July 28, 1925. 1,547,642

J. A. CASAL

PERFORATING APPARATUS

Filed Dec. 24, 1924 2 Sheets-Sheet 1

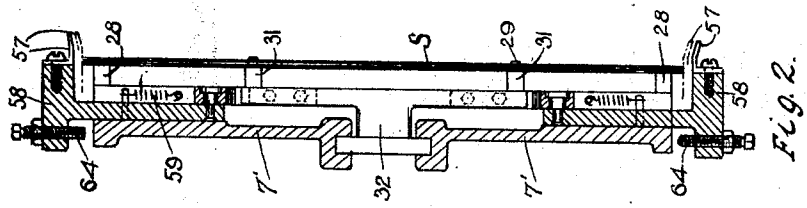


Fig. 2.

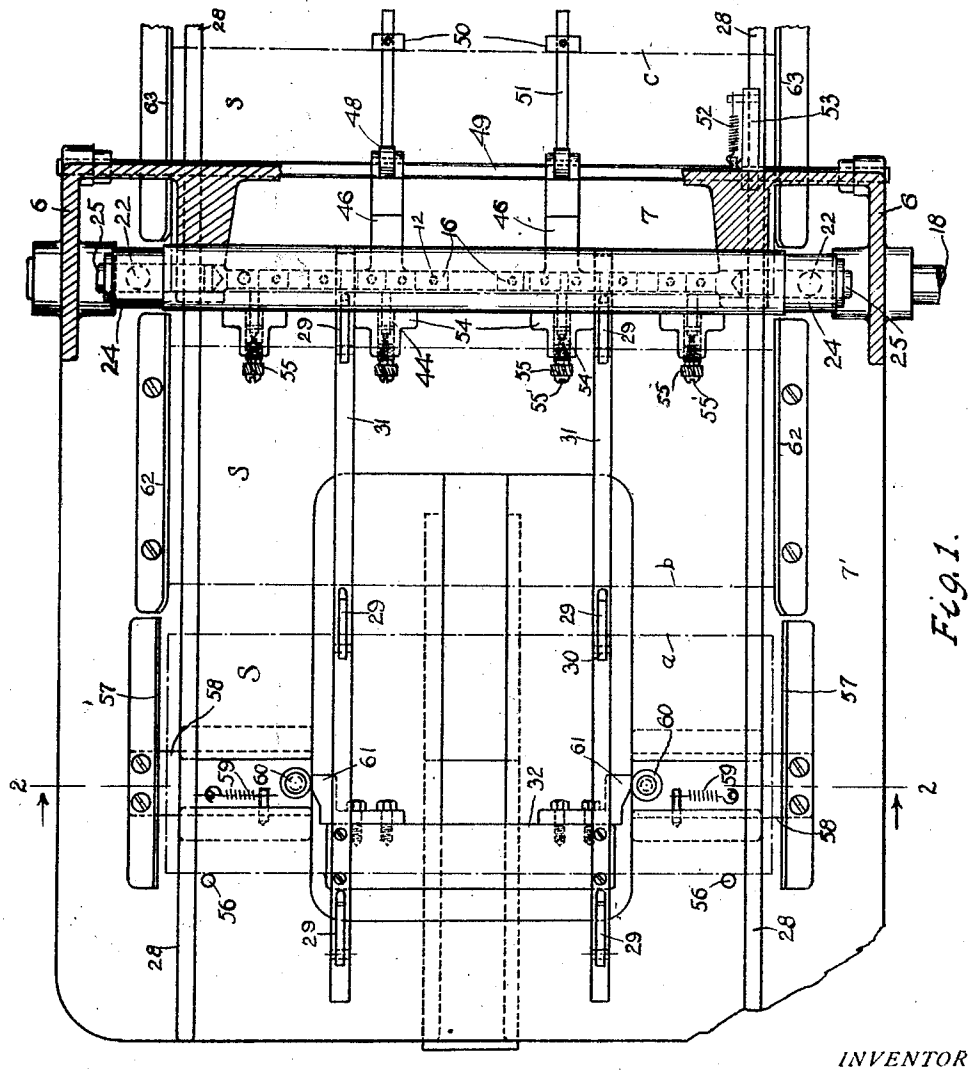


Fig. 1.

INVENTOR
JOSEPH ANEIROS CASAL.

BY

ATTORNEY

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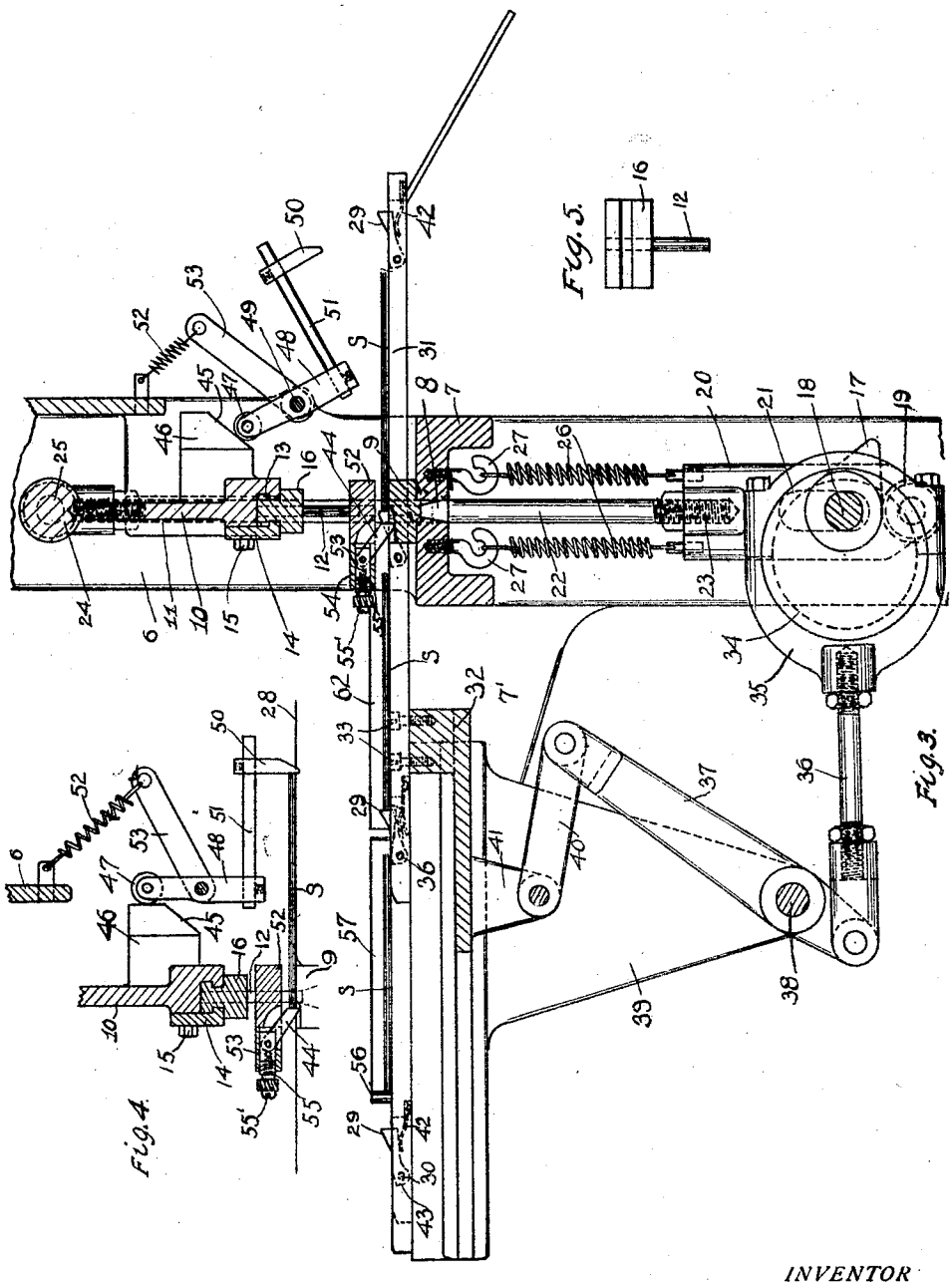


Fig. 3.

Fig. 4.

Fig. 5.

INVENTOR
JOSEPH ANEIROS CASAL.

BY John O. Seifert
ATTORNEY

Patented July 28, 1925. 1,547,642

UNITED STATES PATENT OFFICE.

JOSEPH ANEIROS CASAL, OF BROOKLYN, NEW YORK.

PERFORATING APPARATUS.

Application filed December 24, 1924. Serial No. 757,813.

To all whom it may concern:

Be it known that I, JOSEPH ANEIROS CASAL, a subject of the King of Spain, and resident of the borough of Brooklyn, in the county of Kings, city and State of New York, have invented certain new and useful Improvements in Perforating Apparatus, of which the following is a specification.

This invention relates to punch presses and the like, and particularly to presses of this character for operating upon flat stock or sheets, such as paper, for perforating sheets of paper for use in connection with loose leaf books, and it is the primary object of the invention to provide an improved punching or perforating machine for this purpose wherein the feeding of the sheets is progressive from the feeding end to the perforating means and advanced from the latter to deliver the same, the feeding of the sheets being alternately with the operation of the perforating means and the parts so timed with relation to each other that the material is progressively advanced to the perforating means, arrested in its advance for a time sufficiently long for the perforating means to be actuated when the material is delivered from the perforating means by advancing it to the point of discharge and concomitantly with the delivery of the material from the perforating means advance material to the perforating means.

The principal object of the invention is to provide improved means for progressively advancing the sheets to the perforating means, arresting the sheets in their advance and gauge the sheets in predetermined relation to the perforating means, and after the sheets have been operated upon by the perforating means advancing the sheets from the perforating means to deliver the same.

A further object of the invention relates to the provision of means in apparatus of this character for adjusting the punch and die mechanism whereby the perforations may be variably positioned in the sheets.

Other objects and advantages will hereinafter appear.

In the drawings accompanying and forming a part of this specification Figure 1 is a plan view of a perforating machine, partly in section, illustrating an embodiment of my invention.

Figure 2 is a cross sectional view taken substantially on the line 2—2 of Figure 1 looking in the direction of the arrows.

Figure 3 is a longitudinal sectional view to show the progressive advance of the sheets to the perforating mechanism and the operative connection of the perforating or punching mechanism and feeding means to an operating shaft.

Figure 4 is a sectional detail view to show the means and manner of gauging the sheets relative to the perforating mechanism; and

Figure 5 is an elevational view to show the adjustable mounting for the perforating punches.

Similar characters of reference designate like parts throughout the different views of the drawings.

In carrying out the embodiment of the invention illustrated in the drawings there is provided a framework including vertical end members or columns 6 having a suitable supporting base (not shown) and an intermediate transverse bed or table 7 arranged with a longitudinal slot 8 cut therethrough with individual dies in the form of perforated blocks 9 mounted on the bed to have adjustment longitudinally in said slot. A punch carrying head 10 is slidably mounted at its ends in guideways in the inner side of the columns, as at 11, to have reciprocatory movement toward and away from the table. The head carries punches 12 in alinement with the dies 9, said punches being carried by the head to have adjustment longitudinally thereof and relative to the dies. For this purpose the head is arranged with a T-slot, as at 13, extending longitudinally thereof one wall 14 of which is releasably connected to the head as by bolts 15. The punches 12 are carried in blocks 16 arranged with a portion to correspond with the T slot 13 of the punch carrying head, and are secured in adjusted position by the releasably wall 14 of the head which is in the nature of a clamping member.

The punch carrying head is positively actuated to move it in a direction toward the die carrying table 7 by cams 17 on a driving shaft 18 journaled in the end members of the frame below the table, there preferably being two of these cams one adjacent each end of the shaft 18. The cams operate to actuate the punch carrying head through rollers 19 rotatably mounted in a bifurcated portion of carriers 20 therefor. The bifurcation of each carrier for the cam following rollers straddle the cams with the legs of the bifurcation engaging at opposite

ends of the cam and arranged with elongated openings 21 for the passage of the shaft 18 and permit of movement of the carriers transversely of the shaft. The carriers for the cam followers are adjustably connected to the punch carrying head by rods 22 having threaded connection 23 at one end with the carriers 20 and at the opposite ends with bosses integral with collars 24 loose on studs 25 fixed in and extending laterally of the heads adjacent the top thereof. The punch carrying head is urged in a direction away from the table by springs 26 connected at one end to the carriers 20 and at the opposite ends to a fixed member at the bottom of the bed or table, in the present instance shown as hooks 27 threaded into the table. The springs also serve to maintain the cam following rollers in operative relation to the cams.

To feed the work or material to the punch and die mechanism to be operated thereon, in the present instance comprising a plurality of sheets to be simultaneously perforated, although it will be obvious that a single sheet may be operated upon, the bed or table 7 is provided with an extension 7′ integral with the framework and which in effect is a continuation of the table 7. The sheets are successively or progressively fed to and arrested at the punch and die mechanism and after operation thereon by said punch and die mechanism delivered from the latter by further advancing the sheets. For this purpose the table is arranged with sheet supports in the form of rails 28 fixed to the top of the table and its extension to extend longitudinally and above the same, said rails supporting the sheets adjacent the ends.

The sheets are fed by fingers 29 engaging at the rear edge of the sheets, said fingers being pivotally carried, as at 30, in slots of bars 31 fixed to a carriage 32 by screws 33 so that said bars will be in the same plane as the bars 28 and support the sheets intermediate said latter bars. The feed bars are also slidably supported in table 7. The carriage 32 with the feed finger carrying bars has reciprocatory movement imparted thereto through an eccentric 34 fixed to the driving shaft 18, the eccentric being operatively connected to said feed carriage by a yoke 35 surrounding the eccentric having an adjustable rod connection 36 with one arm of a lever 37 pivotally supported at 38 in hangers 39 extending downward from the table extension 7′, the opposite end of the lever 37 having a link connection 40 with a lug 41 extending downwardly from the carriage. The actuating cams 17 for the punch carrying head and the eccentric 34 are so constructed and timed that when the head is in retracted position feeding movement will be imparted to the carrier for the feed finger carrying bars, and during the retracting movement of the carriage the punch carrying head will be operated to perforate the sheets. The feeding fingers are arranged in equidistant spaced relation on their carrying bars, they being urged by light springs 42 to position to project above the feed bars, and as said bars are moved forward the fingers will engage the rear edge of the sheets and advance the same. By this arrangement during the retractive movement of the feed finger carrying bars an inclined rear or top edge of the fingers will engage the leading edge of the advanced sheets and be moved into the slots in the bars against the tension of the springs 42 and be engaged below the sheets during the retractive movement of the carrying bars for said fingers. As the fingers are moved out of engagement with the bottom sheet they will be moved upward in position to engage the rear edge of the sheets upon the successive movement of the finger carrying bars. The upward movement of the fingers is limited by a straight edge portion 43 of the fingers engaging with the end wall of the slots in which the fingers are mounted.

As stated, the present apparatus is particularly adapted for perforating sheets for use in loose leaf books, and it is essential that the sheets shall be perforated at a predetermined distance from the edge thereof. Means are therefore provided for positioning and gauging the sheets at the rear edge relative to the punch and die mechanism. This means comprises abutments in the form of fingers 44 pivotally carried at the rear end in a guide block 52 for the punches and the forward end engaging by gravity with the die carrying block 9, and the forward end of the abutments arranged as a straight edge extending parallel to the axis of the punches. As the sheets are advanced to the punch and die mechanism the gauge abutments will be engaged by the leading end of the sheets and during the advancing movement of the sheets will ride along the top of the sheets, and as the sheets are advanced beyond the abutment fingers, as shown in Figure 3, said fingers will drop behind the sheets. The feed fingers 29 are so arranged that at the terminus of the forward movement of the carrying bars therefor the fingers will be slightly in advance of said abutment fingers. As the feeding fingers 29 are retracted the punches 12 are moved toward the dies and during the initial movement of the punch carrying head cam edges 45 on projecting portions 46 of such head will engage a roller 47 carried at one end of levers 48 fixed to a rock shaft 49 rotatably mounted in the standard 6 forwardly of the punch carrying head. This engagement of the cam heads with the rollers carried by the levers 48 will move said levers to cause fingers 50 carried by arms 51 carried by the shaft 47

to engage with the leading edge of the sheets and move the sheets rearwardly to abut and gauge the rear edge of the sheet relative to the gauges 44, as shown in Figure 4, and hold the sheets in such position during the punching thereof. During the punching of the sheets the finger carrying bars will be retracted and during this retracting movement of said bars the feed fingers 29 at the forward end of the feed bars will be positioned to engage in the rear of the sheets being punched. During the retracting movement of the punch carrying head the rock shaft 49 will be moved to position the fingers 50 out of the path of movement of the sheets advanced from the punch and die mechanism by a spring 52 connected at one end and an arm 53 fixed on the rock shaft and the other end to a fixed part of a frame standard 6. By the arrangement of the forward extending of the arms 51 and the mounting of the fingers 50 thereon to extend downward it is possible to adapt the mechanism to sheets of variable sizes for which purpose the arms are adapted to have adjustment in a longitudinal direction and secured in adjusted position by set screws, and the fingers 50 adjusted along the arms and secured in adjusted position by set screws, as shown.

To perforate the sheets at variable distances from the edge the gauge fingers 44 are adjustable. For this purpose said gauges are pivotally carried by blocks 53 slidably mounted in supports 54 to engage with adjustable abutments 55 threaded into the supports and arranged with a knurled finger piece to facilitate the adjustment thereof, the gauge carrying blocks 53 being drawn and held to the abutments 55 by set screws 55′ passing through said abutments 55 and having threaded connection with the gauge carrying blocks.

In operation the sheets are placed on the supporting bars 28 and feed bars 31 with the rear edges abutting against pins 56 extending upward from the table extension 7′ and between guides 57 for the side edges of the sheets, as shown at *a* in Figure. 1. The guides are mounted on guide carriers 58 slidably mounted in the feed bar carriage 32 to have movement transversely thereof, said guides being urged in a direction toward the sheets by springs 59, with the feed bar carrier in its rearmost position these guides are maintained in spaced relation to the side edges of the sheets to compensate for variations in the piled sheets by rollers 60 mounted on studs projecting up from the guide carriers engaging with cam members 61 fixed to the feed bar carriage. During the initial forward movement of said carriage the rollers 60 will ride off from the high portion of the cams 61 and the guides will be moved inward toward the sheets, and should there be any sheets projecting or extending laterally of the pile they will be adjusted so that the side edges of all the sheets will be in parallel relation. As the feed bar carriage continues to move forward the sheets are positioned as shown at *b* in Figure 1 between side guides 62, and during the successive movement of the feed bar carriage the sheets are moved to the position *c* between side guides 63. During the retractive movement of the feed bar carriage the high portion of the cams 61 will engage the rollers 60 of the carriers for the side guides 57 and move said guides to the position shown in Figure 1. The movement of the side guides 57 toward the sheets is controlled by abutments 64 adjustably mounted in the carriers for said guides.

While there is illustrated in the drawings an embodiment for carrying out the invention it will be obvious that various modifications may be made in arrangement and structure of parts without departing from the scope of the invention, and that portions of the invention may be used without others and come within the scope of the invention.

Having thus described my invention, I claim:

1. In sheet feeding means for punch presses and the like, a die carrying table, a punch carrying head reciprocable toward and away from the table, means to advance sheets along the table to the punching mechanism, gauge means for the rear edges of the sheets to position the sheets relative to the punching mechanism, said gauge means being adapted to be engaged by and ride over the sheets during the advancing movement thereof and engage at the rear of the advanced sheets, and means operative during the initial movement of the punch carrying head to abut the rear edges of the sheets against said gauging means.

2. In sheet feeding means for punch presses and the like, a die carrying table, a punch carrying head reciprocable toward and away from the table, means to advance sheets along the table to the punching mechanism, gauge means for the rear edges of the sheets to position the sheets in predetermined relation to the punching mechanism, said gauge means normally resting by gravity upon the table and adapted to ride over the sheets as they are advanced to the punching mechanism and engage at the rear of the sheets when the sheets are advanced beyond the same, and means operative from the punch carrying head during the initial movement thereof to punch the sheets to engage the leading edges of the sheets and impart retrograde movement to the sheets to abut the rear edges against the gauge means and hold the sheets in such position during the punching thereof.

3. In sheet perforating apparatus and the

like, a die carrying table, a punch carrying head reciprocable toward and away from the table, means to progressively advance the sheets to be perforated along the table to the punch and die mechanism, abutments to engage at the rear of the sheets advanced to the punch and die mechanism, means operative with the initial movement of the punch carrying head toward the table to engage the leading edges of the sheets and move the sheets to gauge the rear edges against the abutments to position the sheets in predetermined relation to the punch and die mechanism, and means to move the means to engage the leading edges of the sheets away from the sheets during the retracting movement of the punch carrying head, said abutments being adjustable to variably locate the perforations in the sheets.

4. In sheet perforating apparatus and the like, a die carrying table, a head carrying punches in alinement with the dies and reciprocable toward and away from the table, feeding means to progressively advance sheets along the table to the punch and die mechanism operative alternately with the movement of the head, abutments for the rear edges of the sheets to position and gauge the sheets relative to the punch and die mechanism, and an adjustable support for said abutments to variably position the sheets relative to the punching mechanism and perforated in variable predetermined relation to the edges of the sheets.

5. In sheet perforating apparatus and the like, a die carrying table, head carrying punches in alinement with the dies and reciprocable toward and away from the table, feed means to progressively advance sheets along the table to the punch and die mechanism operative alternately with the movement of the head, pivoted abutments for the rear edges of the sheets to position and gauge the sheets relative to the punch and die mechanism, said abutments being adapted to engage the table by gravity and ride over the sheets during the advancing of the sheets to the punch and die mechanism and engage at the rear of the sheets as the sheets are advanced beyond the same, and an adjustable support for said abutments to variably position the sheets relative to the punch and die mechanism, and said sheet feeding means being operative to advance and deliver the sheets from the punch and die mechanism during the advancing of successive sheets to said mechanism.

6. In sheet perforating apparatus and the like, a die carrying table, a head carrying punches in alinement with the dies and reciprocable toward and away from the table, bars reciprocable longitudinally of the table, fingers pivotally carried in equidistant spaced relation by said bars and normally urged upward to extend above the table, said fingers being adapted to engage the rear edges of the sheets to advance the sheets along the table by the movement of the bars in one direction and to move below the sheets during the return of the bars, abutments for the engagement of the rear edges of the sheets to position the sheets relative to the punch and die mechanism, and means to actuate said punch carrying head and feed finger carrying bars in alternation.

7. In sheet perforating apparatus and the like, a die carrying table, a punch carrying head reciprocable toward and away from the table, means to progressively advance the sheets to be perforated along the table to the punch and die mechanism, abutments to engage at the rear of the sheets advanced to the punch and die mechanism, and means operative to engage the leading edges of the sheets to move the sheets to gauge the rear edges against the abutments to position the sheets in predetermined relation to the punch and die mechanism, said means being adjustable to adapt the same to sheets of variable sizes.

8. In sheet perforating apparatus and the like, a die carrying table, a punch carrying head reciprocable toward and away from the table, means to progressively advance the sheets to be perforated along the table to the punch and die mechanism, abutments to engage at the rear of the sheets advanced to the punch and die mechanism, means operative during the initial movement of the punch carrying head toward the table to engage the leading edges of the sheets and move the sheets to gauge the rear edges against the abutments to position the sheets relative to the punch and die mechanism, said means being adjustable to adapt the same to sheets of variable sizes, a return spring to move said fingers away from the leading edges of the sheets to permit of the advancing and delivering of the perforated sheets from the punch and die mechanism during the advancing of successive sheets, and means to actuate said punch carrying head and sheet feeding means in alternation.

9. In sheet perforating apparatus and the like, a die carrying table, a punch carrying head reciprocable toward and away from the table, means to progressively advance the sheets to be perforated along the table to the punch and die mechanism, abutments to engage at the rear of the sheets advanced to the punch and die mechanism, means operative during the initial movement of the punch carrying head toward the table to gauge the leading edges of the sheets and move the sheets to engage the rear edges against the abutments to position the sheets relative to the punch and die mechanism, comprising a rock shaft and fingers carried by said shaft.

10. In sheet perforating apparatus and

the like, a die carrying table, a punch carrying head reciprocable toward and away from the table, means to progressively advance the sheets to be perforated along the table to the punch and die mechanism, abutments to engage at the rear of the sheets advanced to the punch and die mechanism, a rock shaft extending transversely of and above the table, fingers carried by said shaft, and means to rock the shaft during the initial movement of the punch carrying head toward the table to engage the fingers with the leading edges of the sheets and move the sheets to gauge the rear edges with the abutments.

11. In sheet perforating apparatus and the like, a die carrying table, a punch carrying head reciprocable toward and away from the table, means to progressively advance the sheets to be perforated along the table to the punch and die mechanism, abutments to engage at the rear of the sheets advanced to the punch and die mechanism, a rock shaft extending transversely and above the table, arms extending laterally from the shaft and forwardly of the table, fingers carried by said arms to extend toward the table, said rock shaft being normally urged to position with the arms and fingers above the table, and means on the rock shaft adapted to be engaged by a cam edge on the punch carrying head to rock the shaft to engage the fingers with the leading edges of the sheets on the table and move the sheets to gauge the rear edges thereof with the abutments.

12. In sheet perforating apparatus and the like, a die carrying table, a punch carrying head reciprocable toward and away from the table, means to progressively advance the sheets to be perforated along the table to the punch and die mechanism, abutments to engage at the rear of the sheets advanced to the punch and die mechanism, a rock shaft extending transversely of and above the table, arms carried by the shaft to extend laterally from and forwardly of the table and adapted to have longitudinal adjustment and transversely of the shaft, fingers carried by said arms to have adjustment along the same, a spring to normally move the shaft to position the arms and fingers above the table, and means carried by the rock shaft adapted to be engaged by a cam edge on the punch carrying head to rock the shaft to engage the fingers with the leading edges of the sheets on the table and move the sheets to gauge the rear edges thereof with the abutments.

13. In sheet perforating apparatus and the like, a table arranged with dies, a head carrying punches in alinement with the dies reciprocable toward and away from the table, feed finger carrying bars slidably carried by the table to progressively advance sheets to the punch and die mechanism, yielding means to normally urge the punch carrying head away from the table, a drive shaft, a cam on the shaft to co-operate with te punch carrying head to move it against said yielding means toward the table, an eccentric on said shaft, means to operatively connect the feed finger carrying bars to said eccentric, said cam and eccentric being arranged whereby the reciprocation of the punch carrying head will be alternate with the reciprocation of the feed finger carrying bars.

14. In sheet perforating apparatus and the like, a table arranged with dies, a head reciprocable toward and away from the table carrying punches in alinement with the dies, means to progressively advance the sheets to and deliver the same from the punch and die mechanism, and guides for the side edges of the sheets as they are advanced to the punch and die mechanism, said guides being positioned in spaced relation to the side edges of the sheets with the sheet feeding means in its rear position, and urged into engagement with said edges of the sheets as the sheets are advanced for the purpose specified.

15. In sheet perforating apparatus and the like, a table arranged with dies, a head reciprocable toward and away from the table carrying punches in alinement with the dies, reciprocatory feeding means to progressively advance the sheets to and deliver the same from the punch and die mechanism, guides for the side edges of the sheets slidably mounted to have movement toward and away from the side edges of the sheets, means to yieldingly urge the guides toward the sheets, and means operative from the feeding means during the reverse movement thereof to move the guides laterally against the action of said yielding means, said means being operative during the initial advancing movement of the feeding means to release said guides to adapt them to be urged toward the sheets for the purpose specified.

Signed at city of New York, in the county of New York and State of New York, this 19th day of December, 1925.

JOSEPH ANEIROS CASAL.