c* of the holder base 21 between the longitudinal apertures 21′ and 21″ may be cross-sectionally curved or dished downwardly, as shown in Figure 3, for longitudinal reinforcing purposes.

While no unexpressed limitation thereto is intended, I prefer the slit formation of the perforations in the slip S (particularly when the slit is narrow and is directed toward the record) because of its resemblance, when the slip in later use is backed by a surface of contrasting color, to linear marks such as have been made on index slips as annotations by conventional annotating structures.

As illustrated in the earlier figures of the drawings, I may conveniently employ, as a common part of both the punch means 32 and the die means 40, a forward-and-backward extending, vertical plate 31. This may have a folded-over rear lug portion 28 secured, and forming the means for securing the entire punch assembly 30, to the carriage bracket 29. The plate 31 may further be provided with the generally horizontal slot 31*a* extending rearwardly from its front to near its rear edge, dividing it into upper and lower portions which extend forwardly respectively above and below the holder 20 to approximately the front edge of the front longitudinal aperture 21″ therein—or, from the reverse point of view, the holder 20 becomes disposed within the slot 31*a*. While the bottom edge of the upper portion of plate 31 may be in small but appreciable spaced relationship to the top of a slip S held in holder 20, it is desirable that the top edge of the lower portion of plate 31 have extensions passing upwardly into the longitudinal apertures 21′ and 21″ in holder base 21 and almost into contact with the bottom of the held slip S. Such extensions, indicated as 31′ and 31″, are provided by making the slot 31*a* appropriately narrow and by locally enlarging it—e. g., between 31′ and 31″ by the downward hemispherical notch 31*c*, and behind 31′ by a hole 31*b* (in which the slot 31 may terminate) which extends not only downwardly but also upwardly from the slot to provide clearance about the rear holder flange 23.

A housing 33 for the punches is formed by the upper portion of plate 31 together with a plate 34; a surface of the latter plate is provided with the generally vertical slots 34′ and 34″, and then secured against the plate 31 as by screws 34*a*—the slots 34′ and 34″ thus becoming punch-ways for the punches next described, and being of course respectively disposed above the paths S′ and S″.

The punches are shown as 35′ and 35″. Each punch may comprise a rectangularly cross-sectioned piece of metal—preferably of hardened steel—of thickness and width fitting slidably within the respective punch-way 34′ or 34″; pref-

erably, however, the width of each punch will be slightly reduced in its very bottom portion, as illustrated. The punches are respectively provided with the central, much-elongated holes 36' and 36''; to retain the punches in the housing 33 screws 36a' and 36a'', secured between plates 31 and 34, may pass through these respective holes. On the tops of the punches, which may extend well above the housing 33, are respectively secured the buttons 37' and 37''; and encircling the punches, between those buttons and the top of the housing 33, are the respective expansion springs 38' and 38''. These springs of course bias each punch to upward movement, which movement is limited by the impingement of the bottom of the elongated hole 36' or 36'' against the respective screw 36a' or 36a''; in that limiting position of each punch its bottom extremity is preferably at least substantially fully retracted within the housing 33. Over the buttons 37' and 37'' may be respectively slipped the cylindrical, slightly flanged caps 39' and 39''—which may if desired hold against the caps respective paper or Celluloid discs 37a' and 37a'' with indicia printed thereon to indicate the significance of annotation by the respective punch. In the normal or upward positions of the punches, these caps may extend downwardly to just below the top of the housing 33; to permit this, and to permit downward movement from those positions for punch operation, the caps are provided with respective pairs of slots 39a' and 39a'' extending upwardly from their bottom edges.

The die means 40 in the structure of the earlier figures is formed by the lower portion of plate 31, together with a plate 41 elevationally similar to that lower plate portion. A surface of the plate 41 is provided with the generally vertical slots 41' and 41'', which may be of similar thickness and width to the slots or punch-ways 34' and 34'' abovementioned, and then secured as by screws 42 against the lower portion of plate 31 in elevational alignment therewith—the position of the slots 41' and 41'' in plate 41 being such that the holes which they form become respectively aligned with the punch-ways 34' and 34''.

The entire punch assembly 30 will of course travel along a slip S held in the holder 20, normally without contact with that slip or holder, in accordance with the carriage travel relative to the record. At any point in the travel at which it is desired to make an annotation, the travel will be stopped, and the appropriate one of the punch buttons 37' and 37'' will be depressed. This will move the associated punch downwardly, against its bias, so that its lower extremity will contact the slip S, and will tend to force that strip downwardly into the holder base aperture 21' or 21'', as the case may be. That slip movement, however, is almost immediately stopped by slip impingement against the top of the die means 40, and further pressure on the punch button will force the punch through the slip—the die means insuring definiteness of action, as well as clean and sharp edges of the slit punched in the slip, in view of the similar thickness of the die means holes 41' and 41'' to, and their respective alignment with, the punch-ways thereabove.

I have found that the most desirable formation for the lower extremity of each punch is an elevationally double-pointed one, this insuring exceptionally clean and sharp slit ends. Still further, I have found it desirable that the two points in the case of each punch be of slightly unequal length, so that one point comes into contact with and at least tends to begin piercing a slip S before the other, this insuring the greatest ease of operation of the punch and being otherwise desirable. As an embodiment of such formation I have shown the lower extremities, or cutting ends of the punches, as elevationally of an inverted V-shape—having the respective longer points 35a' and 35a'' and the respective shorter points 35b' and 35b''. It will of course be understood that each of these four, while elevationally a point, comprises a linear cutting edge of length equal to the thickness of the punch, as appears from 35a' in Figure 4.

There is also desirable a slight progressive widening of the lower portion of each punch toward its points 35a'—35b' or 35a''—35b''. This I have illustrated in Figure 3 by the downwardly slightly diverging edges 35c' and 35c'' in these portions of the respective punches; it is of course permitted without widening of the punch-ways 34' and 34'' in view of the slight general width reduction of these punch portions, abovementioned. An advantage of this configuration is the avoidance of frictional contact of the edges 35c' and 35c'' with the ends of a slit in process of being punched in the slip, after the initial penetration of the punch points.

For the maximum facilitation of the punching operation, while preserving a desirable stiffness or ruggedness of each slip S, I have found advantageous the provision, in one or the other face of each slip, of longitudinal grooves which will respectively lie above the holder base apertures 21' and 21'' when the slip is in the holder, and which will accordingly coincide with the paths S' and S'' abovementioned. Such grooves are indicated in Figure 3 as G' and G'', respectively, each being formed by removing a portion of the thickness of the slip material; these grooves have been illustrated, as I prefer, as formed in the top surface of the slip, but no unexpressed limitation to that surface is intended.

The punchings, or small pieces removed from the slip S by the action of the punches, will fall downwardly through the die means holes 41' and 41''. For purposes of their disposal I provide, beneath both the holder 20 and the path of travel of the die means 40, means which diverts the punchings into a receptacle 26 provided in well known manner underneath the mandrel 4 to receive the cuttings removed from the record R by the recording stylus 13 in its recording action. This diverting means may be the plate 24 abovementioned as supporting the holder 20, that plate being suitably inclined downwardly and rearwardly, and the forward edge of the receptacle 26 substantially abutting against the upstanding strip 25 at which the plate 24 terminates.

In Figure 2 there appears in plan view, and in Figure 5 in cross-section, a means for positively retaining an index slip S in place in the holder 20, as by "clipping" it. This means has been illustrated as a resiliently mounted cam 54 arranged to offer very slight resistance to the insertion of a slip into its place in the holder, but materially greater resistance to its removal—so that the slip will not be disturbed excepting by a deliberate removing operation. A mounting for this means may be provided at the left-hand extremity of the holder 20, by an extension 51 of the holder base 21, inclinedly folded back to extend upwardly and rightwardly from that extremity, by vertical lugs 52 folded over from the extension 51 at its front

and back edge to extend rightwardly therefrom, and by a horizontal cross-pin 53 secured to and extending between those lugs. The cam means 54 may be of cylindrical form, provided with an offset longitudinal hole 54*a* nearest one surface portion of the cylinder, and with a longitudinal slot 54*b* extending tangentially from the hole to a materially removed surface portion. The hole 54*a* surrounds the cross-pin 53, but with a material spacing therefrom, within which spacing a spiral spring 55 is coiled about the cross-pin. One end 55'' of the spring is retained in the slot 54*b*, while the other end 55' is extended adjacent one of the lugs 52 to be retained in the angle between the holder base 21 and the extension 51.

The spring 55 is tensioned to urge the cam 54 to counter-clockwise rotation as shown in Figure 5; but the cam is disposed with its major portion to the left of the cross-pin 53, and that cross-pin is so near the holder base 21 that such cam rotation is limited by impingement of its surface against that base. In Figure 5 a slip S is shown approaching the cam in the process of the slip insertion. As it is pushed still further leftwardly it will impinge against the cam and pass under it, simply causing a slight clockwise rotation of the cam against the bias of the latter. In any attempt to draw the slip rightwardly for removal from the holder, however, the friction of the surface of the slip S against the cam surface will unite with the cam bias to urge counter-clockwise cam rotation, tending to "lock" the slip against such rightward movement. The bias of the cam by spring 55 may of course be made light enough so that the slip will slide under the cam in spite of this locking tendency, upon a reasonably firm, deliberate pull on the slip—although if desired the cam 54 may itself be manipulated in aid of the "unlocking" of the slip.

Figures 6 et seq. of the drawings illustrate an embodiment of my invention modified in respect of the punch assembly, which in these figures is broadly designated by the numeral 60. Most importantly the modification comprises the inclusion with each punch of a respective presser-foot, which is brought down into contact with a slip S in advance of the punch and locally clamps the slip during the actual punching operation; it also clamps the slip during the ensuing retraction of the punch from out of the slit which it has made, thereby suppressing any possible tendency of the slip to "ride" upwardly with the punch during that retraction.

In this embodiment the housing for the punch means is a metallic block 63 having its rear extremity secured to the carriage bracket 29, and extending therefrom forwardly above the holder 20 as did the housing 33 of earlier figures, excepting that its bottom may be somewhat further spaced above the holder. In the top of this block 63, and extending therefrom almost through the block, are provided the relatively large circular holes 64*a*' and 64*a*'', respectively above the longitudinal apertures 21' and 21'' in the holder base 21. In the centers of the bottoms of these holes there are cut through to the bottom of the block 63 the respective rectangular punch-ways 64' and 64''. In the holes 64*a*' and 64*a*'' there will be seen the respective cylinders 67' and 67'', which may be surmounted by the respective caps 69' and 69''. Secured in and extending downwardly from the bottoms of these cylinders 67' and 67'', and passing through the punch-ways 64' and 64'', will be seen the respective punches 65' and 65''; these may be similar, in respect of their lower or cutting extremities, to the punches 35' and 35'' of earlier figures and therefore need not here be described in detail. Respectively associated with the punches 65' and 65'', and normally held against the bottom of the block 63, are the presser-feet 66' and 66'', centrally provided with the respective rectangular apertures 66*a*' and 66*a*'' very slightly larger than necessary to pass the respective punches. The interrelationship of the several components just referred to may be more precisely described with reference to Figures 9, 10 and 11, illustrating the same for the rear one of the punches 65'—it being understood that the assembly for the other or forward punch 65'' will be entirely analogous.

The cylinder 67' is provided with two longitudinal holes 67*a*' on either side of its center, extending from its top extremity almost to its bottom extremity; and from the bottoms of these holes to that bottom cylinder extremity there extend the respective smaller holes 67*b*'. In the bottom of the hole 64*a*' in the block 63, on either side of the punch-way 64' and centered below the cylinder holes 67*b*', are provided holes 64*b*'. Screws 58', having their heads disposed within the cylinder holes 67*a*', pass through the cylinder holes 67*b*' and through the holes 64' in block 63, and terminate in threaded engagement with the presser-foot 66' on either side of its central aperture 66*a*' abovementioned. A coiled expansion spring 68' surrounds the screws 58' and the punch 65' between the bottom of the cylinder 67' and the bottom of hole 64*a*' in block 63, urging the cylinder to upward movement; this movement is of course limited by the screws 58' and the impingement of the presser-foot 66' against the bottom of the block 63. There are also provided two further springs 59', respectively surrounding the screws 58' between the bottom of the cylinder 67' and the top of the presser-foot 66'; these bias the presser-foot 66' to the greatest separation from the cylinder 67' permitted by the screws 58'. Accordingly when the punch is operated by downward pressure on the cap 69' and cylinder 67', the presser-foot will move downwardly into contact with the top of the slip S in the holder; and only after this contact has been effected, and while it is being maintained and the slip thus locally clamped, will the punch 65' be projected downwardly out of the presser-foot aperture 66*a*' to pierce the slip.

Die means 70, analogous to the die means 40 of earlier figures, are provided in the punch assembly 60 of Figures 6 et seq. by a bar 61, joined at its rear extremity to the rear extremity of block 63 as by the connecting portion 63*a*, and extending forwardly underneath the holder S with a similar elevational contour and substantially similar position to that of the lower portion of plate 31 of earlier figures; and by a plate 71 similar to the plate 41 of earlier figures, held to the bar 61 as by screws 72. The surface of plate 71 secured against 61 will of course be provided with slots 71' and 71'' respectively similar to 41' and 41'' of earlier figures, which slots will form die holes respectively aligned with the punch-ways 64' and 64''.

If there were employed in the structure of Figures 6 et seq. even the slight spacing of the die means below the bottom of a slip S held in holder 20 which was shown in the earlier figures, the action of the presser-foot would be a clamping of the slip against the holder only and not a clamping thereof against the die means. It may, however, be desirable that the action of the presser-

foot be extended to comprise the latter of these clampings; and I have accordingly illustrated the die means in Figure 6 as extending up through the holder base apertures 21' and 21'' into full contact with the bottom of a held slip S. This will of course tend to cause a light longitudinal rubbing of the bottom of the slip by the die means as the entire punch assembly travels rightwardly along the slip; this, however, has in no way been found objectionable, particularly when positive slip retaining means such as 50 are employed.

While I have disclosed my invention in terms of specific embodiments thereof, I do not intend that its broader aspects be unnecessarily limited by virtue of the details of those embodiments; accordingly in many of the appended claims I undertake to express the scope of the invention broadly, subject however to such proper limitations as the state of the art may impose.

I claim:

1. In apparatus of the character described including a carriage: the combination of a holder for an index slip, said carriage and holder being arranged for relative movement, and said holder comprising a slip-supporting base provided with a narrow aperture extending parallel with the path of said movement; and a punch assembly secured to said carriage for relative movement of said assembly and said holder, and including a die extending into said aperture and at least substantially into contact with the bottom of a slip held in said holder.

2. In apparatus of the character described including a carriage: the combination of an apertured holder for an index slip, said carriage and holder being arranged for relative movement; a plate secured to said carriage and having a plane substantially normal to the path of said movement, said plate being provided with a slot surrounding said holder; punch means assembled to said plate on one side of said slot; and a member secured to said plate on the other side of said slot and forming with said plate a die for said punch means.

3. In apparatus of the character described including a carriage: the combination of an apertured holder for an index slip, said carriage and holder being arranged for relative movement; a plate secured to said carriage and having a plane substantially normal to the path of said movement, said plate being provided with a substantially horizontal slot surrounding said holder; a second plate having a surface provided with a substantially vertical slot and secured against said first plate on one side of said slot therein to form a punch-way; a punch in said punch-way; and cooperating die means associated with said first plate on the other side of said slot therein.

4. In apparatus of the character described including a carriage: the combination of a punch assembly carried by the carriage and having normally separated cooperating parts; and a holder for an index slip, said carriage and holder being arranged for relative movement, and said holder being interposed between said parts, being provided with slots parallel with the path of said movement through which said punch assembly parts are operable, and comprising solid slip-supporting portions between and surrounding said slots.

5. In apparatus of the character described including a carriage: the combination of an apertured holder for an index slip, said carriage and holder being arranged for relative movement; a plate secured to said carriage and having a plane substantially normal to the path of said movement, said plate being provided with a substantially horizontal slot surrounding said holder; a second plate having a surface secured against a surface of said first plate on one side of said slot, at least one of said surfaces being provided with a substantially vertical slot forming a punch-way; a punch in said punch-way; and cooperating die means associated with said first plate on the other side of said substantially horizontal slot.

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