March 11, 1924. 1,486,561

F. BÉLISLE

SELF FEEDING GANG PUNCHING MACHINE

Filed Oct. 9, 1922 10 Sheets-Sheet 1

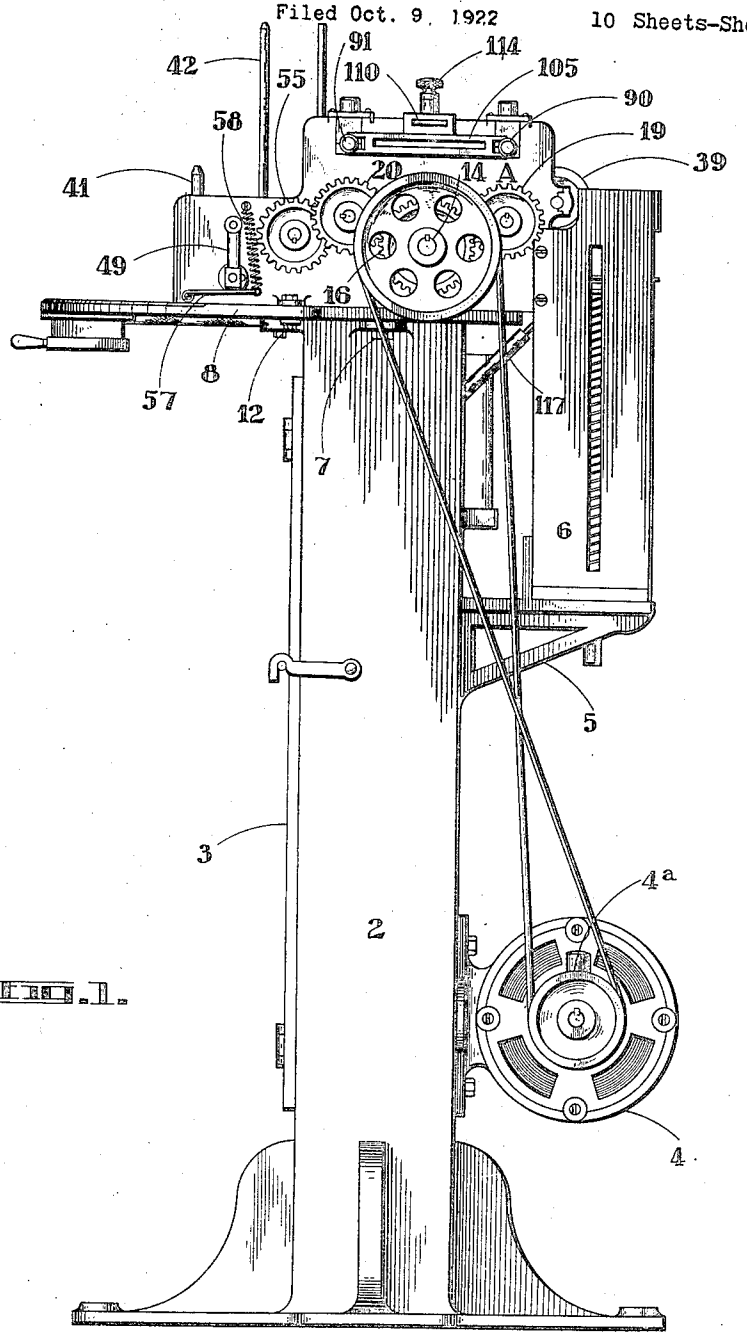


FIG. 1.

Inventor
FERNAND BÉLISLE.

By Caron & Caron.
Attorneys

March 11, 1924. 1,486,561

F. BÉLISLE

SELF FEEDING GANG PUNCHING MACHINE

Filed Oct. 9, 1922 10 Sheets-Sheet 2

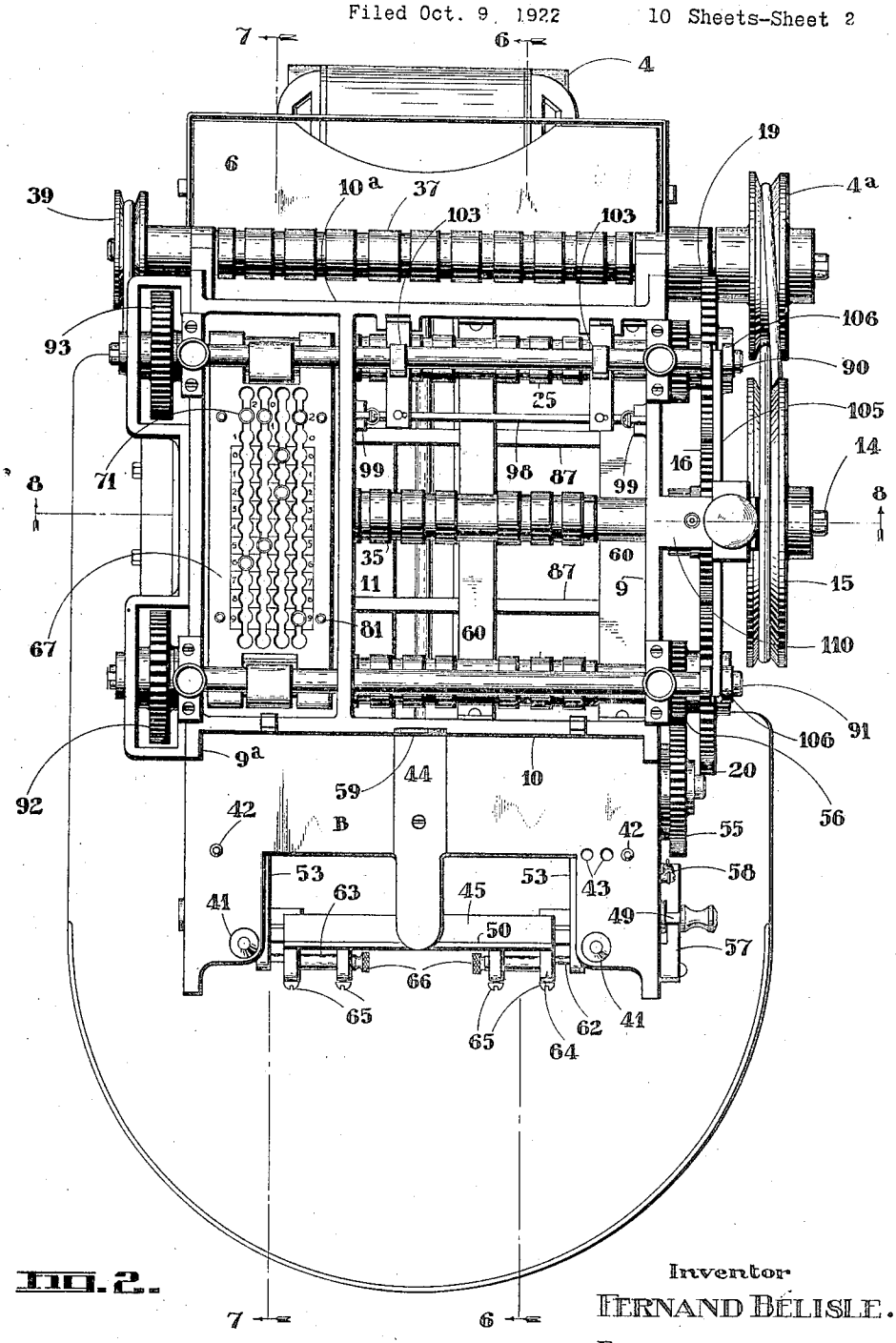


Fig. 2.

Inventor
FERNAND BÉLISLE.
By
Caron & Caron.
Attorneys

March 11, 1924. 1,486,561

F. BÉLISLE

SELF FEEDING GANG PUNCHING MACHINE

Filed Oct. 9, 1922 10 Sheets-Sheet 3

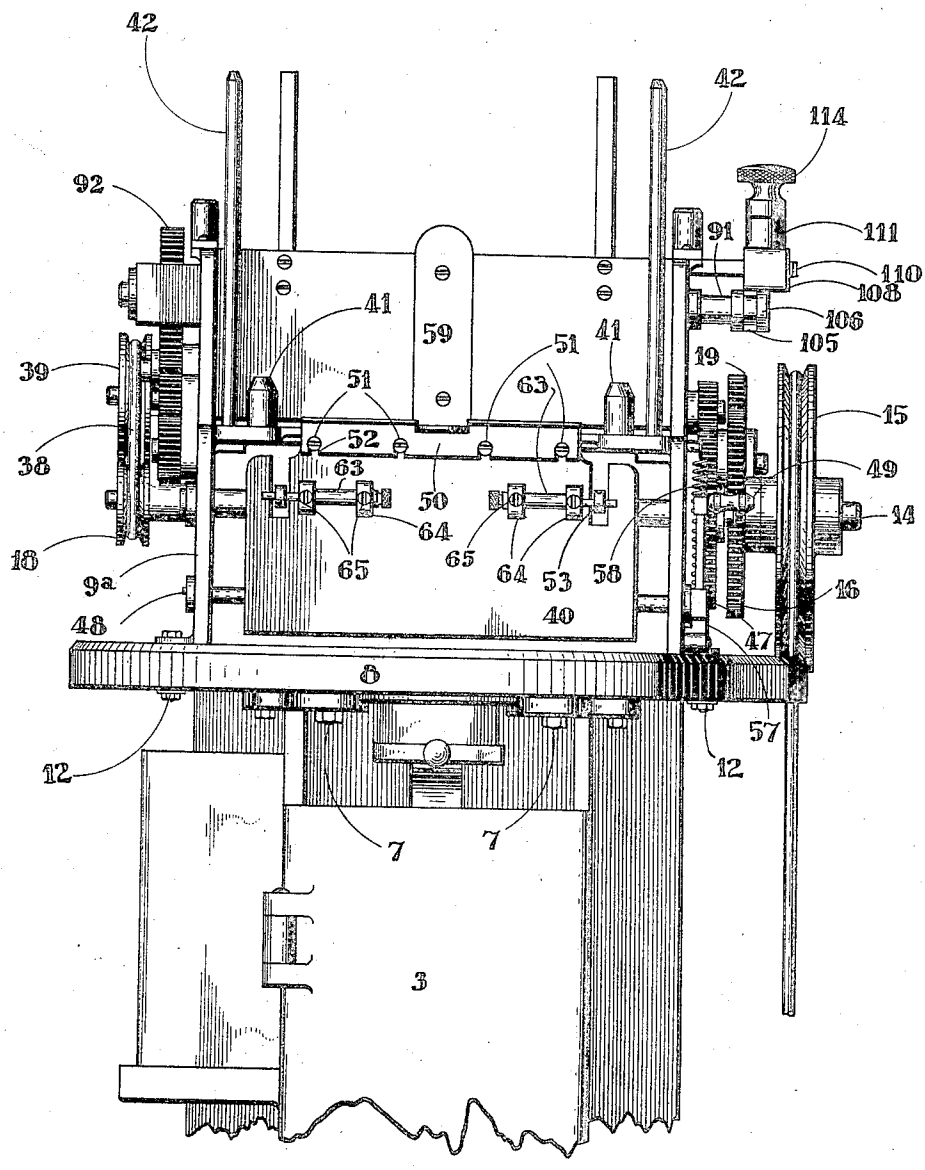


Fig. 3.

Inventor
FERNAND BÉLISLE.
By
Baron & Baron.
Attorneys

March 11, 1924. 1,486,561

F. BÉLISLE

SELF FEEDING GANG PUNCHING MACHINE

Filed Oct. 9, 1922 10 Sheets-Sheet 4

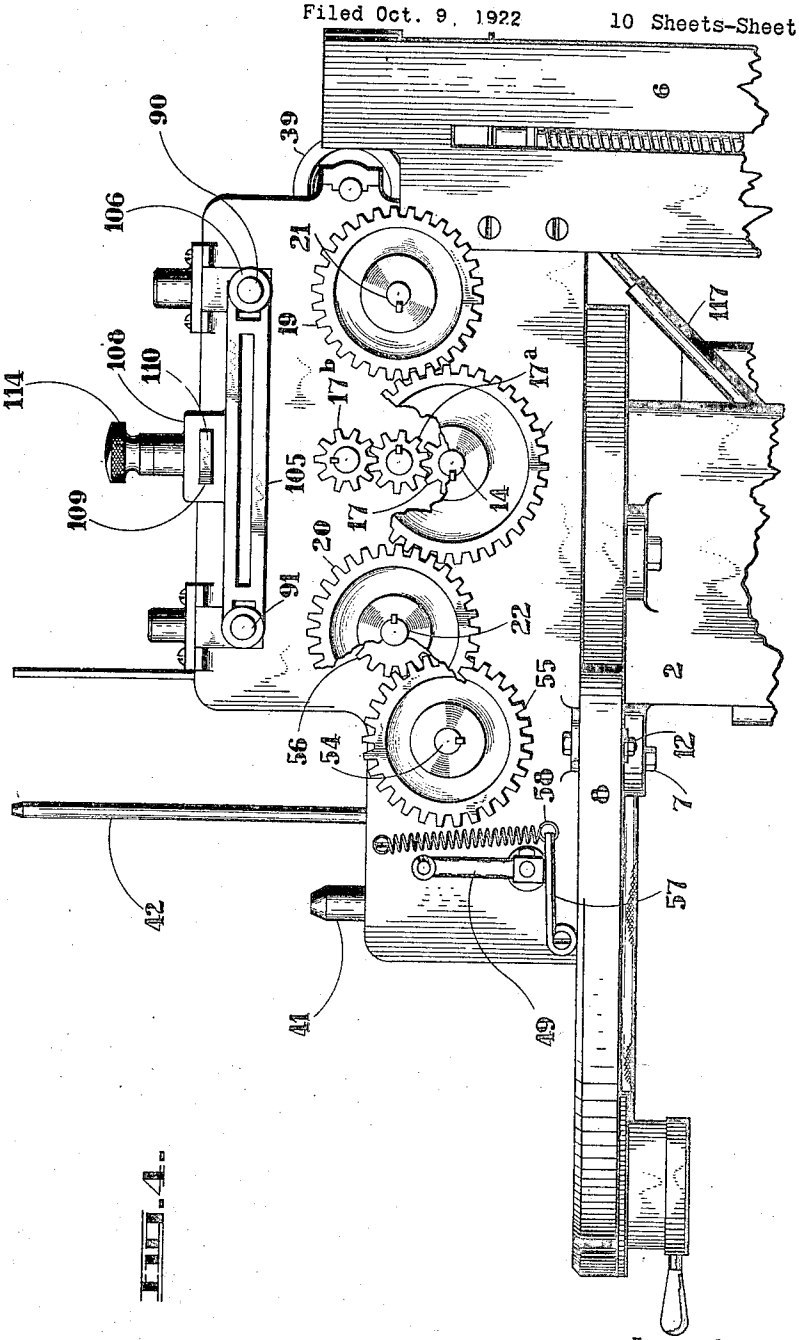


FIG. 4.

Inventor
FERNAND BÉLISLE.
By
Baron & Baron.
Attorneys

March 11, 1924.

1,486,561

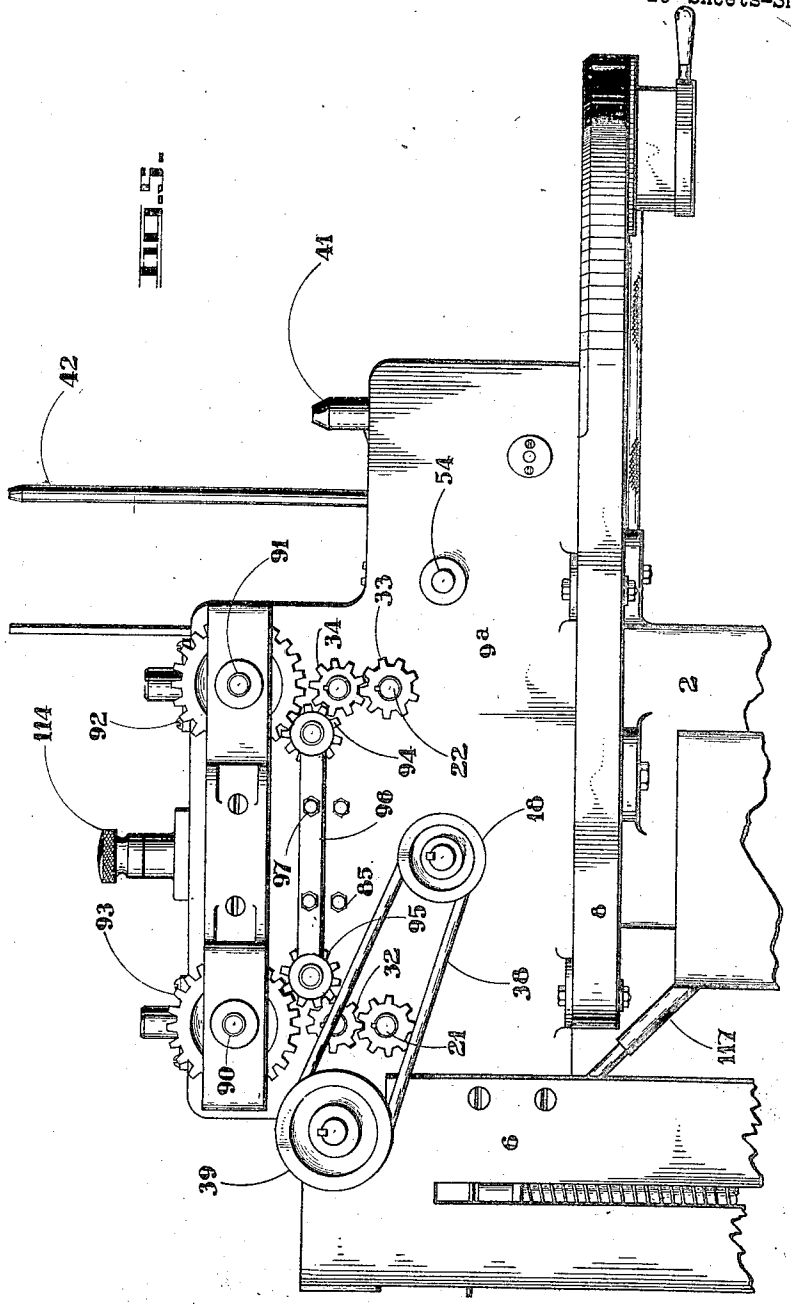
F. BÉLISLE

SELF FEEDING GANG PUNCHING MACHINE

Filed Oct. 9, 1922

10 Sheets-Sheet 5

FIG. 5.



Inventor
FERNAND BÉLISLE.
By
Caron & Caron.
Attorneys

March 11, 1924. 1,486,561

F. BELISLE

SELF FEEDING GANG PUNCHING MACHINE

Filed Oct. 9, 1922 10 Sheets-Sheet 6

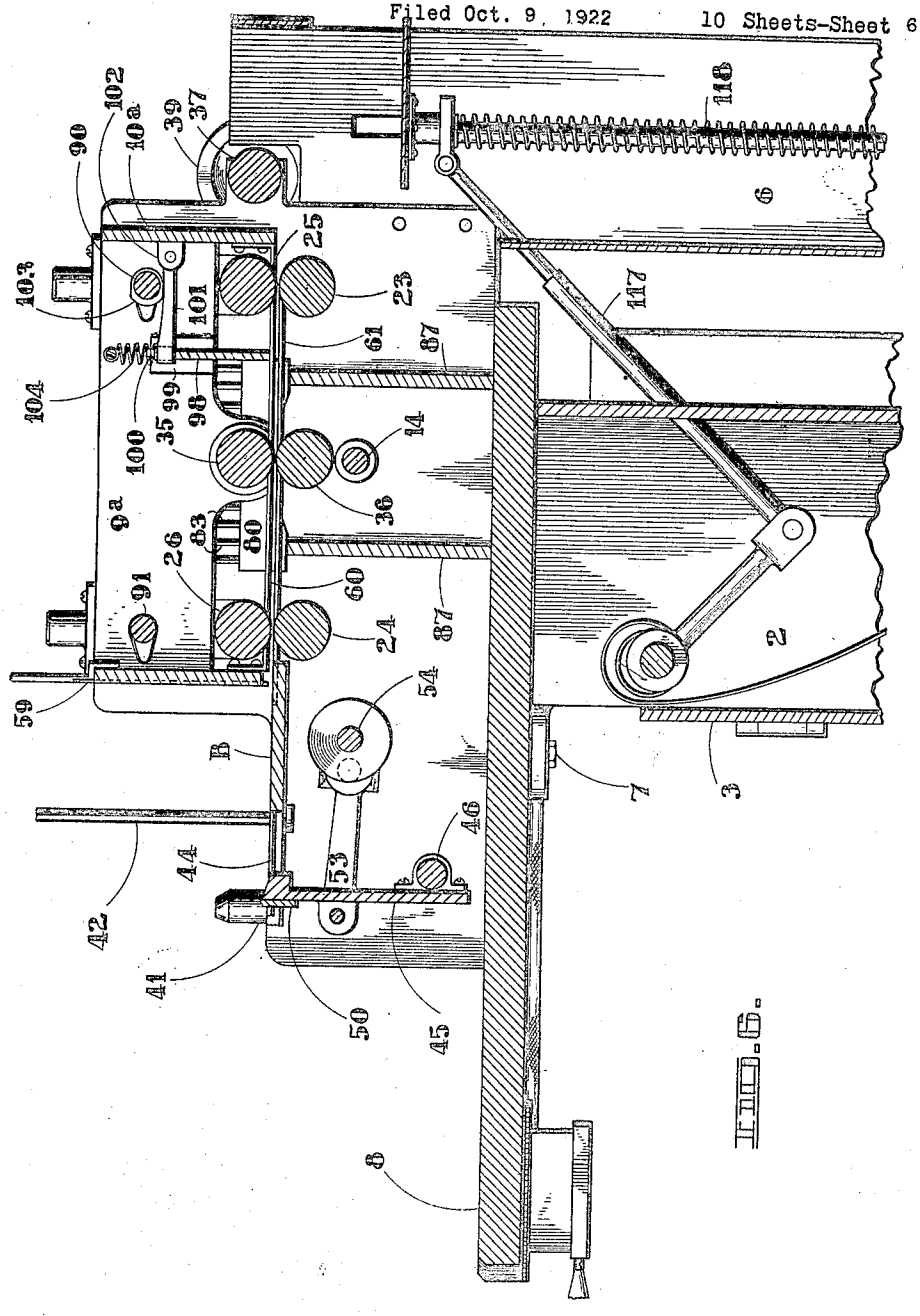


Fig. 6.

Inventor
FERNAND BELISLE.

By Caron & Caron.
Attorney

March 11, 1924. 1,486,561

F. BÉLISLE

SELF FEEDING GANG PUNCHING MACHINE

Filed Oct. 9, 1922 10 Sheets-Sheet 7

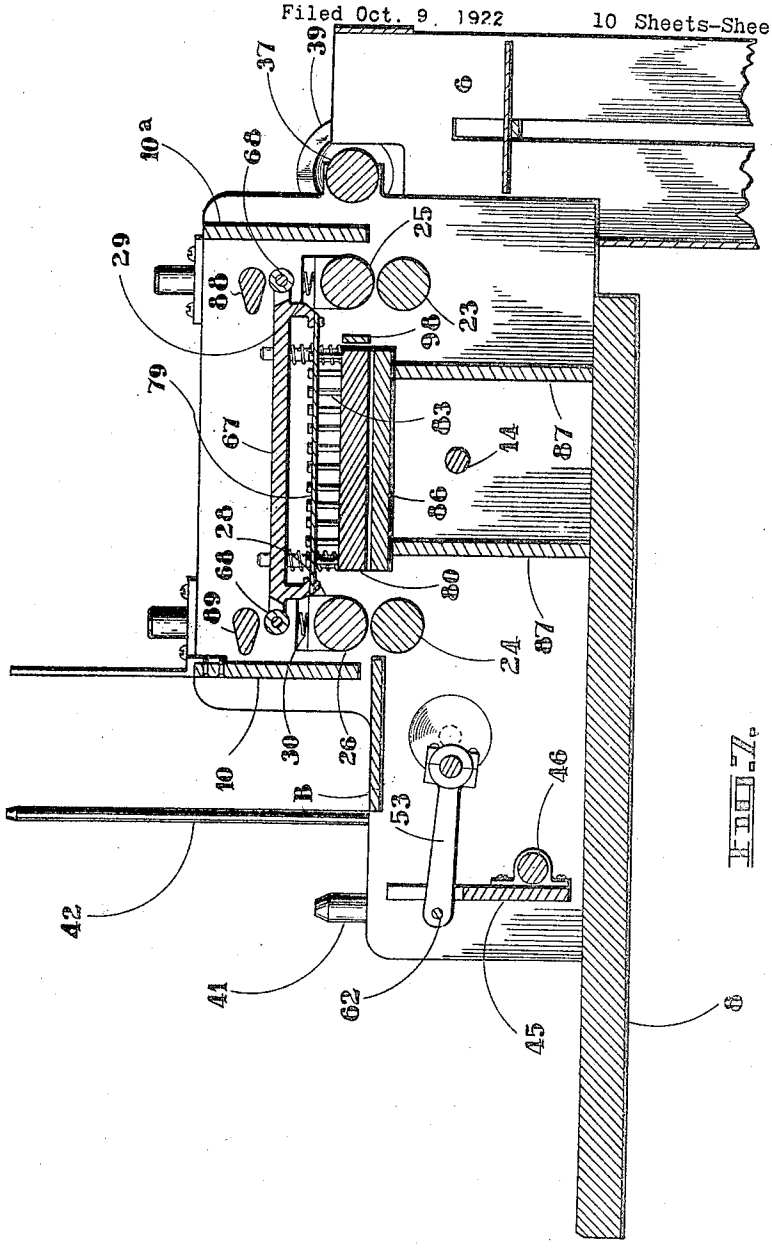


FIG. 7.

Inventor
FERNAND BÉLISLE.
By Caron & Caron.
Attorneys

March 11, 1924. 1,486,561

F. BELISLE

SELF FEEDING GANG PUNCHING MACHINE

Filed Oct. 9, 1922 10 Sheets-Sheet 8

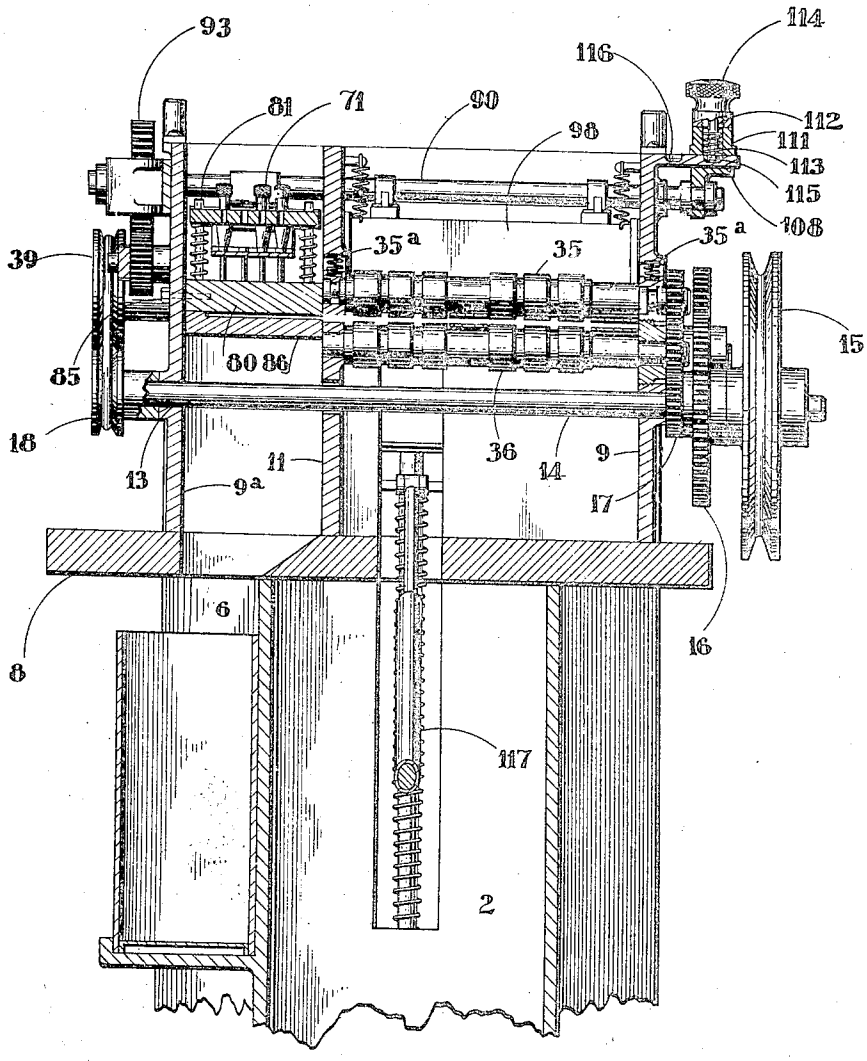


FIG. 8.

Inventor
FERNAND BÉLISLE.

By Caron & Caron.
Attorneys

March 11, 1924. 1,486,561

F. BÉLISLE

SELF FEEDING GANG PUNCHING MACHINE

Filed Oct. 9, 1922 10 Sheets-Sheet 9

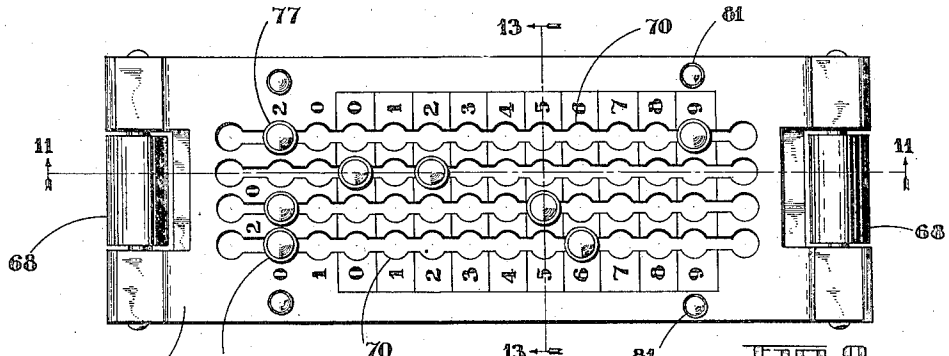


Fig. 9.

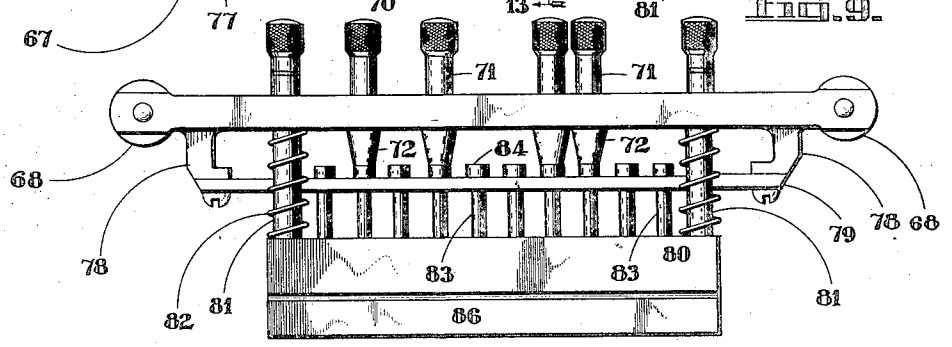


Fig. 10.

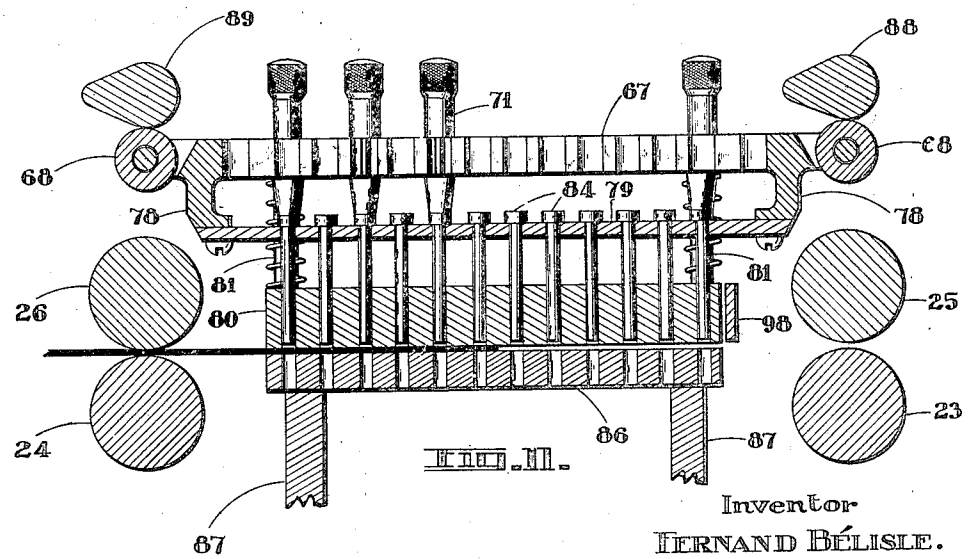


Fig. 11.

Inventor
FERNAND BÉLISLE.
By
Caron & Caron.
Attorneys

March 11, 1924. 1,486,561

F. BÉLISLE

SELF FEEDING GANG PUNCHING MACHINE

Filed Oct. 9, 1922 10 Sheets-Sheet 10

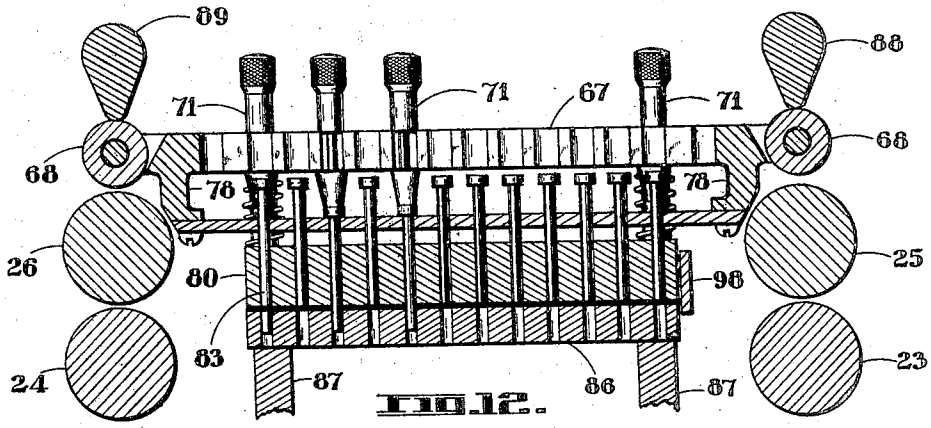


FIG. 12.

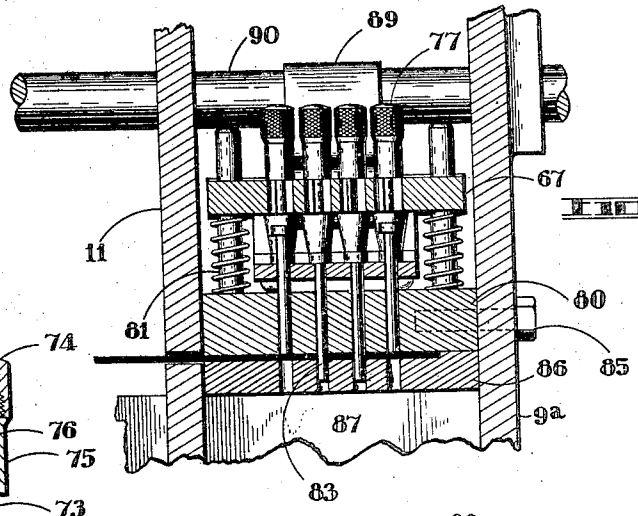


FIG. 13.

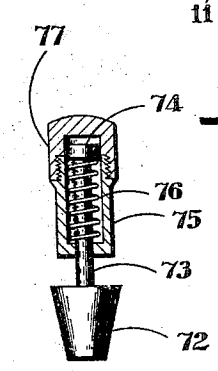


FIG. 15.

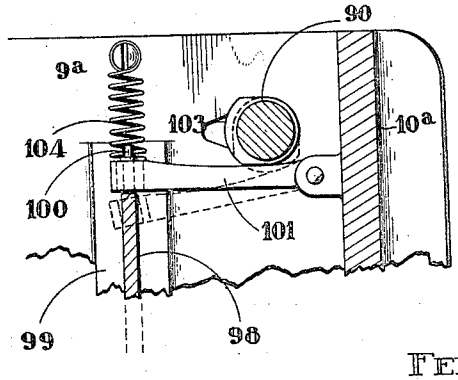


FIG. 14.

Inventor
FERNAND BÉLISLE.

By Caron & Caron.
Attorneys

Patented Mar. 11, 1924. 1,486,561

UNITED STATES PATENT OFFICE.

FERNAND BÉLISLE, OF OTTAWA, ONTARIO, CANADA.

SELF-FEEDING GANG PUNCHING MACHINE.

Application filed October 9, 1922. Serial No. 593,428.

To all whom it may concern:

Be it known that I, FERNAND BÉLISLE, a subject of the King of Great Britain, residing at Ottawa, in the county of Carleton and Province of Ontario, Canada, whose post-office address is 129 Water Street, have invented certain new and useful Improvements in Self-Feeding Gang Punching Machines, of which the following is a full, clear and exact description.

My invention relates to self-feeding gang perforating machines adapted to the perforating of statistical cards, wherein a number of perforations disposed in rows corresponding to the data required are accurately made, ready for the tabulating machines.

The object of my invention is to produce a machine capable of mechanically feeding and perforating statistical cards in a more expeditious and accurate manner than the hand machines formerly used, thereby saving time and labor.

In the drawings forming part of this specification, identical parts in all the views will bear the same symbols.

Figure 1 is a side elevation of the machine.

Figure 2 is a top view thereof.

Figure 3 is a front end view of the head.

Figure 4 is a right side view of the head showing the gear train.

Figure 5 is a left side view showing the means of synchronizing the punch depressing cams.

Figure 6, a section through line 6—6, Figure 2.

Figure 7, a section through line 7—7, Figure 2.

Figure 8, a cross section through line 8—8, Figure 2.

Figure 9, a top view of the punch depressing plate.

Figure 10, a side view of the perforating mechanism.

Figure 11, a section through line 11—11, Figure 9.

Figure 12, a section showing a card being perforated.

Figure 13, a cross section of the perforating mechanism on line 13—13, Figure 9.

Figure 14, a detail section showing the card stop plate.

Figure 15 shows the construction of the punch depressure.

In Figure 1 is shown a standard 2 which may be hollow and provided with a door 3 so as to form a tool cupboard. A motor 4 having a driving pulley 4^a may be supported on said column as shown. A bracket 5 is also attached to the column to support a card stacking receptacle 6. A card perforator A is securely fastened to column 2 by means of bolts 7 passing through its base plate 8. Upon the base plate 8 the walls of the perforator head are fastened. These walls comprise side walls, 9, 9^a, end walls 10, 10^a and central walls 11 bolted to the base by bolts 12. The two distinct features of the machine will be described separately. First, the card feeding mechanism composed of a card holder positioned over a card gripper and feeding rolls mounted to carry the cards in position to be perforated, a card stopping plate and feeding rollers to convey the cards to the stacking receptacle. Second, the perforating mechanism comprising a punch holder, a punch die and mechanism to actuate the same.

Card feeding mechanism.

The card feeding mechanism comprises side walls 9 and 9^a provided with perforated bosses 13 forming journal bearings for a driving shaft 14 carrying at one end driving pulley 15, spur wheel 16, pinion 17, all positioned outside of wall 9, and pulley 18 positioned at its other end outside of wall 9. Spur wheels 16 drive spur wheels 19 and 20 mounted on shafts 21, 22 which shafts are journaled through walls 9 and 9^a and carry feed rolls 23, 24. Feed rolls 25 and 26 are mounted over rolls 23, 24 in sliding bearings 27 and 28 depressed by springs 29, 30 so as to maintain the feed rolls in resilient contact. Upper feed rolls 25, 26 are geared to lower feed rolls 23, 24, by pinions 31, 32, 33, 34, (see Fig. 5). Another set of feed rolls is journaled centrally of the two sets above described, the top roll of which is shown in Fig. 3 and numbered 35. Both are shown in cross section in Fig. 6, the lower one being numbered 36. The resilient pressure of the top roll being obtained by means of springs 35^a which are just sufficiently strong to normally carry the card forward but will slip over the same when its travel is arrested during the perforating process. This set of rolls is journaled in wall 9 and central wall 11. It is driven from main shaft 14 by pinions 17, 17^a, 17^b, (see Fig. 4). Back of the top feed

roll 25, over the card stacking receptacle 6, (see Fig. 2), a feed roll 37 is mounted in bearings on the ends of side walls 9, 9ª. This roll is positioned in a plane slightly lower than the top feed rolls 26, 35 and 25 so as to deflect the card downwards into the stacking receptacle. Roll 37 is driven from pulley 18 on driving shaft 14 by a belt 38 and pulley 39. A card holder consists of a table B resting on an extension of walls 9, 9ª at the front end of the machine. It is recessed, forming a gap C, to allow the mounting of the card pusher 40. The cards are held in position on the table by rear guide posts 41 and side rods 42. The position of one of side rods 42 may be shifted by being placed in any one of aligned holes 43. To prevent the card from sagging in gap C a plate 44 extends therein as shown. The card pusher, shown in elevation in Figure 3, and in side section in Figure 6, comprises a plate 45 rockingly mounted on a rod 46, the ends of which are reduced in diameter so as to be eccentric to the main part thereof. These reduced ends 47, 48 are mounted in bearings in the walls 9, 9ª. A crank 49 is fastened to end 48 so as to turn rod 46 and thereby lower plate 45 to the extent of the eccentricity of ends 47, 48. In order to hold pusher 40 in either a set or unset position, the boss of crank 49 is made square shaped so as to allow its faces to lay flat on a pivoted plate 57 kept in contact therewith by means of a spiral spring 58. Plate 45 is provided with a knife head 50 fastened thereto by screws 51 engaging notches 52. A rocking movement is imparted to plate 45 by means of connecting rods 53 pivotally mounted thereon and to a crank shaft 54 mounted in bearings in walls 9, 9ª, and driven by spur wheel 55 geared with pinion 56, as shown in Fig. 4. By referring to Fig. 6, it will be noticed that there is a space left between the lower edge of wall 10 and the table B. This space allows the cards to pass therethrough to be caught by feed rolls 24, 26. In order to allow but one card at a time to pass under partition 10 in the space above described, a gage plate 59 is adjustably mounted on wall 10. The cards are guided between the driving rollers by strips 60 and 61 mounted in suitable grooves in the rollers. Strips 60 are fastened to the walls 10 and 10ª. Strips 61 are fastened to table B and turned over roll 23 as shown. In order to adjust the edge of knife head 50 so as to engage the edge of but one card, pins 62 are eccentrically mounted on plate 45 by having their larger portion 63 mounted through lugs 64, these lugs being provided with set screws 65 to retain the pins in position. As pins 62 are eccentric, it will be evident that a turn by means of the knurled head 66 will bring the knife edge to a fine adjustment.

The operation of the feeding mechanism may be briefly described as follows: A pack of cards is set on the table B and the guide post 52 is placed in the hole near the edge of the cards. Knife 50 is then adjusted by turning knurled head 66 until its edge just engages the edge of the lower card. Gauge 59 is adjusted to the thickness of one card. The machine being set in motion, the pusher 49 will feed one card at every forward stroke sufficiently forward to allow its front edge to be engaged by the first set of feed rolls 24 and 26, whence guided by strips 60 and 61 it will reach central feed roll 35 and 36, and after the punching operation, which will be described below, will continue its travel past feed rolls 23 and 25 under roll 37 when it will fall in the stacking receptacle 6.

Perforating mechanism.

The perforating dies, as mounted in the casing, occupy the space bounded by wall 9ª and 11 (see Fig. 2). Figs. 9 to 13 illustrate the construction of the perforating dies presently described. The punch holding frame comprises plate 67 having friction rollers 68 mounted at each end and a plurality of longitudinal slits 69, having circular apertures 70, in which punch depressing keys 71 may be inserted. The construction of these keys is shown in Fig. 15 and comprises a member 72, preferably conical as shown, surmounted by a stem 73, preferably threaded therein. This stem terminates with a head 74; a sleeve 75 partly encloses the same; a compression spring 76 surrounds the stem inside the sleeve to normally keep head 74 against cap 77 which is preferably screw-threaded on the sleeve as shown. As will be readily seen in Fig. 9, these keys may be positioned in any of the circular apertures 70 by pulling on the sleeve until it clears the aperture when the stem may be slid along the slit until the desired aperture is reached. The sleeve upon being released, will enter this aperture. Plate 67 carries two brackets 78 to which is fastened a punch carrying plate 79. Referring now to Figs. 7 and 8, it will be seen that the punch holding frame, above described, is mounted over a punch guiding plate 80 by means of posts 81 carried by plate 80 and passing through plates 79 and 67 into which it moves freely. Compression springs 82 surround posts 81 so as to normally keep the punch holding frame in its upward position. Punch holding plate 79 carries a number of punches 83 corresponding to the number of circular apertures 70 in the key receiving plate 67. Punches 83 are provided with heads 84 normally resting over their holding plate 79. The punch guiding plate 80 is fastened to walls 9ª and 11 by means of screws 85, (see Fig. 8). Be-

low punch guiding plate 81 is mounted a die plate 86 suitably supported from the standard base 8 on cross plates 87. Punch carrying plate 79 is actuated by means of cams 88 and 89 positioned over rollers 68 of key plate 67 and mounted on shafts 90, 91 which carry spur wheels 92, 93 driven from pinions 31, 32, 33, 34, and idle pinions 94 and 95. Pinions 94 and 95 are mounted on a bar 96 fastened to walls 9ª by screw bolts 97. Besides driving spur wheels 92, 93, these pinions serve to properly time cams 88 and 89 so that the perforating of the card is effected in time with the card feeding. The means for arresting the card during the perforating of the same comprises a plate 98, (see Figs. 2 and 6), mounted in guideways 99 in walls 9 and 11. The upper edge of plate 98 carries pins 100 on which is mounted one end of actuating arms 101. The opposite ends of these arms are pivotally mounted in lugs 102 on walls 10ª. Arms 101 are positioned to be depressed by cams 103 carried by shaft 90. Plate 98 is kept clear of the card path by tension springs 104 fastened to its upper edge and to walls 9ª and 11. Should it be desired to arrest the perforating mechanism, a cam shifting device is provided, comprising a bar 105, (see Figs. 2, 3, 4 and 8), having bifurcated ends to engage between collars 106 and 107 of cam shafts 90 and 91. Bar 105 is surmounted with a member 108 having a mortise 109 sliding on a plate 110 extending from wall 9. Member 108 carries a post 111 into which is slidably mounted a pin 112, (see Fig. 8), normally kept down by a compression spring 113. Pin 112 is fastened to a hand piece 114 as shown. The upper surface of plate 110 is provided with two cavities 115 and 116 into which the end of pin 112 enters. The cams are shifted by raising member 114 so that pin 112 may enter either one of cavities 115 or 116.

The operation of the perforating mechanism is as follows: The card, which is carried by the card feeding mechanism previously described, reaches a position over the punching die, (see Fig. 12), when its further travel is impeded by stop plates 98 actuated by cam 103 which comes in its path just prior to its arrival. Cams 88 will now lower the punches to perforate the card after which cams 103 will release the stop plates and allow the card to continue its path to the stacking receptacle.

The stacking receptacle 6 is of ordinary construction, excepting that I provide a compensating lever 117 mounted over the spiral spring 118 so as to equalize the tension thereof.

The present description and illustration has been made from a working machine giving satisfactory results but it must be understood that many changes both in the form and disposition of the various parts may be made without departing from the spirit of the following claims.

Claims:

1. In a perforating machine of the class described, a card holder, means for feeding the cards forward one by one in position to be perforated, a perforator comprising a die-plate, a plurality of punches mounted to move vertically in a punch holding plate positioned over said die-plate, means over said punch plate to arrest the vertical movement of the punches selected to perforate the card, means to arrest the travel of the card while being perforated and means to lead the card to a stacking receptacle.

2. In a perforator of the class described, a power shaft, sets of card feeding rolls mounted distantly over said power shaft, gears connecting the feeding rolls to the power shaft, a card holder, a card pusher mounted underneath said card holder, means to rock said card pusher so as to feed the cards forward singly, and guiding band extending between the feeding rolls to guide the cards to each set of rolls.

3. In a perforating machine of the class described, a card holder, sets of feeding rolls, means to feed the cards to said feed rolls, a perforator, means to arrest the cards when they reach the position to be perforated, said means comprising a vertically sliding plate coming in the path of the card just prior to the card being punched, and means to cause the feeding rolls to slip over the card when the travel of the same is arrested by the said arrester.

4. In a perforator of the class described, a card holder, sets of feeding rolls, means to feed the cards to the feed rolls, a perforator, a card arrester comprising a vertical plate capable of obstructing the path of the card, means to actuate said vertical plate comprising a shaft carrying cams to depress the said vertical plate and means connecting said cam shaft to the power shaft to actuate the same.

5. In a perforator of the class described, a punch carrying plate, a plurality of punches mounted to move vertically in said plate, a main plate over the punch carrying plate connected thereto, a series of keys mounted to move laterally over said punches so as to stop the vertical movement of the selected punches, a die-plate positioned under said punches having holes coincident with the punches, and a punch guiding plate over said die plate.

6. In a perforator of the class described, a punch carrying plate, a plurality of punches mounted to move vertically in said plate, a main plate over the punch carrying plate connected thereto, a series of keys mounted to move laterally over said punches so as to stop the vertical movement of the

selected punches, a die-plate positioned under said punches having holes coincident with the punches, a punch guiding plate over said punch plate, friction rollers mounted at each end of the main plate, cam shafts mounted over the friction rollers carrying cams bearing on said rollers so as to actuate the punch plate and perforate the card.

7. In a perforator of the class described, means to shift the punch plate depressing cams, comprising a bar engaged between collars carried at the end of each cam carrying shaft, said bar having a mortised lug projected centrally therefrom engaging a guide bar integral with the perforator frame, and a spring pin mounted over said lug engaging perforation in said guide bar.

8. In a perforator of the class described, a frame, a plurality of lower feeding rolls mounted in a horizontal alignment in said frame, a plurality of upper feeding rolls mounted over said lower feeding rolls, forming sets, a gear mounted at one end of one of the rolls of each set meshing with a driving gear on the driving shaft, intermeshing gears mounted on each roll of each set at the opposite ends, cam shafts mounted over the feeding rolls, gears carried by said cam shaft, idle gears mounted to mesh with the cam shaft gears and one of the feeding roll gears, so as to synchronize the movement of the cams carried by said cam shaft.

9. In a perforator of the class described, a main plate mounted in guide rods so as to reciprocate vertically, rows of parallel slits running longitudinally of said plate, a plurality of circular apertures equally distant in said slits, a punch carrying plate mounted underneath the main plate carrying a number of punches free to move vertically, keys mounted to move laterally in the slits of the main plate so as to prevent the vertical movement of the punches selected to perforate the card.

10. In a perforator of the class described, a key to arrest the vertical movement of the punches selected to perforate, comprising a member having a stem provided with a head, a sleeve partly enclosing said stem, a cap closing the sleeve and a compression spring around the stem inside the sleeve to normally maintain the head of the stem against the sleeve cap.

11. In a perforator of the class described, a main plate movably mounted in guide rods so as to reciprocate vertically, rows of parallel slits running longitudinally of said plate, a plurality of circular apertures equally distant in said slits, a punch carrying plate mounted underneath the main plate, said punch plate carrying a plurality of punches free to move vertically, a number of keys mounted in the slits of the main plate comprising a member resting underneath the main plate having a stem passing through the slit and provided with a head, a sleeve partly enclosing said stem and normally engaging a circular aperture in the slits, a cap closing said sleeve and a compressing spring around the stem in the sleeve to keep the stem head normally against the sleeve cap so that an upward pull on the sleeve will cause the same to clear the circular aperture and allow the stem to move longitudinally of the slit until the desired aperture is reached.

Ottawa, Ont., this 6th day of October, 1922.

FERNAND BÉLISLE.

In the presence of—
M. A. CARON,
M. BLACK.