Oct. 31, 1950 F. T. MELBERG 2,528,282

BELT PUNCHING DEVICE

Filed June 9, 1948 2 Sheets-Sheet 1

Fig. 1.

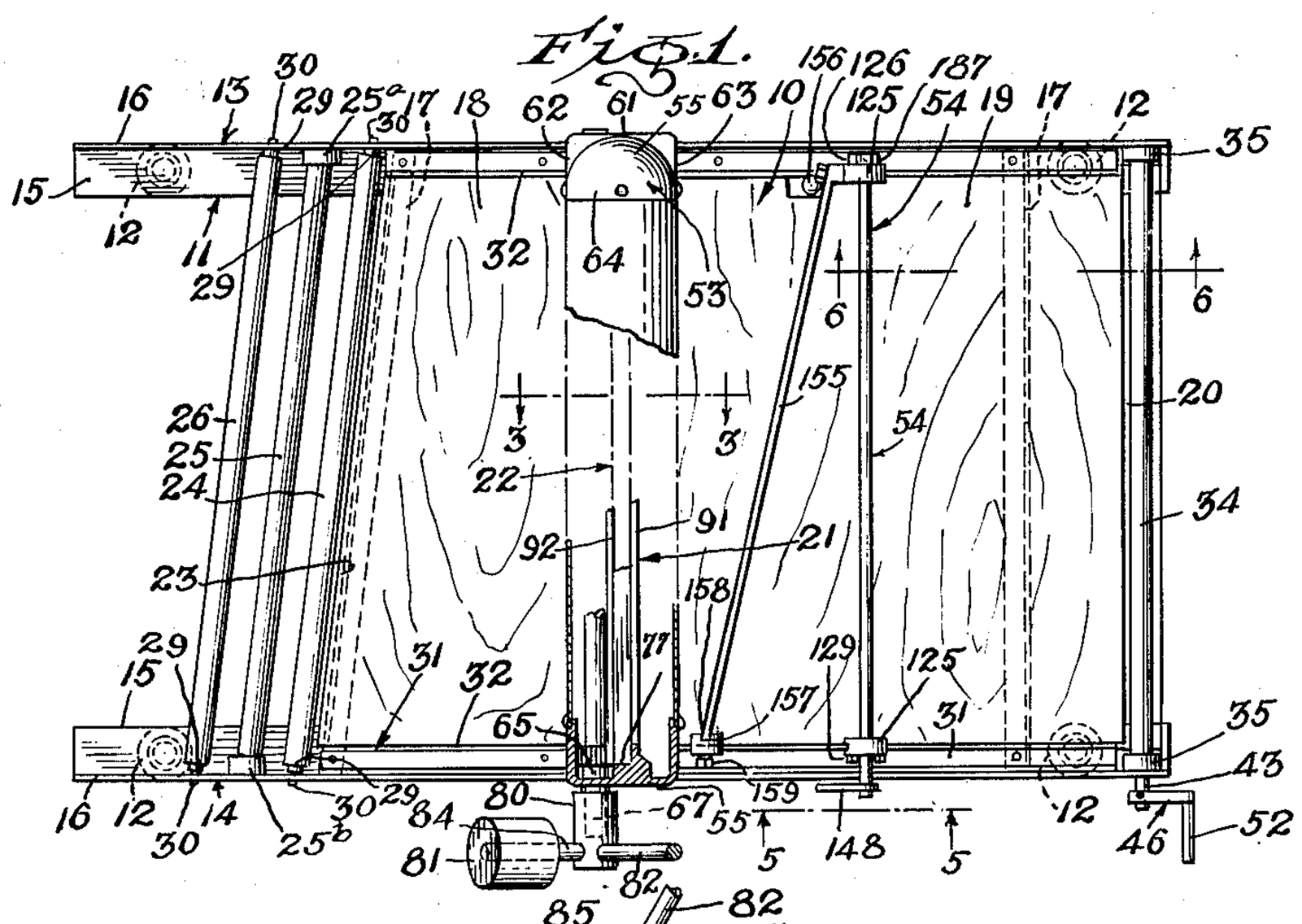

Fig. 2.

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Fig. 3.

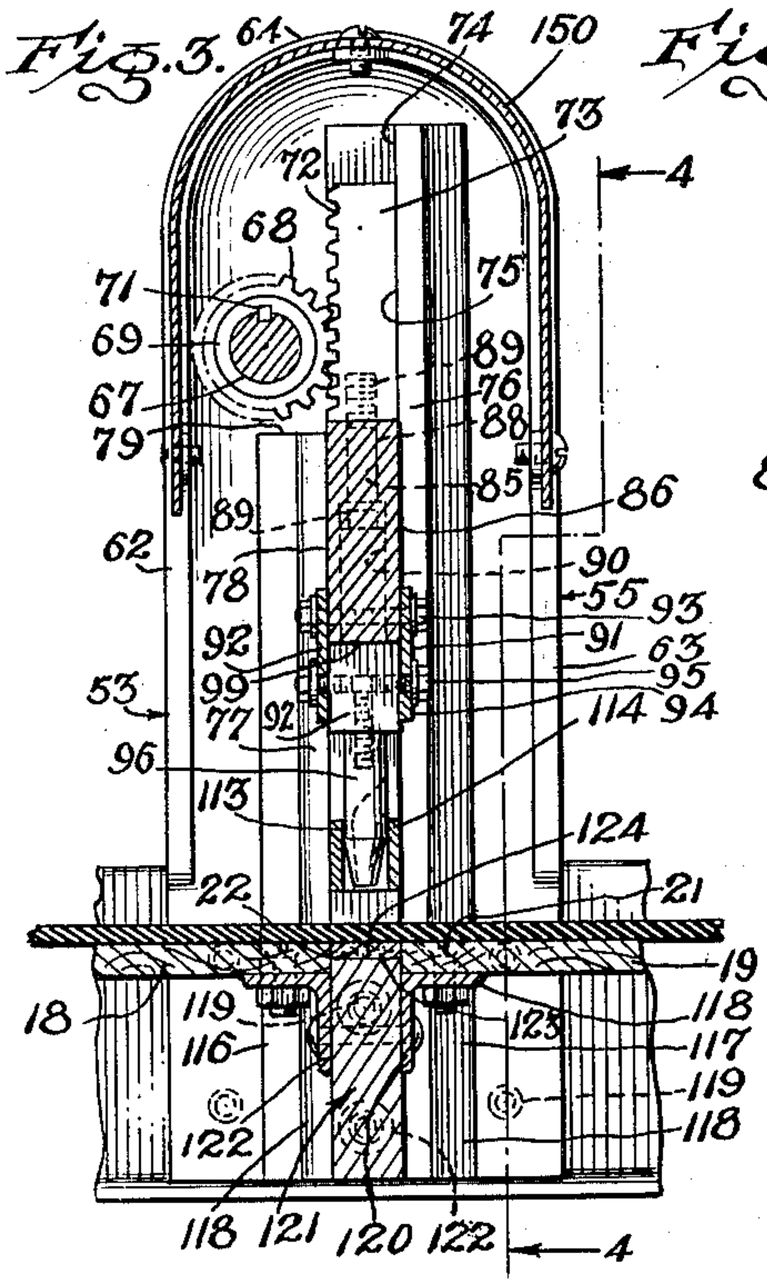


Fig. 4.

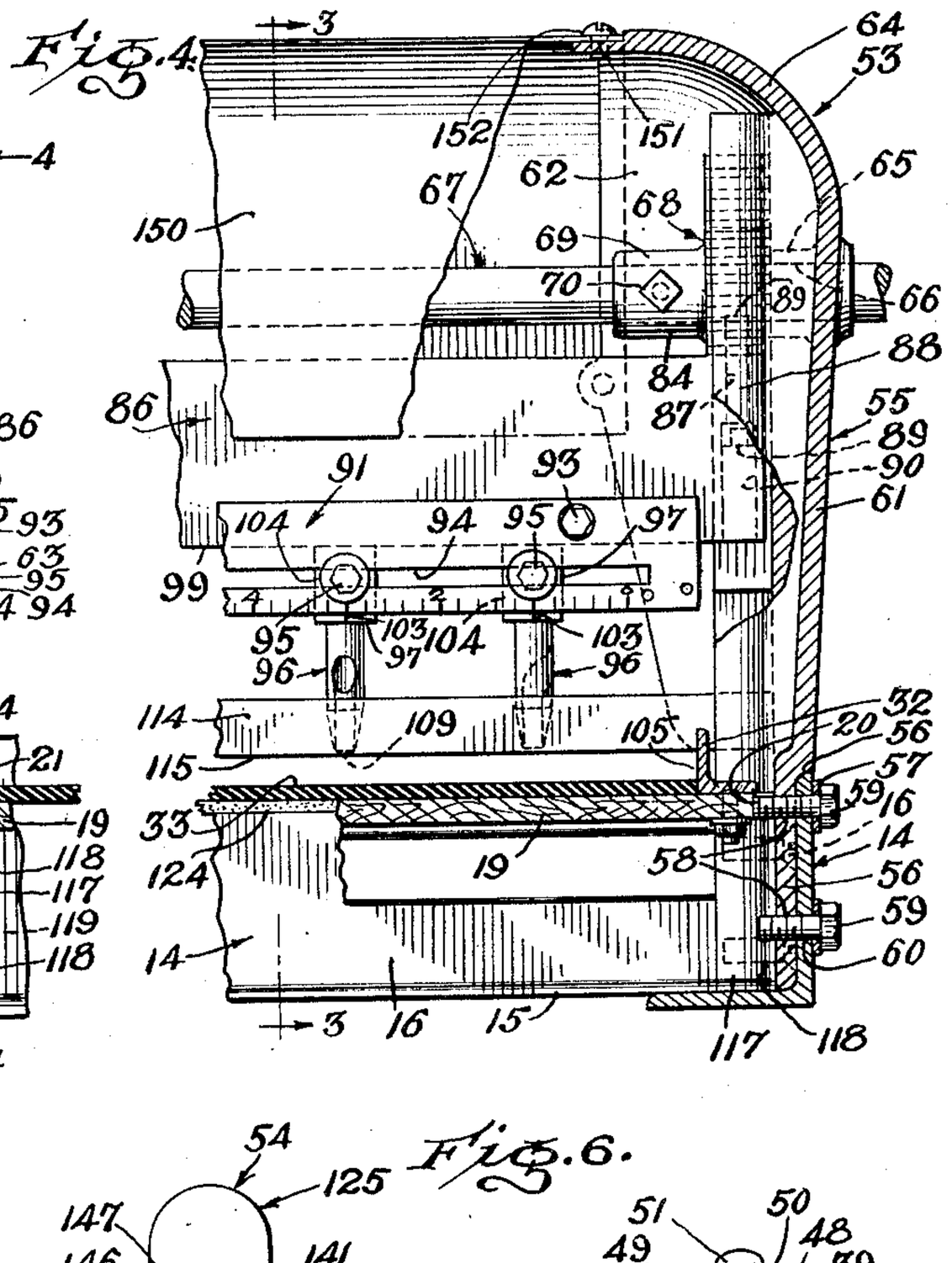


Fig. 5.

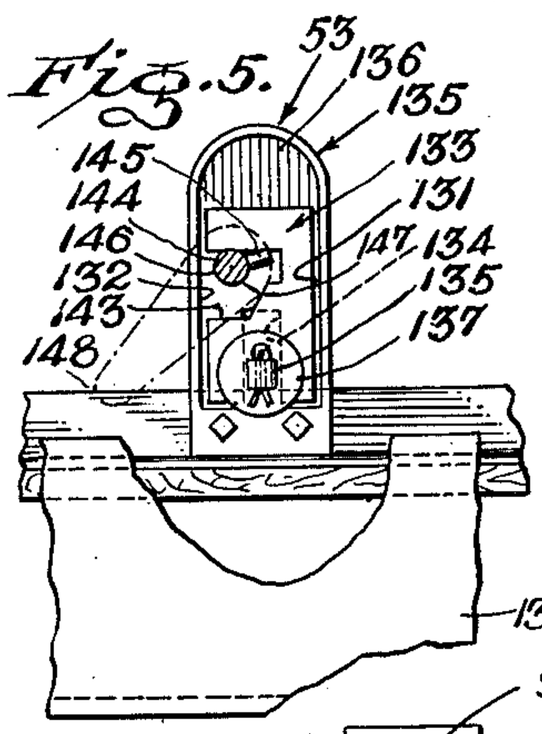


Fig. 6.

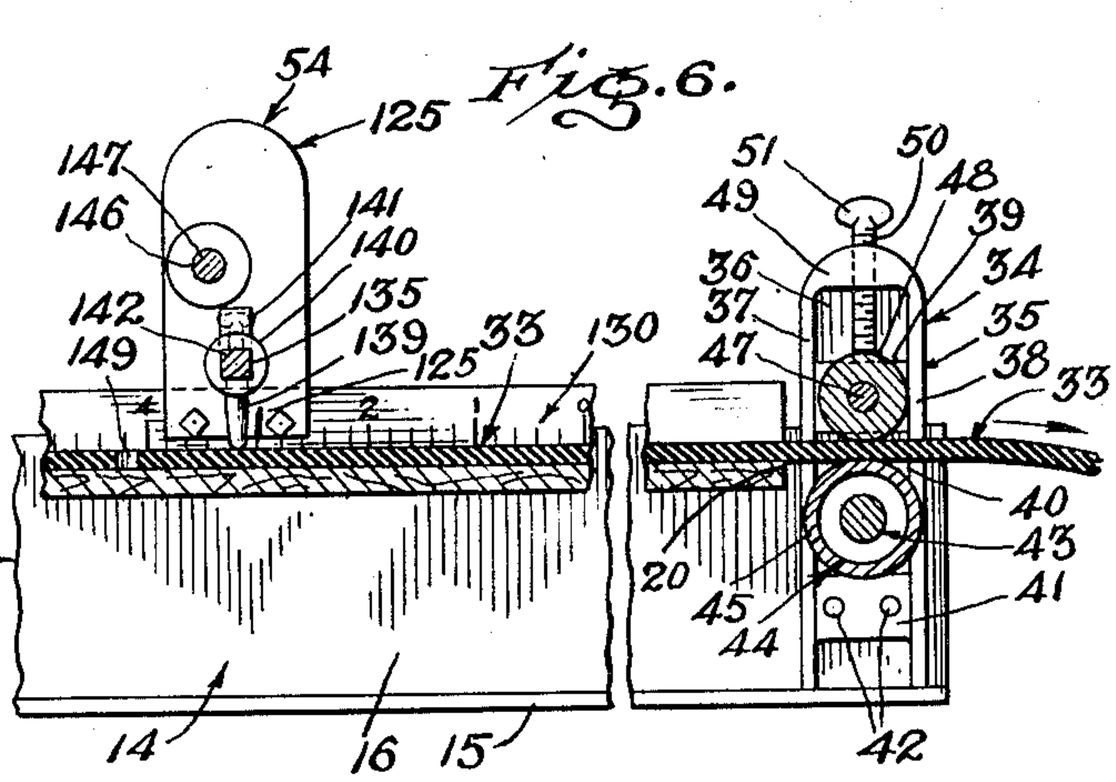
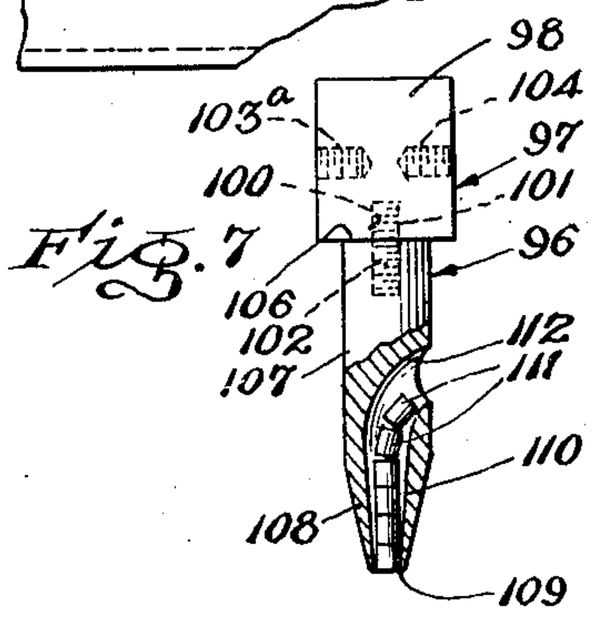


Fig. 7.



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UNITED STATES PATENT OFFICE

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BELT PUNCHING DEVICE

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Application June 9, 1948, Serial No. 31,965

5 Claims. (Cl. 164—91)

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The present invention relates to belt punching devices, and is particularly concerned with the provision of an improved device for reducing the time and labor which is now spent in punching rubber and other belts with the holes which are necessary for the attachment of cleats, buckets, etc.

It is customary at the present time, when buckets are to be attached to a rubber belt, to turn the job over to an individual who carefully measures the distance between the points for holes, and thereafter punches by hand with a mallet and punch all of the holes necessary for the attachment of buckets at regularly spaced intervals on the belt. This is a time-consuming and expensive process and is paid for according to the number of holes punched.

One of the objects of the invention is the provision of an improved machine which when it has been properly adjusted and set for a given job, may be used to punch all of the holes in a line across the belt at one time, and which thereafter determines the proper spacing of the holes longitudinally of the belt so that it is only necessary to feed the belt through the device step by step, and to actuate the punch at regular intervals when the belt has reached the proper position.

Another object of the invention is the provision of an improved device, which when properly adjusted will assure the holes being regularly spaced both transversely and longitudinally so that there will be no danger of a misfit between the holes and the buckets, and a finished and workman-like job will be assured under all conditions.

Another object of the invention is the provision of an improved punch which is provided with means for assuring the location of the belt under the punch, in engagement with a suitable guide that is so located that the holes will be properly located transversely of the belt.

Another object is the provision of an improved stopping and holding device which operates automatically in connection with a belt feed, in such manner that after one row of holes has been punched, the belt will be stopped automatically and held in position to punch the next row of holes and so on.

Another object of the invention is the provision of an improved belt punching machine, which is provided with means for urging the belt toward a lateral guide so that the guide will be able to determine the position of the punched apertures laterally of the belt, and in which the latter means is also adapted to cause the belt to lie

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flatly on the table and to avoid the upward bulge which would otherwise be caused by the belt being guided to the table from a roll on the floor.

Another object is the provision of an improved means for removing punchings from the top of the belt so that they will not interfere with the feed rollers or the automatic stops.

A further object of the invention is the provision of an improved device of the class described, which is simple, sturdy, accurate, capable of being manufactured at a low cost and which may be used for a long period of time without necessity for repair or replacement of any of its parts.

Other objects and advantages of the invention will be apparent from the following description and the accompanying drawings, in which similar characters of reference indicate similar parts throughout the several views.

Referring to the two sheets of drawings accompanying this specification,

Fig. 1 is a top plan view of a punching machine embodying the invention, the housing being partially broken away to expose the drive mechanism for the punches;

Fig. 2 is a side elevational view of the punching machine;

Fig. 3 is a fragmentary sectional view taken on the plane of the line **3—3** of Figure 4, looking in the direction of the arrows;

Fig. 4 is a fragmentary vertical sectional view taken on the plane of the line **4—4** of Figure 3, looking in the direction of the arrows;

Fig. 5 is a fragmentary side elevational view of the stopping and holding mechanism for holding the belt in proper position for the punching of another set of holes, taken on the plane of the line **5—5** of Figure 1, looking in the direction of the arrows;

Fig. 6 is a fragmentary vertical sectional view taken on the plane of the line **6—6** of Figure 1, looking in the direction of the arrows; and

Fig. 7 is a fragmentary vertical elevational view showing one of the punches in partial section to show its structure.

Referring to Figures 1 and 2, **10** indicates in its entirety the punching machine which preferably comprises an upper frame **11** suitably supported upon a plurality of legs **12**. The frame **11** may consist of a pair of longitudinally extending angle irons **13**, **14**, having a horizontal flange **15** and an upwardly extending flange **16**.

The longitudinal frame members **13** and **14** may be secured together by a plurality of transverse channels **17**, bolted or welded to the horizontal flanges **15**, and also by a pair of table

boards 18, 19, which are bolted to the horizontal flanges 15 to form a table top.

The boards 18 and 19 may consist of pieces of five-ply plywood, the board 19 being rectangular and extending from its discharge end 20 to its leading end 21, where it is spaced slightly from the discharge end 22 of the board 18 underneath the punches.

The leading edge 23 of the board 18 may extend diagonally and may be parallel to the rollers 24, 25, 26, which are located at the receiving end of the machine. The legs 12 may consist of iron or steel pipes provided with a cap 27 at their lower ends, and with a flange fitting 28 at their upper ends. The flange fitting may be bolted or welded to the horizontal flanges 15 of the frame members 13 and 14.

On particularly heavy and wide installations the legs may be suitably braced crosswise and lengthwise by diagonally extending braces welded or bolted to the legs and frame. At the feeding end of the machine the rollers 24—26 may consist of suitable steel pipes provided at their ends with plugs 29, carrying axial pins 30 which serve as trunnions.

The trunnions 30 of rollers 26 and 24 extend through drilled apertures in the vertical flanges 16 of the frame members 13 and 14, these apertures serving as bearings. Roller 25 has its trunnions mounted in sliding blocks 25*a*, guided by fittings 25*b* and urged downward by screws. Thus the roller 25 flattens the belt on the table by holding down the upward bulge which is due to the belt hanging down at the left end of the table.

The rollers extend diagonally so that they automatically tend to feed the belt toward the right against a suitable guide, such as, for example, an angle iron 31, having a vertical flange 32 extending along the side of the table top at the bottom of Figure 1.

Thus the belt is constantly held against the guide flange 32 from which the position for all holes is determined. The belt itself may be supported upon a suitable stand with a rotating roll which is located on the floor toward the left of Figure 1, in position to feed the belt 33 to the machine.

At the right end of the machine, Figure 1, Figure 2, the upper frame 11 supports a suitable feeding mechanism 34, the details of which are shown in section in Figure 6. This feed mechanism comprises a pair of supporting castings, such as the castings 35, which have an outer web 36 joining a pair of parallel side flanges 37, 38. These side flanges serve as guides for a pair of bearing blocks 39 and 40.

The side flanges 37, 38, and web 36 may be joined by a transverse integral bar 41, which is provided with apertures 42 for receiving the screw bolts by means of which the castings 35 are secured to the vertical flanges 16 of the frame members 13 and 14, which are also apertured to receive these bolts.

The bearing block 40 is provided with an aperture for receiving the pin or trunnion 43, which rotatably supports the lower feed roller 44. This feed roller 44 may, if desired, be provided with a tubular rubber cover 45, or it may consist of a steel tube provided with end plugs carrying the pins 43.

Bearing blocks 40 rest on the transverse bar 41 and hold the roller 44 at such a level that its top is flush with the top of the table board 19. The flange 16 of the side frame member 14 has an aperture for passing an extension of the pin 43,

which carries a crank 46 by means of which roller 44 may be turned. The block 39 is adapted to slide between the flanges 37, 38, and it has apertures for the pins 47 which project from the ends of the roller 48.

The top yoke 49 of each casting 35 is provided with a threaded bore 50 for receiving a screw bolt 51, by means of which a suitable pressure is placed on the top roller 48 to grip the belt 33 between the roller 48 and roller 44 to assure its feed. When the crank 46 is rotated by means of its handle 52, the rollers 44 and 48 feed the belt 33 from the left toward the right in Figure 6, and in Figures 1 and 2.

Referring to Figure 5 and Figures 1 and 2, the machine is preferably provided at a central point, between the boards 18 and 19, with the punching apparatus 53, and above the board 19 between the feeding apparatus 34 and the punching apparatus 53 with an automatic device 54, for stopping and holding the belt in proper position for the punching of the next series of holes.

Referring to Figure 1, 155 indicates a metal bar which is mounted for vertical sliding movement and which extends diagonally with respect to the belt. The bar 155 is for the purpose of removing punchings, and as the belt progresses under it the punchings slide toward the left, that is, the top of Figure 1, and are discharged through the hole 156 which extends through the top of the table.

The bar 155 may be placed between the automatic stop 54 and the punching device 53, as shown in Figure 1, but if the holes are to be too close together longitudinally of the belt this bar may be moved over toward the right between the automatic stop 54 and the feeding mechanism 34.

Bar 155 is supported at each end by a block 157, each block having a diagonally extending groove 158 in which the bar 155 slides up or down. Each block 157 has a groove for receiving the guide flange 32 of angle iron 31, and each block has a set screw 159 for securing the block in place on the flange 32. Thus the punchings are automatically removed from the top of the belt so that they will not interfere with the automatic stop or with the feeding mechanism.

Referring to Figures 3 and 4, the details of the punching mechanism are shown here in section. The side frame members 13 and 14 each support a casting 55. This casting may have a lower flat attaching flange 56, which fits on the vertical flange 16 of the side frame member 14 and has a shoulder 57 engaging the top of the flange 16.

Attaching flange 56 has threaded bores 58 for receiving the screw bolts 59 which pass through apertures 60 in the side frame member 14, and are threaded into the attaching flange 56. Above the attaching flange 56 the casting 55 has an upwardly extending housing formation comprising the yoke wall 61 and a pair of side flanges 62, 63.

The yoke wall 61 is integrally joined to the side flanges 62 forming a half-round end housing and is provided with a curved top wall 64 closing the top of this casting. At one side, that is, the left side in Figure 3, the casting 55 supports a transversely extending bearing 65, the bearing 66 of which is provided with a rotatable shaft 67.

The shaft 67 carries a pinion 68, the hub 69 of which is secured to shaft 67 by a set screw 70 and by means of a key and keyway 71, Figure 3. The pinion 68 engages the teeth 72 of a rack bar 73, and the rack bar 73 is slidably mounted against a guide surface 74 which forms a back wall for engaging the side 75 of the rack bar.

The castings **55** are formed with a pair of vertically extending guide ribs **76** and **77**, the former of which bears the surface **74** and the latter has a guide surface **78**. The guide rib **77** terminates at **79**, below the pinion, to expose the teeth **72** of the rack for engagement with the pinion **68**.

Shaft **67** projects from the bearing **65** at one side, that is, the bottom of Figure 1, where it is provided with a hub **80** for supporting a counterweight **81** and a handle bar **82**. Handle bar **82** may extend transversely through the bore **83** in the hub, and is used to actuate the punches, but the counterweight **81** is supported upon a rod **84**, which is secured in a bore in the hub **80**.

Counterweight **81** is adjustably mounted on the rod **84** by means of set screw **85**, in such manner as to effect a substantial balance of the weight of the punches and assembled cross bar, rack, etc.

The shaft **67** supports a pinion at each of its ends for engaging a pair of racks **73**, one of which is located in each casting **55**. The castings **55**, with their guide surfaces **78** and **74** also support and guide a cross bar **86**, Figure 4, which is carried at each of its ends by a rack **73**.

For this purpose the cross bar may have at each end a bore **87** for receiving a screw bolt **88** which is threaded into a threaded bore **89** in the rack **73**. The counterbore **90** communicates with the bore **87** and is adapted to receive the head of the bolt **88**. Thus the racks **73** project upward at right angles to the cross bar **86** and are held in position to be engaged by the pinion **68**.

The cross bar **86** supports a pair of guide plates **91**, **92** which may be identical in construction. Each guide plate comprises an elongated rectangular strip of steel provided with apertures for receiving the screw bolts **93**, by means of which both guide plates are clamped to the cross bar **86**. The guide plates are provided below the cross bar **86** with the elongated slots **94** for passing the screw bolts **95**, by means of which the punches are clamped in place.

Referring to Figure 7, each punch **96** is supported by a punch head **97**, and the punch heads **97** may consist of rectangular blocks of steel fitting in between the plates **91**, **92**, and having a flat upper surface **98** engaging the flat bottom surface **99** of the cross bar **86**. Each punch head **97** has a lower threaded bore **100** for receiving the threaded stub bolt **101**, the other end of which is threaded into a bore **102** in a punch **96**. Thus the punches are fixedly secured on the punch heads **97**.

Each punch head also has two laterally extending threaded bores **103***a*, **104***a*, these bores registering with the elongated slots **94** in the plates **91** and **92**, and receiving the screw bolts **95**. Thus the screw bolts **95** may be loosened and the punch heads **97** may be slid longitudinally of the cross bar **86** and adjusted to any position desired, where they may be clamped by means of the bolts **95** engaging plates **91**, **92**.

Each punch head may be provided with a marker, such as a groove **103** at its lower edge for registering with the scale divisions **104**, which are provided with indicia for indicating inches and fractions thereof over the full length of the plates **91**, **92**. The zero point of the indicia is located at one end, as shown in Figure 4, in alignment with the inner surface **105** of a guide flange **32**.

Thus the scale divisions **104**, and their indicia serve to indicate in connection with the pointers

103, the distances at which the punches are located with respect to each other and with respect to the edge of the belt which engages the guide surface **105**.

The punches **96** may be identical in shape, and comprise tapered steel members provided with the flat end surface **106**, and the axial threaded bore **102**, previously mentioned, for securing them to the punch heads **97**. Each punch has a cylindrical body **107** and a frusto-conical tapered end **108**.

The tapered end **108** terminates in a sharp circular edge **109**, which is formed by providing a circular bore **110** in the punch. The bore **110**, becomes larger upwardly and tapers downwardly so that the punches **111** pass upward easily and are directed outwardly at an enlarged side aperture **112**.

The center of each circular punch edge **109** is accurately aligned with the pointer **103** on the punch head **97**, and the pointer **103** may be located after the punch has been secured to its head.

A multiplicity of punches and punch heads are provided so that any number of holes may be punched in a belt passing through the machine. When the belt is narrower than the table the extra punch heads may be slid over toward the side of the table which is vacant and clamped in place there.

In order to guide the punches **96**, the two castings **55** also preferably support a pair of steel bars **113**, **114**, Figure 3, which are located to engage the cylindrical sides of the punches **96** and to guide them against tilting forwardly or backwardly. These guide bars **113**, **114** may be secured against the guide surfaces **78** and **74** of the ribs **76**, **77** at the table top, as shown in Figure 3, just above the top of the table and spaced therefrom sufficiently to pass any thickness of belt that might be employed.

The lower edge **115** of one of these guide bars is shown spaced from the belt **33** in Figure 4. This lower edge **115** is preferably located below the cutting edges **109** of the punches so that the bars **113**, **114** also serve to strip the belt from the punches as the punches are raised.

In order to provide a backing against which the belt may react as it is being punched, the side frame members **13**, **14** support a pair of transversely extending angle irons **116**, **117**, Figure 3, one on each side of the aperture or slot between the edges **21** and **22** of the table boards **18** and **19**.

Each of these angle irons **116**, **117** has its horizontal flange **118** secured to the horizontal flange **15** of the frame members **13** and **14** by a screw bolt **119** and a suitable nut. The two vertical flanges **120** of the angle irons **116**, **117** are spaced from each other an equal amount, such as the spacing between the edges **21**, **22** of the table boards, and these vertical flanges support an elongated strip **121** of hard wood which is secured to them by through screw bolts **122**.

The hard wood backing strip **121** has an upper flat surface **123** that is depressed below the table top sufficiently to provide space for a resilient rubber back strip **124**, which is cemented to the upper surface **123** and which has its upper surface flush with the table top. Thus the punches **96** are adapted to pass through the belt and to press it against the rubber backing strip **124**, which the punch cutting edge **109** eventually engages.

The rubber backing strip **124** serves to protect

the sharp edge 109 of each punch 96, but the hard wood back strip 121 assures a definite and firm backing against which the punches may react, if necessary, to assure a cleanly punched hole.

The automatic stopping and holding devices 54 are preferably located between the punching mechanism 53 and the feeding mechanism 34 so that the stop mechanism 54 is in position to engage in the holes that have been previously punched. This device 54 may consist of a pair of end castings 125, each of which has attaching flanges 126 for receiving the clamping bolts 127, by means of which the castings 125 are clamped to the vertical flanges 32 of the guide members 31. Thus the castings 125 may be moved to the right or left and adjusted as desired.

A marking groove 129 on the castings 125 may be located to register with the scale divisions 130 marked on the outside of the flanges 32, and provided with numerals to indicate the spacing from the line of centers of the punches 96.. Thus if the holes are to be spaced 12 inches longitudinally of the belt, the castings 125 of the stop device 54 will be located with the line 129 in alignment with the scale division bearing an indicia 12 in inches.

Each of the castings 125 has its upper end formed with a pair of guide flanges 131, 132 for guiding a cam block 133. The cam block 133 comprises a block of steel of rectangular shape adapted to slide between the flanges 131, 132, and formed adjacent its lower end with an elongated rectangular aperture 134.

Aperture 134 is adapted to receive the elongated rectangular steel bar 135, which also passes through a registering aperture in the web 136 of casting 125, Figure 5. The bar 135 is provided at each end with a thrust washer 137 and with a through cotter pin 138, serving to prevent longitudinal movement of the bar 135.

Referring to Figure 6, bar 135 carries a plurality of pins 139 similar in size and shape to the punches 96, but the pins 139 may be solid pins with a circular end of the same size as the cutting end 109 of each punch 96. The pins 139 are carried by circular collars 140 having set screws 141 extending through threaded bores into a rectangular aperture 142.

The rectangular aperture 142 serves to mount the pins 139 and collars 140, for sliding movement on the bar 135. Any number of pins 139 may be employed, but assuming that the belt is properly aligned longitudinally of the table engaging one of the guide surfaces 32, a single pin 139 may perform the function properly.

However, the bar 135 may be provided with a plurality of pins 139, so spaced that they will fall into the apertures that have been previously punched by the punches 96, and the castings 125 may be so located longitudinally of the table that the spacing between the axes of the pins 139, and the axes of the punches 96 is the desired longitudinal spacing of the holes which are to be punched in the belt.

In order to lift the pins 139 from the holes in the belt the blocks 133, Figure 5, may each be provided with a side slot 143, having at its upper side an engaging surface 144 for engagement with the pin 145 carried by shaft 146. Shaft 146 is rotatably mounted in bearings 147 in each of the castings 125, and shaft 146 is provided with a handle 148 at one end.

The handle 148 has two positions. When the handle 148 is in the position of Figure 5, it supports the block 133 in such a position that the bar 135 and its pins 139 rest on top the belt 33, as shown in Figure 6, but there is sufficient clearance between the bar 135 and the bottom of the slot 134 so that the pins 139 can drop down into engagement with the table top 19, when the apertures 149 in the belt 33 move over into registry with the pins 139.

When the handle 148 is turned downward counterclockwise until the end of the pin 145 engages surface 144 of block 133, then the block 133 is lifted sufficiently so that it lifts the bar 135 and pins 139 out of the belt apertures 149, and it may hold the pins 139 above the belt temporarily.

The punch mechanism is preferably covered with a U-shaped hood 150 of sheet metal, such as steel, which is shaped to fit on the recessed attaching flanges 151, carried by castings 55, to which the sheet metal hood is secured by the screw bolts 152. This U-shaped hood extends from one casting 55 to the other and covers and encloses the rack and pinion mechanism while leaving the punches and their supports open for adjustment.

The operation of my belt punching machine is as follows: The belt which may be leather, rubber, canvas or of any suitable composition or fabric, may be supported on a roll on the floor or on suitable bearings at the left end of the machine, Figure 1. In some embodiments of the invention the punch shaft may be driven by means of a suitable electric motor and reducing gearing, controlled by suitable switches to eliminate manual labor.

The punches should then be lifted by moving the handle 82 to the position of Figure 2, in which the counterweight 81 holds the pinions 68 in such position as to hold the racks 73 up, as shown in Figure 3.

The belt is then fed over the table top 18 until it is in position to punch the first set of holes, the longitudinal position of which should be marked. With the belt held by hand in proper position under the punches, the handle 82 is turned clockwise and forced down until all of the holes desired are punched at once, the punches having been previously set in proper transverse position on the punch supporting bar 86.

The stop device 54 has been previously set to such a position longitudinally of the machine as corresponds to the desired longitudinal spacing of the holes in the belt. The belt is then fed across the table top with the handle 148 of the stop device 125 in the position of Figure 5, and the pins 139 riding on top the belt 33.

As the belt slides toward the right the pins will eventually drop into the first-punched apertures 149, when the movement of the belt should be stopped, as it is now in position to punch the next holes. These holes may then be punched in the same way by forcing the handle 82 on punching mechanism 53 downward toward the right in Figure 2.

In the course of its movement across the table top, the leading edge of the belt 33 will eventually reach the feed rollers 44, 48. These should be adjusted to receive the belt between them, and thereafter pressure may be applied to these two rollers by means of the screw bolts 51, so that they grip the belt.

Then assuming that the second row of holes has been punched, the automatic stop device 125

may have its handle pushed downward counterclockwise in Figure 5 to raise the pins **139**. While the pins are raised and the punch is raised, the crank **46** of the feed device **34** may be turned in a clockwise direction. This draws the belt **33** longitudinally of the table tops **18**, **19**, and since the last apertures **149** have passed to the right beyond the pins **139**, the automatic stop device **125** may have its handle **148** again moved to the position of Figure 5.

Then the pins **139** will rest on top of the belt, as shown in Figure 6, and they are ready to drop into the next apertures **149**, as these come into registry with the pins **139** in the passage of the belt **33** toward the right in Figure 6. When the pins **139** are located in the last cut apertures **149**, then the belt is located in position to punch the next row of apertures, which is done by rotating shaft **67** clockwise in Figure 2 by means of handle **82**. As this is done the pinions **68** drive the racks **73** downward and force the punches through the belt.

When the punching has been accomplished the handle **82** is moved back upward in counterclockwise direction in Figure 2, withdrawing the punches, and during this movement guide bars **113**, **114** strip the belt from the punches. The belt is now ready to be moved to the right another step, the extent of which is determined by the location of the pins **139**.

As the belt moves from left to right the punchings which are discharged from the punches on the top of the belt are automatically guided across the belt by the bar **155**, and discharged on the floor or in a receptacle through hole **156**.

My method of punching belts comprises the feeding of a belt longitudinally across a suitable support and urging it toward one side to guide the belt at one of its edges, stopping the feed of the belt at predetermined positions, which positions are determined by the engagement of the last-punched holes with dummy pins suitably located on the support and riding on the belt surface at a spacing from a punch which is determined by the desired longitudinal distance between the holes, punching a multiplicity of holes simultaneously while the belt is held in such position by the dummy pins, removing the punches from the belt, lifting the dummy pins from the holes in the belt, feeding the belt onward past the dummy pins and punch, permitting the dummy pins to ride on top the belt, and continuing its feed until the dummy pins drop in the last cut apertures, and thereupon punching the next series of holes located transversely of the belt.

Thereafter the belt is successively fed, stopped and punched with holes, which are equally spaced longitudinally of the belt and equally spaced transversely of the belt until the entire belt is provided with the desired holes.

It will thus be observed that I have invented an improved method and machine for punching belts, by means of which the belt is automatically brought into proper position for the punching of a multiplicity of holes in one operation, and each successive series of holes is located in the proper position longitudinally of the belt.

By my method and machine a great deal of time and labor is saved, and belts which took days to punch may now be punched in a few hours.

The present machine is adapted to be adjusted for various sizes of belts and for various numbers and locations of apertures, and will meet a great number of different requirements.

While I have illustrated a preferred embodiment of my invention, many modifications may be made without departing from the spirit of the invention, and I do not wish to be limited to the precise details of construction set forth, but desire to avail myself of all changes within the scope of the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States, is:

1. In a belt punching machine, the combination of a supporting table having a plurality of legs and a pair of longitudinally extending angle irons carried thereby, a platform carried by said angle irons for supporting a belt, a pair of feed rolls mounted at the output end of said machine and comprising a lower driving roll having a resilient tubular cover for engaging the bottom of the belt and provided with a crank, and an upper pressure roller for engaging the top of the belt, a pair of combined housing and guide members carried by said angle irons and extending upwardly at opposite sides of said table, said latter members being formed with aligned bearings for receiving an actuating shaft having a balance weight and an actuating arm, a pinion carried by said shaft in said latter member opposite a vertically extending rectangular guide slot, a horizontal bar provided with an upwardly extending rack at each end, the said racks being mounted in said slots in engagement with said pinions, said horizontal bar being provided on its opposite sides with horizontally slotted depending punch guide plates, said punch guide plates being provided with linear indicia and scale divisions for indicating the spacing of punches, a plurality of punches carried by said horizontal bar, each punch comprising a rectangular-sided block fitting between said punch guide plates and having a depending punch on said block, said block having a marker for cooperation with said scale divisions, said marker being aligned with the center of the punch, threaded means passing through said slots and threaded into said block for clamping the punch blocks in adjusted position transversely of said horizontal bar, the top of each block engaging the bottom of said horizontal bar to take the thrust on the punch.

2. In a belt punching machine, the combination of a supporting table having a plurality of legs and a pair of longitudinally extending angle irons carried thereby, a platform carried by said angle irons for supporting a belt, a pair of feed rolls mounted at the output end of said machine and comprising a lower driving roll having a resilient tubular cover for engaging the bottom of the belt and provided with a crank, and an upper pressure roller for engaging the top of the belt, a pair of combined housing and guide members carried by said angle irons and extending upwardly at opposite sides of said table, said latter members being formed with aligned bearings for receiving an actuating shaft having a balance weight and an actuating arm, a pinion carried by said shaft in said latter member opposite a vertically extending rectangular guide slot, a horizontal bar provided with an upwardly extending rack at each end, the said racks being mounted in said slots in engagement with said pinions, said horizontal bar being provided on its opposite sides with horizontally slotted depending punch guide plates, said punch guide plates being provided with linear indicia and

scale divisions for indicating the spacing of punches, a plurality of punches carried by said horizontal bar, each punch comprising a rectangular-sided block fitting between said punch guide plates and having a depending punch on said block, said block having a marker for cooperation with said scale divisions, said marker being aligned with the center of the punch, threaded means passing through said slots and threaded into said block for clamping the punch blocks in adjusted position transversely of said horizontal bar, the top of each block engaging the bottom of said horizontal bar to take the thrust on the punch, an angle iron guide member carried by said table top and extending longitudinally of one edge thereof for guiding a belt, and a plurality of diagonally extending rollers engaging the top and bottom of said belt at the inlet end of said machine and driven by said belt as it is fed through the machine, the said diagonal rollers producing a lateral component which guides the belt against said latter guide at all times.

3. In a belt punching machine, the combination of a supporting table having a plurality of legs and a pair of longitudinally extending angle irons carried thereby, a platform carried by said angle irons for supporting a belt, a pair of feed rolls mounted at the output end of said machine and comprising a lower driving roll having a resilient tubular cover for engaging the bottom of the belt and provided with a crank, and an upper pressure roller for engaging the top of the belt, a pair of combined housing and guide members carried by said angle irons and extending upwardly at opposite sides of said table, said latter members being formed with aligned bearings for receiving an actuating shaft having a balance weight and an actuating arm, a pinion carried by said shaft in said latter member opposite a vertically extending rectangular guide slot, a horizontal bar provided with an upwardly extending rack at each end, the said racks being mounted in said slots in engagement with said pinions, said horizontal bar being provided on its opposite sides with horizontally slotted depending punch guide plates, said punch guide plates being provided with linear indicia and scale divisions for indicating the spacing of punches, a plurality of punches carried by said horizontal bar, each punch comprising a rectangular-sided block fitting between said punch guide plates and having a depending punch on said block, said block having a marker for cooperation with said scale divisions, said marker being aligned with the center of the punch, threaded means passing through said slots and threaded into said block for clamping the punch blocks in adjusted position transversely of said horizontal bar, the top of each block engaging the bottom of said horizontal bar to take the thrust on the punch, each of said housing members also supporting a longitudinally slotted guide member for the depending punches above the belt, the said guide member holding the depending punches in alignment and its lower surface engaging the belt to strip it off the punches.

4. In a belt punching machine, the combination of a supporting table having a plurality of legs and a pair longitudinally extending angle irons carried thereby, a platform carried by said angle irons for supporting a belt, a pair of feed rolls mounted at the output end of said machine and comprising a lower driving roll having a resilient tubular cover for engaging the bottom of the belt and provided with a crank, and an upper pressure roller for engaging the top of the belt, a pair of combined housing and guide members carried by said angle irons and extending upwardly at opposite sides of said table, said latter members being formed with aligned bearings for receiving an actuating shaft having a balance weight and an actuating arm, a pinion carried by said shaft in said latter member opposite a vertically extending rectangular guide slot, a horizontal bar provided with an upwardly extending rack at each end, the said racks being mounted in said slots in engagement with said pinions, said horizontal bar being provided on its opposite sides with horizontally slotted depending punch guide plates, said punch guide plates being provided with linear indicia and scale divisions for indicating the spacing of punches, a plurality of punches carried by said horizontal bar, each punch comprising a rectangular-sided block fitting between said punch guide plates and having a depending punch on said block, said block having a marker for cooperation with said scale divisions, said marker being aligned with the center of the punch, threaded means passing through said slots and threaded into said block for clamping the punch blocks in adjusted position transversely of said horizontal bar, the top of each block engaging the bottom of said horizontal bar to take the thrust on the punch, and a diagonally extending fixed barrier carried by said table top between the feed rollers and the punches, said table top having an aperture for punchings at the end of said barrier which is nearest to the feed rollers, the barrier impelling the punchings laterally toward said aperture at the side of the table opposite from said guide as the belt progresses.

5. In a belt punching machine, the combination of a supporting table having a plurality of legs and a pair of longitudinally extending angle irons carried thereby, a platform carried by said angle irons for supporting a belt, a pair of feed rolls mounted at the output end of said machine and comprising a lower driving roll having a resilient tubular cover for engaging the bottom of the belt and provided with a crank, and an upper pressure roller for engaging the top of the belt, a pair of combined housing and guide members carried by said angle irons and extending upwardly at opposite sides of said table, said latter members being formed with aligned bearings for receiving an actuating shaft having a balance weight and an actuating arm, a pinion carried by said shaft in said latter member opposite a vertically extending rectangular guide slot, a horizontal bar provided with an upwardly extending rack at each end, the said racks being mounted in said slots in engagement with said pinions, said horizontal bar being provided on its opposite sides with horizontally slotted depending punch guide plates, said punch guide plates being provided with linear indicia and scale divisions for indicating the spacing of punches, a plurality of punches carried by said horizontal bar, each punch comprising a rectangular-sided block fitting between said punch guide plates and having a depending punch on said block, said block having a marker for cooperation with said scale divisions, said marker being aligned with the center of the punch, threaded means passing through said slots and threaded into said block for clamping the punch blocks in adjusted position transversely of said horizontal bar, the top of each block engaging the bottom of said horizontal

bar to take the thrust on the punch, said table top having a pair of angle iron guides extending along the sides of said table, a pair of bearing members slidably mounted for adjustment on said guides longitudinally of said table top, a transversely extending pin bar slidably mounted for vertical movement in said bearing members, a shaft rotatably mounted in said latter bearing members and means carried by said shaft for lifting said pin bar, said means being rotatable into a position where the pin bar may drop by gravity, the said bearing members being adjusted to a longitudinal position on said table top equivalent to the longitudinal spacing between the apertures to be punched, and the feeding progressing until the pins of the pin bar drop into the last punched apertures, when the belt is in position for the punching of the next set of apertures.

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