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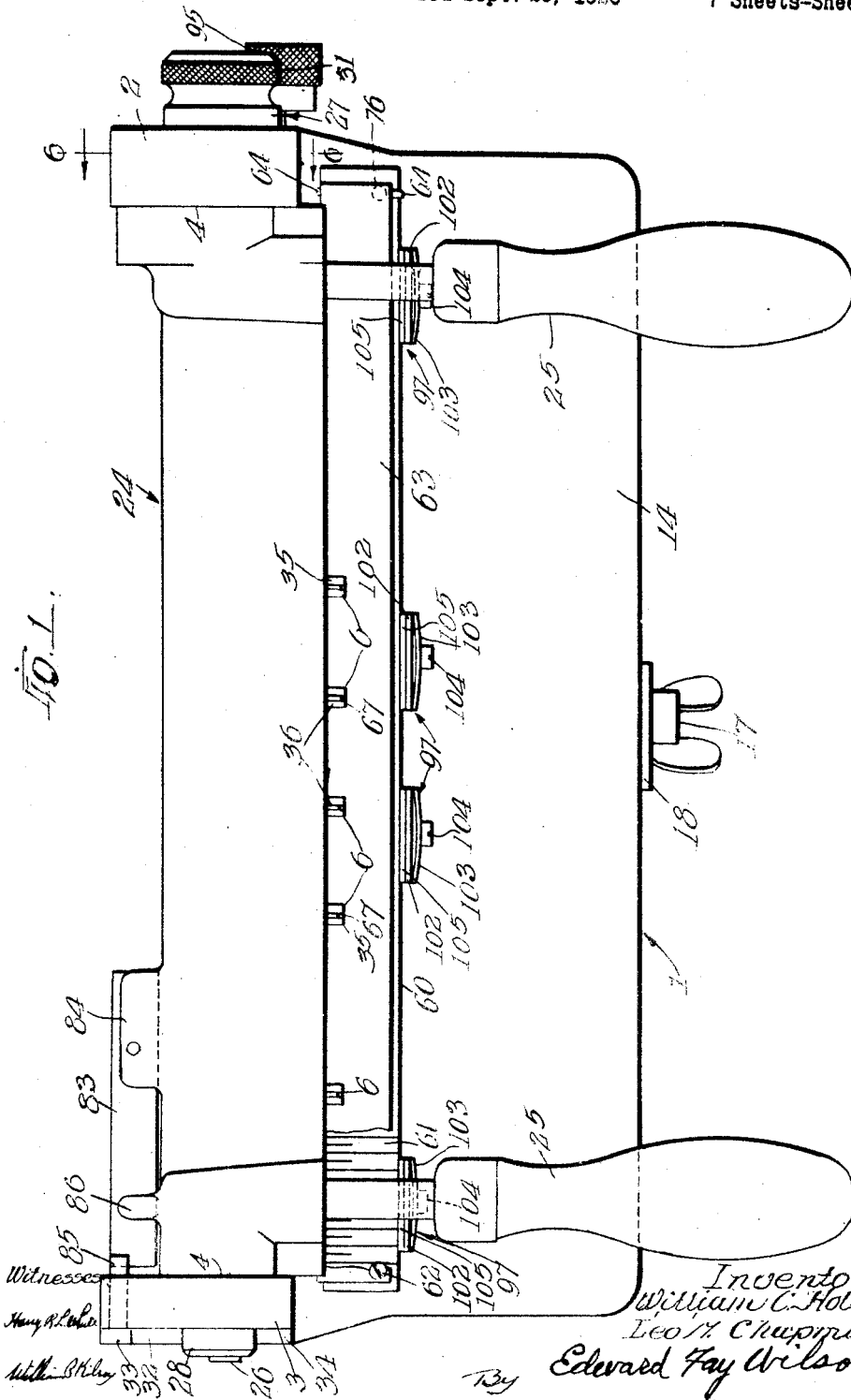
W. C. HOLLISTER ET AL

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BROACH

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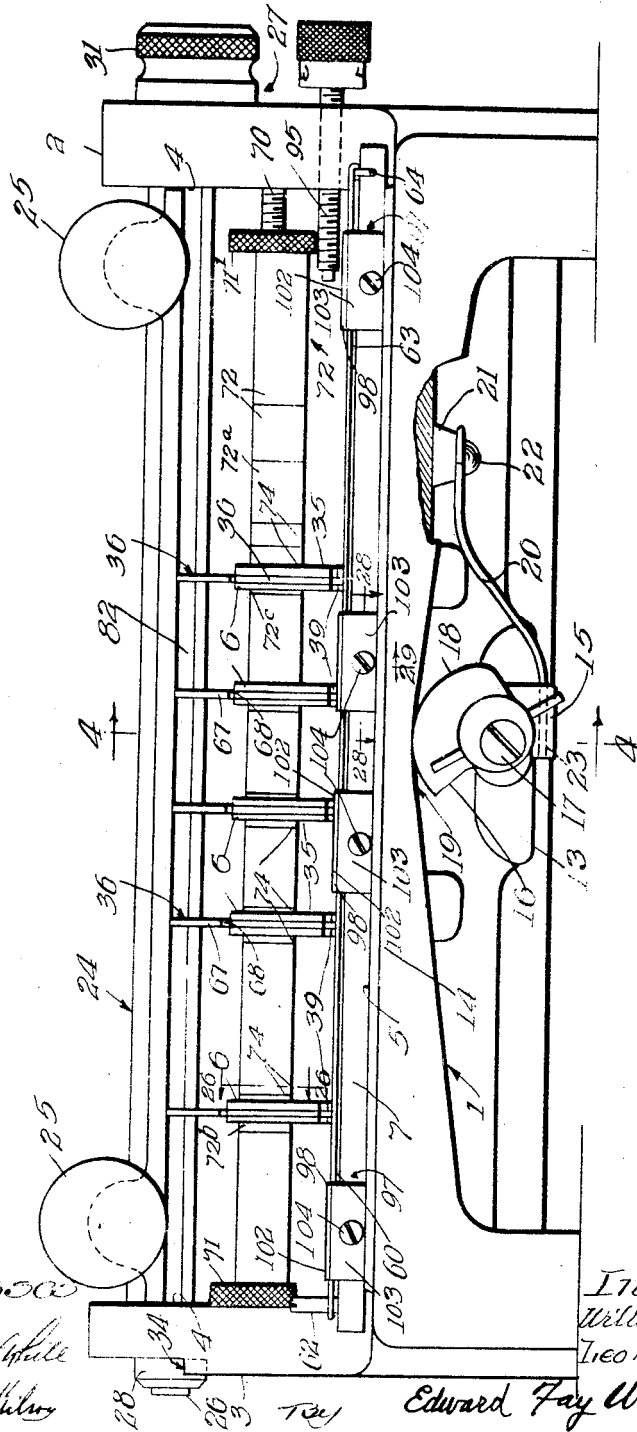
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FIG. 2



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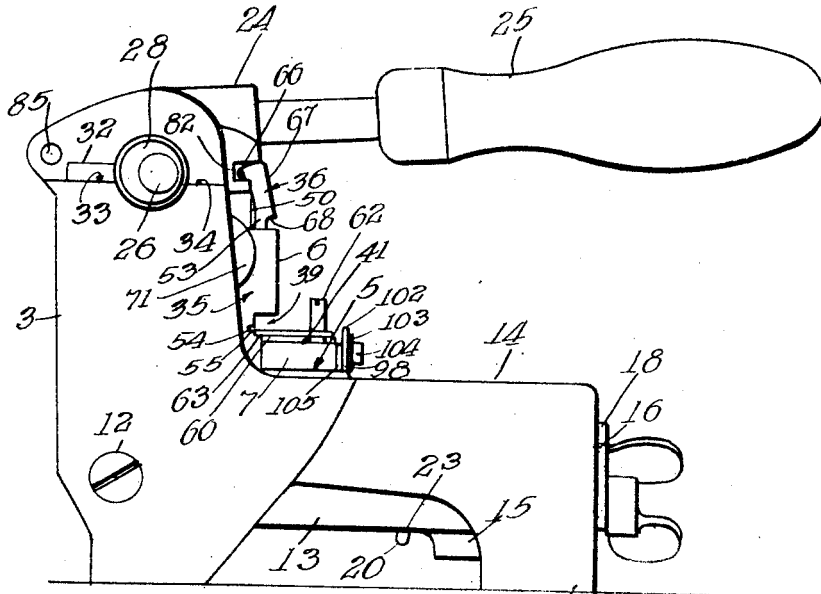
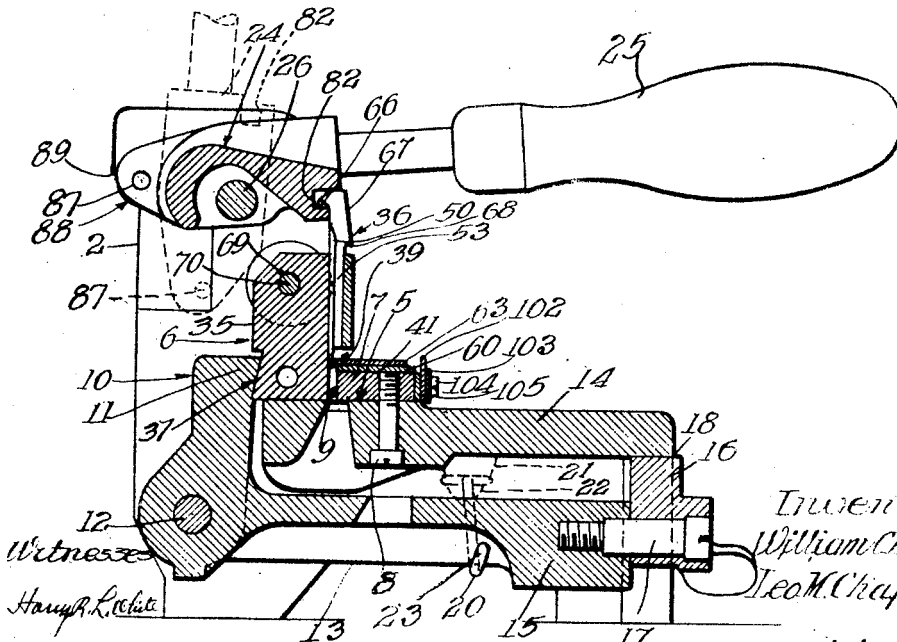


Fig. 4.



Witness

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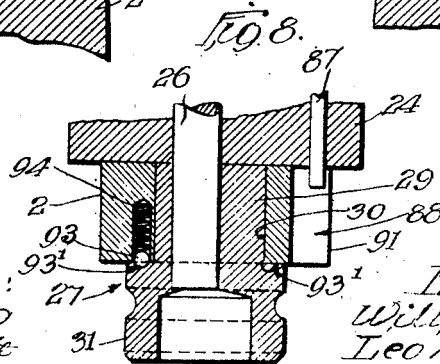
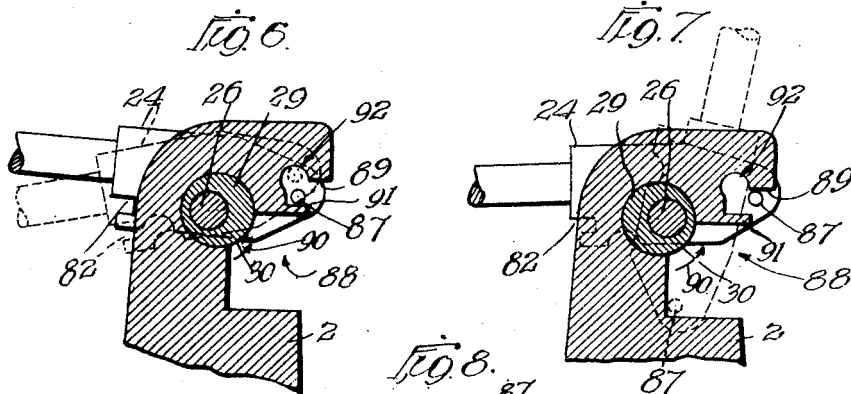
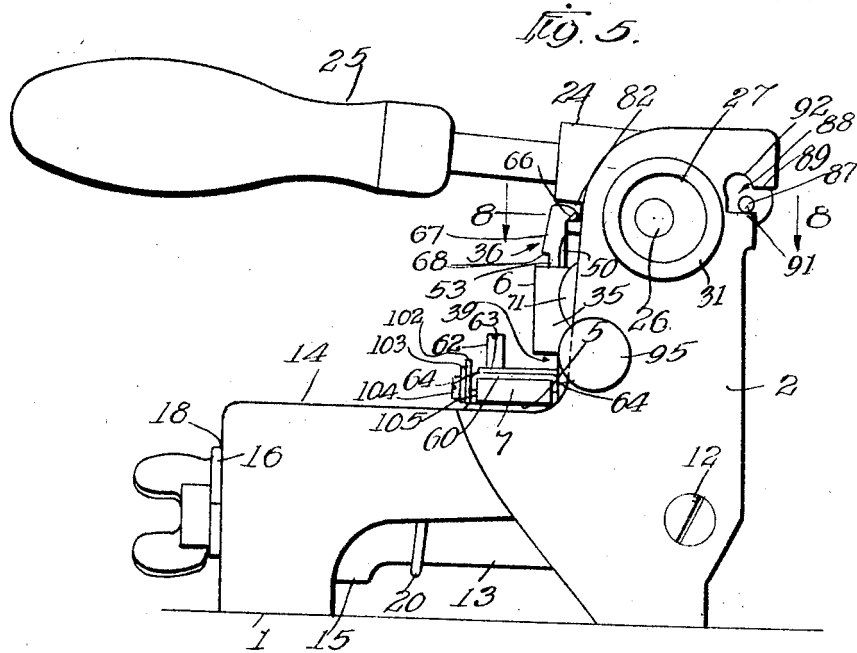
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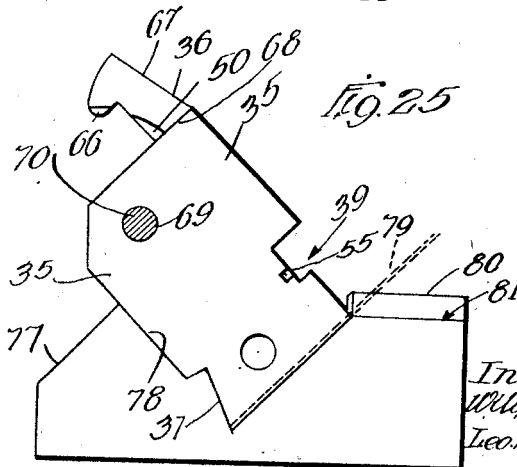
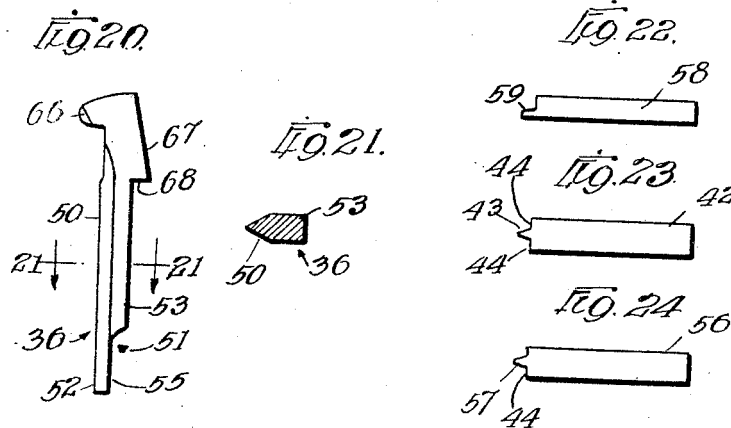
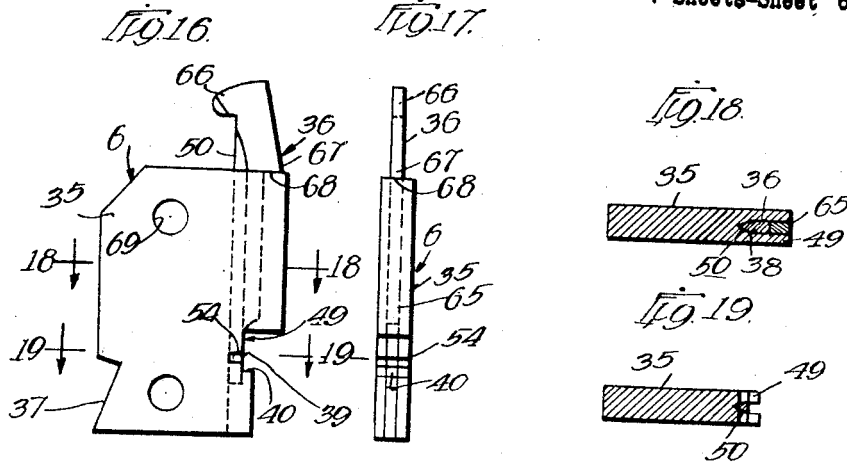
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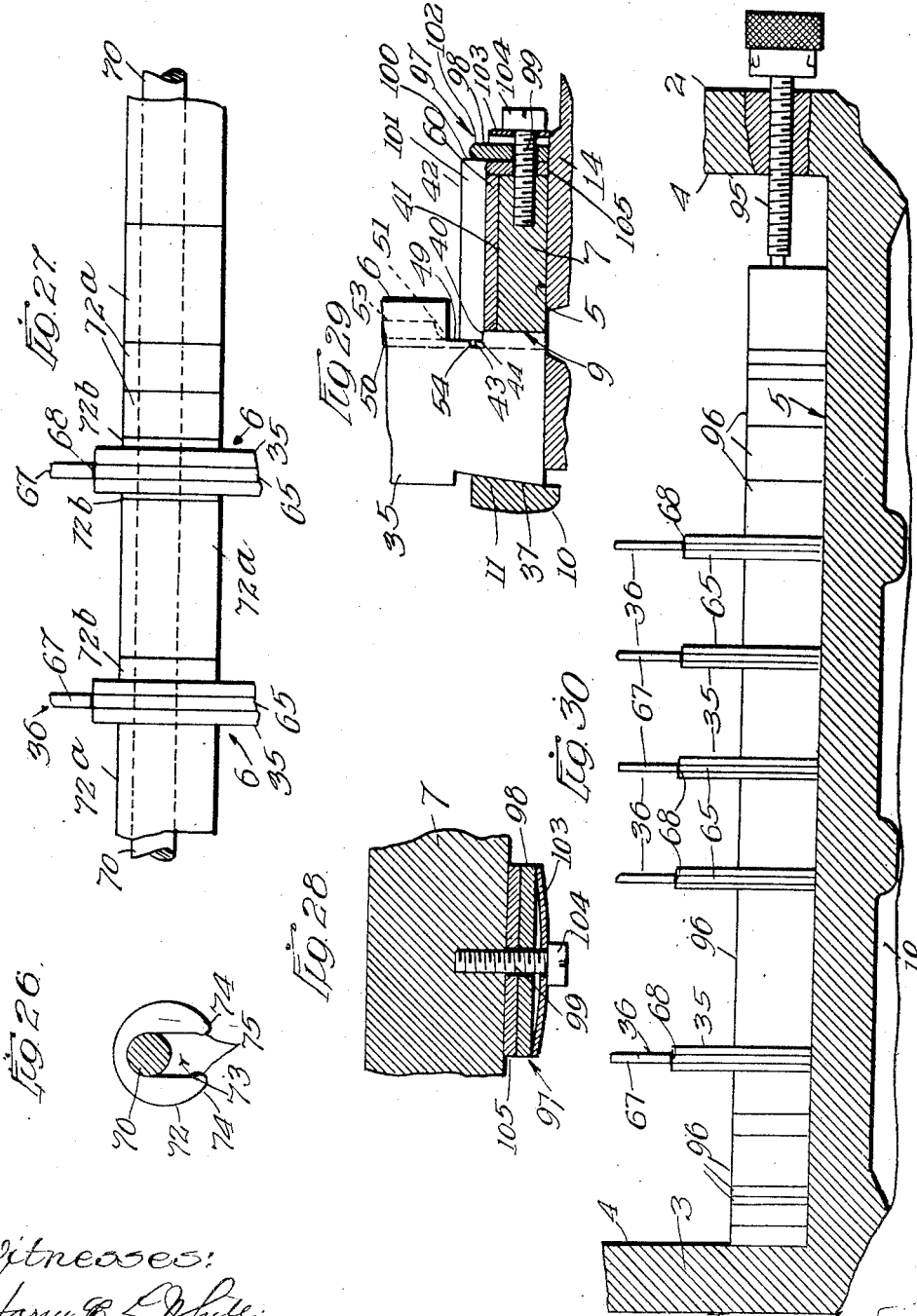
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7 Sheets-Sheet 7



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UNITED STATES PATENT OFFICE.

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TO CHICAGO LINO-TABLER COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION
OF ILLINOIS.

BROACH.

Application filed September 23, 1926. Serial No. 137,321.

Our invention relates to the art of providing printing forms with means for printing vertically extending lines. Such lines or ruling is particularly used or desired in the production of tabular matter and our invention relates to improved means for producing openings in horizontally disposed strips for receiving the small triangular shaped rules disclosed in the Stevenson U. S. Patent No. 1,049,165.

This present invention is an improvement upon our novel rule broaching machine described and claimed in our application for Letters Patent on "broach" filed March 7, 1925, Serial No. 13,734.

Our invention, as herein disclosed, relates to a multiple punching device similar to that disclosed in our said application, and relates particularly to improved means for spacing the punch units and retaining them in spaced relation for operation upon the strips in which the rule receiving openings are to be made.

Another feature of our invention relates to improved means for holding the strips accurately in position while being punched.

Another feature relates to improvements in the punch units by which they are made more durable and the whole device is made more satisfactory.

It is particularly our object to reduce the cost of our broaching device, make it easier to operate, make it more durable and generally to make it more satisfactory in use.

Other features of importance will be made plain and our invention will be more clearly understood by reference to the following description taken in conjunction with the accompanying drawings, forming part of this specification and in which:

Fig. 1, is a plan view of a device embodying the invention in a preferred form;

Fig. 2, is a front elevation of the device;

Fig. 3, is an end elevation of the device as seen from the left hand end, Fig. 2;

Fig. 4, is a vertical sectional view on the line 4—4 of Fig. 2;

Fig. 5, is an end elevation of the device, as seen from the right hand end, Fig. 2;

Fig. 6, is a fragmentary, vertical section on the line 6—6 of Fig. 1;

Fig. 7, is a sectional view similar to Fig. 6, showing different positions of some of the parts;

Fig. 8, is a fragmentary, horizontal section on the line 8—8 of Fig. 5;

Fig. 9, is a diagrammatic view, partly in vertical section and illustrating some of the movements of the punch operator;

Fig. 10, is a view similar to Fig. 9, illustrating other movements of the punch operator;

Fig. 11, is a fragmentary plan view of a printed sheet, showing a vertically ruled printed table as an example of the product which the device is adapted to be used in making;

Fig. 12, is a side elevation of a piece of printer's material provided with rule receiving openings illustrative of the operation of the device;

Fig. 13, is a fragmentary, perspective view of a horizontal line printing slug provided with a rule holding perforation;

Fig. 14, is a fragmentary, perspective view, showing a line printing rule similar to that shown in Fig. 13, and with a piece of vertical line printing rule in place in the rule receiving opening;

Fig. 15, is a fragmentary, perspective view of a different form of horizontal line printing rule provided with a rule receiving opening;

Fig. 16, is a side elevation of one of the punch units;

Fig. 17, is a front elevation of one of the punch units;

Figs. 18 and 19, are horizontal sections on the lines 18—18 and 19—19, respectively, of Fig. 16;

Fig. 20, is a side elevation of one of the punches;

Fig. 21, is a horizontal section on the line 21—21 of Fig. 20;

Figs. 22, 23 and 24, are respectively end views of three forms of rule holding slugs or type form members;

Fig. 25, illustrates a method of setting the punch units to register with a prepared slug or any other prepared scale or sample indicating the spacing of vertical rules desired;

Fig. 26, is a detail, vertical section on the line 26—26 of Fig. 1;

Fig. 27, is a fragmentary, side elevation, particularly illustrating the separators for the punch housings;

Fig. 28, is a detail, horizontal section on the line 28—28 of Fig. 2;

Fig. 29, is a fragmentary, vertical section on the line 29—29 of Fig. 2; and

Fig. 30, is a fragmentary, longitudinal, vertical section of the device, particularly illustrating a modified means for clamping the punch unit in place.

In said drawings 1 illustrates a rectangular base provided at its ends with upstanding posts 2, at the right hand end, and 3 at the left hand end. The opposed vertical faces 4 of these posts are parallel with each other and the various operating parts of the device are mounted between these parallel surfaces.

The top surface 5 of the base 1 (Fig. 4) is flat, extends from post to post, and forms a table upon which the punch units 6 are placed and held in alignment. This surface 5 is defined at its front edge by a fixed longitudinal shoulder member 7, secured upon said surface 5 by screws 8 and having a rear edge 9 against which the punch units 6 are clamped to hold them in perfect alignment during the punching operations.

For thus clamping the punch units there is provided a clamping bar 10 having a longitudinal jaw 11 opposed to the longitudinal shoulder 9. The clamping bar 10 is pivotally mounted at its ends between the surfaces 4 on pivots 12 to swing back and forth so as to move the jaw 11 from and toward the shoulder 9 to release and clamp the punch units 6. For swinging the clamping bar 10, it is provided with a rigid arm 13 extending forward beneath the top wall 14 of the base and carries on its forward end 15 a cam member 16 mounted on a horizontally projecting pin 17 secured rigidly in the forward end of the arm 13. The cam member 16 is rotatable on the pin 17 and has an eccentric cam surface 18 which can be turned into engagement with the under surface 19 of the top wall 14 of the base 1 to depress the free end 15 of the arm 13 and cause the clamp bar 10 to swing forward toward the shoulder 9 to clamp the punch units located therebetween. When the cam member 16 is rotated back to free the punch units the clamp bar 10 is swung toward the rear by a spring 20 in the form of a spring wire secured at one end upon a boss 21, projecting down from the top wall 14 of the base by a screw 22. The free end 23 of the spring 20 projects beneath the free end of the arm 13 and tends to hold it up and thus hold the clamp bar 10 out of clamping position and free of the punch units.

Between the opposed surfaces 4 of the

posts 2 and 3 a second longitudinal member 24 is arranged and extending from post to post. This member is the punch operator and is mounted to swing up and down on a horizontal axis, its front edge being arranged to swing up and down to operate the punches. It is provided with forwardly extending, rigidly, projecting handles or lever arms 25, one at each end, by which it can be easily operated. The operator 24 is mounted on a horizontal bearing rod 26 which extends through the posts 2 and 3 and the ends of the bar 26 are supported in bearing members 27 at one end and 28 at the other end, which have inner bearing ends 29 mounted in aligned openings 30 (see Fig. 8) in the posts 2 and 3. The ends of the rod 26 are eccentrically mounted in the bearing members 27 and 28 and are rigidly connected thereto to rotate therewith. The bearing member 27 is provided on its outer end with a knurled head 31 by which the bearing members 28 and 29 and rod 26 can be rotated back and forth. The rotation of the bearing rod 26 is limited to 180 degrees by a pin 32 which projects radially from the bearing member 28 and contacts at its opposite limits with shoulders 33 and 34 on the post 3, (see Fig. 3). By rotating the eccentric bearings 28 and 29 with the bearing rod 26 the operator 24 is moved back and forth transversely of the base 1. This movement is for engaging and disengaging the punches, as will be more fully described hereinafter.

The operator 24 is rotatably mounted on the rod 26 and can swing up and down in both limiting positions of the eccentric bearing members. When the operator is in its forward position it is in punch operating position, and when in its rear position it can be swung up so that its forward edge is carried back from a position over the punch units so that the punch units can readily be placed in position or removed therefrom. The operator is shown in dotted lines in its swung up position in Figs. 4 and 7.

The punch units 6, as best shown in Figs. 16 and 21, each comprise a housing 35 and a punch 36. The housing is preferably equal in thickness to the thickness of what are known as blank matrices used in the production of printing slugs for making blank spaces on the slugs between rows of figure characters. The lower ends of the housings are formed to fit between the shoulder 9 and the clamp bar 10 and be held tightly in position thereby. Preferably the rear edge 37 of the housing 35 is inclined, see Figs. 4 and 16, and the upper engaging edge of the clamp bar 10 corresponds therewith. This construction tends to seat the housings firmly down upon the flat top surface 5 of the base and also to force them firmly against the longitudinal shoulder 9, thus accurately aligning the

5 housings and their punches. Each housing is provided at its forward edge with a vertical guide channel or opening 38 for containing its punch. The punch unit seats on the flat surface 5 of the base and is pressed against the rear edge or shoulder 9 of the bar 7. At the height of the top of the shoulder member 7 the housing 35 is provided a horizontal notch 39 which intersects the punch guide channel 38. The lower end 40 of the notch 39 is horizontal and coincident with the top surface 41 of the shoulder member 7. The notch 39 is for the purpose of receiving the edge of the strip to be punched and to permit it to extend beneath the lower end of the punch 36.

10 In Fig. 15 the usual horizontal rule material is illustrated. Such rule material 42 (see Fig. 15) consists usually of a thin parallel strip having a V-shaped upper edge 43 which is narrower at its base than the thickness of the strip providing a narrow top shoulder 44 at each side of the V-shaped edge 43. The rule shown is what is known as a line rule, as the thin edge of the V-shaped upper edge prints a narrow line. Such rules are set in the form to print the horizontally extending lines, as shown at 45, Fig. 11. To print the vertically extending lines 46, see Fig. 11, we make use of small rules 47, as shown in Fig. 14. These rules 47 are in the form of a three cornered wire and are equal in height from one edge to the opposite base to the height of the V-shaped top edge on the slug 42. To permit the assembling of the rules 47 with the horizontal ruling member 42 or similar strips, the ruling strips are provided with V-shaped openings 48 which the present invention is designed to make. These openings 48 cut through the top of the V-shaped ridge 43 and the base of the opening is coincident with the shoulder 44 of the slug material. In Fig. 14 there is shown a piece of the wire-like rule 47 projected through one of the openings 48.

15 The rear wall 49 of the notch 39 is vertical and acts as a guide stop against which the shoulder 44 of the slug material is pressed when it is desired to punch the material, to receive the rules 47. The punch 36 is V-shaped at its rear edge 50. The V-shaped edge is of the same shape and dimensions as the wire-like rule 47 and the body of the punch is cut away at its lower end, as shown at 51, to produce a lower punching end 52 on the punch 36 which is triangular in shape so that when it operates it will punch a triangular shaped hole to receive the wire-like rule 47. Above the lower end 52 of the punch the body 53 of the punch extends forward and this body part is straight with parallel sides, except the V-shaped rear edge 50. The punch can slide up and down in the guide channel 38. In order to let the

V-shaped edge 43 of the rule material 42 project into the path of the lower end 52 of the punch the bottom wall 49 of the notch 39 is provided with a small notch 34. The bottom wall 49 of the larger notch 39 is coincident with the flat base 55 of the lower end 52 of the punch and the small notch 54 extends in to a depth substantially the same as the thickness of the punch from the base 55 to the opposite edge.

70 75 In the art to which this invention pertains there are certain predetermined or set dimensions, for instance, the shoulder 44 is .043 of an inch below the printing edge of the slug. Consequently the height of the wire-like rule is the same, viz, .043 of an inch, and the lower end 52 of the punch is of like size. Consequently when a slug such as that shown in Figs. 15 and 23 is laid on the flat top 41 of the shoulder member 7 its shoulder 44 can be placed against the bottom 49 of the notches 39 in the several punch units and the top or printing edge of the V-shaped rib will be aligned by the bottoms of the notches 54 in the several units. In other words, there are two aligning means, the bottom walls 49 for the shoulders 44 and the bottoms of the small notches 54 for the printing edges of the rule material. Sometimes, as shown in Fig. 24, the strip material 56 is non-printing, the ridge 57 being less than printing height. In such instance the shoulder 44 properly aligns the strip for punching. Some printers make use of very thin brass strips which have no shoulder but the printing edge of which is thinned down into triangular shape. Such strips are properly aligned by their printing edges contacting with the bottoms of the small notches 54.

80 85 90 95 100 105 To assist in properly setting the punch units and also setting the strips endwise on the support, there is provided a flat strip 60 which is secured flat on the top surface 41 of the shoulder member 7. This strip extends from end to end of the base along in front of the punch units and is provided on its top surface with a scale 61 showing printer's measure reading from the left to the right and beginning with "0" at a stop 62 (see Fig. 1), which stop can be used in setting the slugs to be punched. When the scale 61 is provided the shoulder member 7 is made low enough to accommodate it so that when the slugs 42 are laid on top of the scale the V-shaped edges can be properly entered into the notches 54.

110 115 120 125 When it is desired to punch the shoulderless metal rules or the rules 58 shown in Figs. 13, 14 and 22, a removable support strip 63 is provided which is laid on top of the strip 60. This removable strip is of a suitable thickness so that its top surface is coincident with the lower wall of the notch 54. The strip 63 is perforated at one

end to receive the stop 62 and at the other end has depending prongs 64 which straddle the shoulder member 7.

In producing the housing, preferably the channel 38 is cut into the front edge of the housing by a suitable milling cutter, the cut being made deeper than the body 53 of the punch, then the front of the slot is permanently closed by a strip 65 which is secured between the side walls of the slot.

The upper end of the punch 36 has a rearwardly extending projection 66 by which the punch is engaged for moving it up and down and to prevent any possibility of the punches being inadvertently forced too far down at any time, they are each provided with a forwardly extending part 67, the lower end 68 of which contacts with the top of the housing when the punch is at the lower limit of its movement.

The housings 36 are each provided with a perforation 69. These holes are near the tops of the housings, they are in alignment and are adapted to receive a rod 70 upon which the housings can be strung. The rod has a knurled head 71 at one end and is threaded at the other end to receive a knurled clamping nut 71' (see Fig. 2). This rod 70 serves as a carrier for the housings and spacing means are provided to be placed on the rod 70 between the several housings 35 and between the head 71 and nut 71' and the housings. While these separators or spacers could be simple tubular spacers to be threaded onto the rod 70, it is preferable to provide spacers or separators which can be placed on the rod and removed therefrom without the necessity of taking off the housings. For this purpose spacers 72 are provided which are slotted longitudinally, as shown at 73. In order to hold the open side of the slot 73 downwardly when the spacers 72 are on the rod 70, the spacers are made somewhat horse-shoe shaped in cross section and the ends 74 are thickened to make them heavy so that when the spacer is placed on the rod 70 with the open side of the slot down it will hang definitely in such position. To prevent the spacer dropping off of the rod, even if it should swing around thereon, slight protuberances or projections 75 are made at the mouth of the slot 73, thus narrowing the mouth. There is enough resilience or give in the spacer to permit it to be readily forced on or removed from the rod 70.

As it is necessary to space the housings to register with any desired spacing to produce the tabular form wanted, the spacers 72 are made of various lengths, as indicated in Fig. 27. The spacer 72^a is quite long and they may vary in length, as indicated by 72^b, 72^c, from such long ones to very short or thin ones, as shown at 72^c. Preferably they are made to vary in length in accordance with

the printer's scale, the longer ones varying from 1 pica to several picas in length, and then by means of the shorter or thinner spacers the punch units can be accurately set to correspond with any desired spacing. After the punch units have been spaced they are all clamped tightly upon the carrier rod 70 between the head 71 and the nut 71'. It is to be noted that the rod is of a length to be entered in between the posts 2 and 3, preferably it is placed in position with the outer side of the head 71, tight against the inner surface of the post 3 at the left hand end of the machine, at which end the slug stop 62 is preferably located. However, for some purposes it is desirable to have the stop 62 at the opposite end of the machine and for this purpose a suitable hole 76 is provided at the right hand end of the shoulder member 7 (see Fig. 1). When it is desired to punch strips which are much longer than the machine one end of the strips is punched with the stop 62 at one end and then the stop 62 is moved to the other end of the machine for setting the strips for punching the opposite end portions of the strips.

The mounting of the punch units on a carrier such as the rod 70 lends itself to a convenient method of readily setting the punch units to register with a prepared copy, scale or slug, as the several punch units with its carrier can be readily removed from the machine and properly assembled and then returned to the machine.

In Fig. 25 there is illustrated a device which greatly simplifies the setting of the punches. This device comprises a V-shaped trough 77, having a groove 78, the walls of which are arranged to receive the housings 35 in an inclined position. A prepared paper copy form such as that shown in Fig. 11 can be placed in the trough, as shown at 79, and against which the bottoms of the housings can rest. Then the housings can be readily positioned to register with the vertical lines on the form. Or, if preferred, a prepared scale or slug, as shown at 80, can be laid upon the level top surface 81. The edge of the scale or the top edge of the slug can be brought close to the front edges of the bottoms of the housings to facilitate the positioning of same. After the housings have been properly arranged they can be clamped upon the rod 70 with suitable spacers, as hereinbefore described. The fact that the guide channel for the punch extends down through the lower part of the housing helps in setting the housings with their punches to register with the copy, scale or slug.

As has been stated, the function of the operator 24 is to manipulate the punches 36. The operator, when in punch engaging position, holds the punches raised so

that the strips to be punched can be entered into position, and then when the operator is depressed by means of the handles 25 the punches are forced down through the edges of the inserted strip. As explained, the operator 24 is carried on the bearing rod 26 and is movable back and forth a short distance by means of the eccentric bearing members 27 and 28. The forward edge of the operator bar 24 is provided with a longitudinal groove 82 of a size to receive the projections 66 at the upper ends of the punches. When the bar 24 is moved forward by the rotation of the eccentric bearing members 27, 28, the groove 82 receives the projections 66. When the punches are free from the operator they drop down to their lowermost positions, being supported at such time by their shoulders 68 contacting with the tops of the housings. Means are provided for depressing the forward edge of the operator as it is moved forward to engage the punches so as to cause the projections 66 to enter the groove 82 and as the bar 24 reaches the forward limit of its movement and after it has engaged the punches it is free to swing up and lift the punches, and means are provided for normally holding it swung up when in punch engaging position.

For normally holding the grooved edge of the operator bar 24 in raised position and yet leave the operator so that it can be readily swung up into the position indicated in dotted lines, Fig. 4, there is provided a flat spring 83 rigidly secured at one end to a lug 84 integral with the bar 24 and projecting out from the rear edge thereof. The spring is arranged longitudinally of the bar 24 and its free end is adapted to contact with a projection 85 rigid with the post 3 when the operator is swung down into operative position. A fixed stop 86 on the bar 24 holds the spring 83 under suitable initial tension. When the operator is swung up to inoperative position the free end of the spring simply swings away from the projection 85 and does not hinder the free movements of the operator.

The means for causing the forward edge of the operator to be depressed in its forward movement to register its groove 82 with the projections 66 of the punches consists of a stop pin 87 which projects horizontally from the right hand end of the operator and into a cam opening 88 in the post 2. The projection 87 is located adjacent to the rear edge of the operator 24 that is on the side opposite to the groove 82. When the operator is swung up to inoperative position it has first been moved bodily rearward to free it from the punches by rotating the eccentric bearings clockwise, as seen in Figs. 6 and 7. The cam opening 88 extends down, as shown in said figures,

so that when the operator is swung up the projection 87 can swing freely down, as shown in dotted lines, Fig. 7. At the upper end of the cam opening 88 is a shoulder 89 against which the projection 87 contacts when the operator is swung down to substantially horizontal position. In such position the groove 82 is slightly above and to the rear of the projections 66 on the punches. The next movement is to rotate the eccentric bearing members 27, 28 clockwise, as indicated by the arrows 90, Figs. 6 and 7. The first action of this rotation is to carry the operator bodily forward and in doing so the projection 85 is moved forward over a stop shoulder 91 which prevents the rear edge of the operator dropping down. The further rotation of the eccentric bearing members depresses the bearing rod 26 and as the rear edge of the operator is held by the stop pin 85 and shoulder 91 from swinging down the forward grooved edge is caused to swing down. As the eccentric bearing members reach the limit of their forward rotation the groove 88 widens vertically at 92 to let the projection 85 rise freely when the operator is swung down to punch the strips.

While the stop pin 32 and the shoulders 33 and 34 limits the rotation of the eccentric bearing members to 180 degrees, it has been found desirable to provide means for yieldingly retaining the operator at each limit of its movement. For this purpose I provide a ball stop 93 on the post 2 arranged to engage in depressions 93' in the inner face of the outer end of the eccentric bearing member 27 and constantly pressed outwardly by a coil spring 94. The depressions 93' are arranged to hold the eccentric bearing members at the forward and rear limiting positions of the bearing rod 26.

Under some conditions it is desirable to hold the punch housings by other means than clamping them on the carrier rod 70. In Fig. 30 we have illustrated such a means. This consists of a horizontal screw 95 which projects through the post 2 and in alignment with the punch housings 6. Spacing blocks 96 can be placed between the housings themselves and between the left hand housing and the post 3 and between the right hand housing and the inner end of the screw 95. Then when the screw 95 is forced in the whole ensemble of blocks and housings will be clamped tightly together, longitudinally of the device.

For the very accurate results which are necessary in producing proper printing forms, it is necessary that the rule receiving openings be very accurately produced. For this purpose it is desirable to hold the strips, during the punching operation, with their top edges or shoulders held firmly against the shoulders of the punch housings. To assist in thus holding the strip there are

stops 97 provided which rise at the front edge of the shoulder member 7 and against which the rear edges or bottom edges, of the strips to be punched, contact when placed in position on the support, to be punched. Each of these stops 97 comprise a plate 98 secured to the shoulder member 7 by a screw 99. The plate is wide enough to rise above the top surface 41 of the member 7, as best shown in Fig. 29, and in position for the bottom 100 of the strip 101, being punched to contact therewith. The upper edge 102 of the plate 98 is rounded, as shown, to facilitate the placement of the strip 101 in position to be punched.

For the purpose of making the stop or shoulder 98 slightly yielding, there is a flat spring 103 interposed between the head 104 of the screw 99 and the plate 98. The spring 103 contacts at its ends with the end portions of the plate 98 and yieldingly holds it toward the support 7. In the form shown a filler plate 105 is arranged between the plate 98 and the support 7 for the purpose of properly spacing the plate 98 from the shoulders of the punch housings 6.

In placing a strip in position to be punched the top or printing edge is placed against the shoulders of the punch housings, the rear edge resting on top of the rounded upper edges of the stop plates 98, the strips are then pressed down flat upon the support by being thus squeezed in between the plates 98 and the shoulders on the housings. The springs 103 are stiff enough to prevent the pressure of the punches pushing the strips back during the punching operation.

As many modifications of our invention will readily suggest themselves to those skilled in the art, we do not limit or confine our invention to the specific constructions herein shown and described.

We claim:

1. In a machine of the kind described, a plurality of punch units, each comprising a punch housing and a punch movable therein, a carrier for said units, spacers for the punch units on said carrier, and means for clamping the units and spacers longitudinally of the carrier.

2. In a machine of the kind described, a plurality of punch units, each comprising a punch and a housing therefor, a rod upon which the housings are arranged, spacers arranged on the rod between the housings, and means for clamping the housings and spacers together longitudinally of the rod.

3. In a machine of the kind described, a plurality of substantially identical punch units, each comprising a punch and a housing therefor, a rod upon which the housings are strung, and spacers on the rod between the housings, the spacers being removable from the rod without unstringing the housings.

4. In a machine of the kind described, punch units, a rod upon which the punch units are strung, U-shaped spacers adapted to be placed on the rod between the units for spacing them apart.

5. In a machine of the kind described, a plurality of punch units, a rod upon which the units are strung, U-shaped spacers for placement on the rod between the units, said spacers being capable of being placed upon and taken from rod while the housings are on the rod.

6. In a machine of the kind described, a plurality of punch units, a rod upon which the units are carried, U-shaped spacers for placement on the rod between the units for spacing them apart, the open end of the spacers being heavy enough to cause the spacers to normally hang with their open sides down.

7. In a machine of the kind described, a plurality of punch units, a rod upon which the units are strung, U-shaped spacers adapted to be placed on the rod between the units to space them apart, the spacers being slightly resilient and adapted to be retained upon the rod by their resiliency.

8. In a machine of the kind described, a series of punch units, means for holding the punch units in aligned and spaced relation, a support in front of the punch units upon which strips can be laid for punching, abutments on the punch units against which the strips can be placed for aligning them in relation to the punches, and means for retaining the strips in tight contact with said abutments.

9. In a machine of the kind described, a series of punch units, means for holding the punch units in aligned and spaced relation, a support in front of the punch units upon which strips can be laid for punching, abutments on the punch units against which the strips can be placed for aligning them in relation to the punches, and shoulders against which the bottoms of the strips contact during the punching operation.

10. In a machine of the kind described, a series of punch units, means for holding the punch units in aligned and spaced relation, a support in front of the punch units upon which strips can be laid for punching, abutments on the punch units against which the strips can be placed for aligning them in relation to the punches, and yielding shoulders against which the bottoms of the strips contact during the punching operation.

11. In a machine of the kind described, a series of punch units, means for holding the punch units in aligned and spaced relation, a support in front of the punch units upon which strips can be laid for punching, abutments on the punch units against which the strips can be placed for aligning them in relation to the punches, and stop members

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opposite the punch units having rounded tops for facilitating the placement of the strips, said stop members being yieldingly held toward the punch units, as and for the purpose specified.

12. In a machine of the kind described, a series of punch units, means for holding the punch units in aligned and spaced relation, a support in front of the punch units upon which strips can be laid for punching, abutments on the punch units against which the strips can be placed for aligning them in relation to the punches, and spring held stop members opposite the punch units against which the bottoms of the strips contact during the punching operation.

13. The herein described improvement, comprising a plurality of substantially identical punch units, each comprising a housing and a punch, each housing having a transverse opening, a common carrier adapted to be projected through the said several openings, and means for clamping the sev-

eral housings in spaced relation upon said carrier, the carrier with the several housings thereon being easily removable from and replaceable in operative position in a machine as an entity.

14. In a machine of the kind described, a series of aligned punch units, a support in front of the punch units upon which strips can be laid for punching, aligned shoulders on the punch units against which strips can be placed for aligning the strips in relation to the punches, and yieldingly held abutments opposed to said shoulders for pressing the strips against said shoulders, the upper edges to the abutments being rounded to facilitate the entering of the strips between the abutments and the shoulders.

In testimony whereof, we have hereunto set our hands, this 18th day of September, 1926.

WILLIAM C. HOLLISTER.
LEO M. CHAPMAN.