Aug. 21, 1962 A. HOHMANN 3,050,244

MACHINES FOR PUNCHING TABULATING CARDS

Filed July 16, 1959 7 Sheets-Sheet 1

Fig. 1

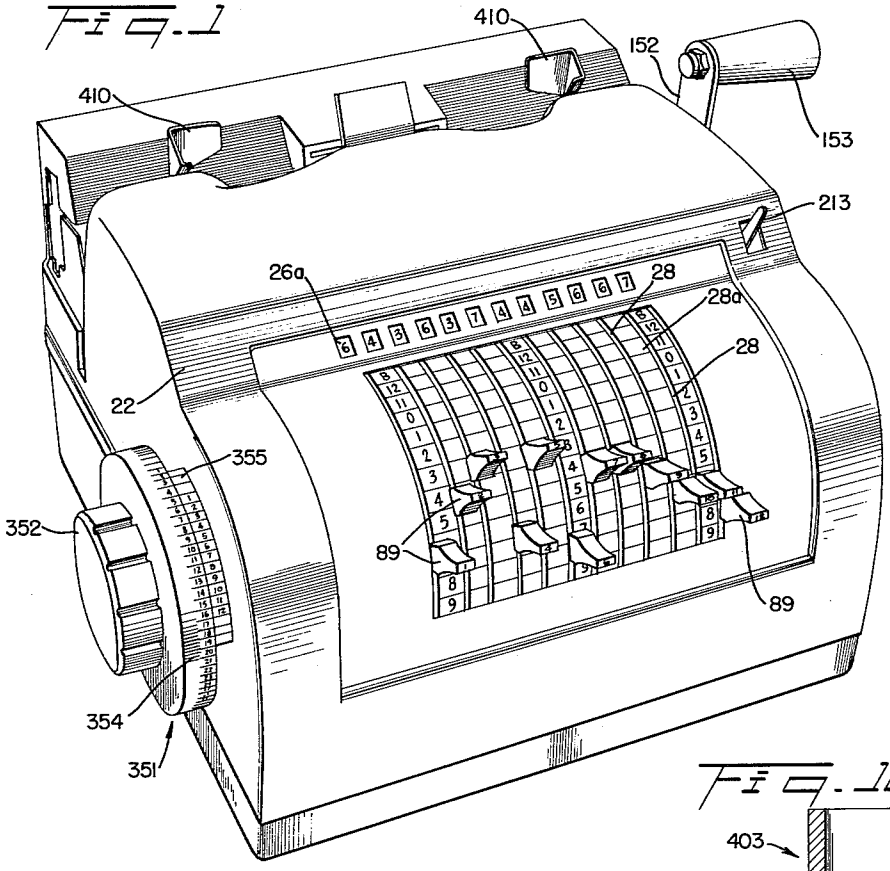
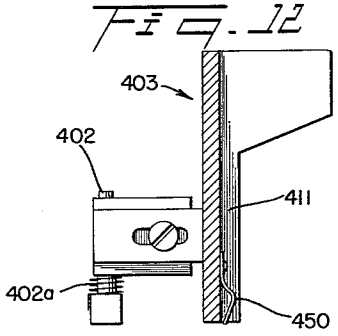


Fig. 12



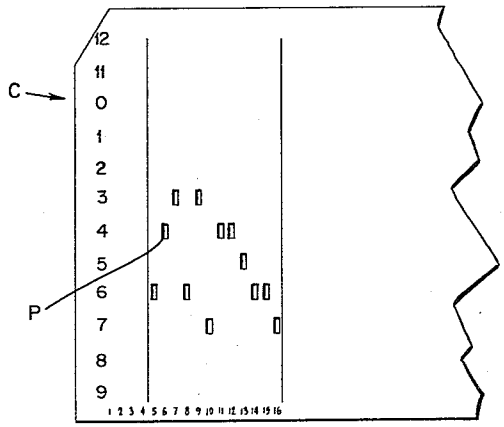


Fig. 2

INVENTOR.
ALBERT HOHMANN

BY

J. B. Feeley

ATTORNEY

Aug. 21, 1962 A. HOHMANN 3,050,244

MACHINES FOR PUNCHING TABULATING CARDS

Filed July 16, 1959 7 Sheets-Sheet 2

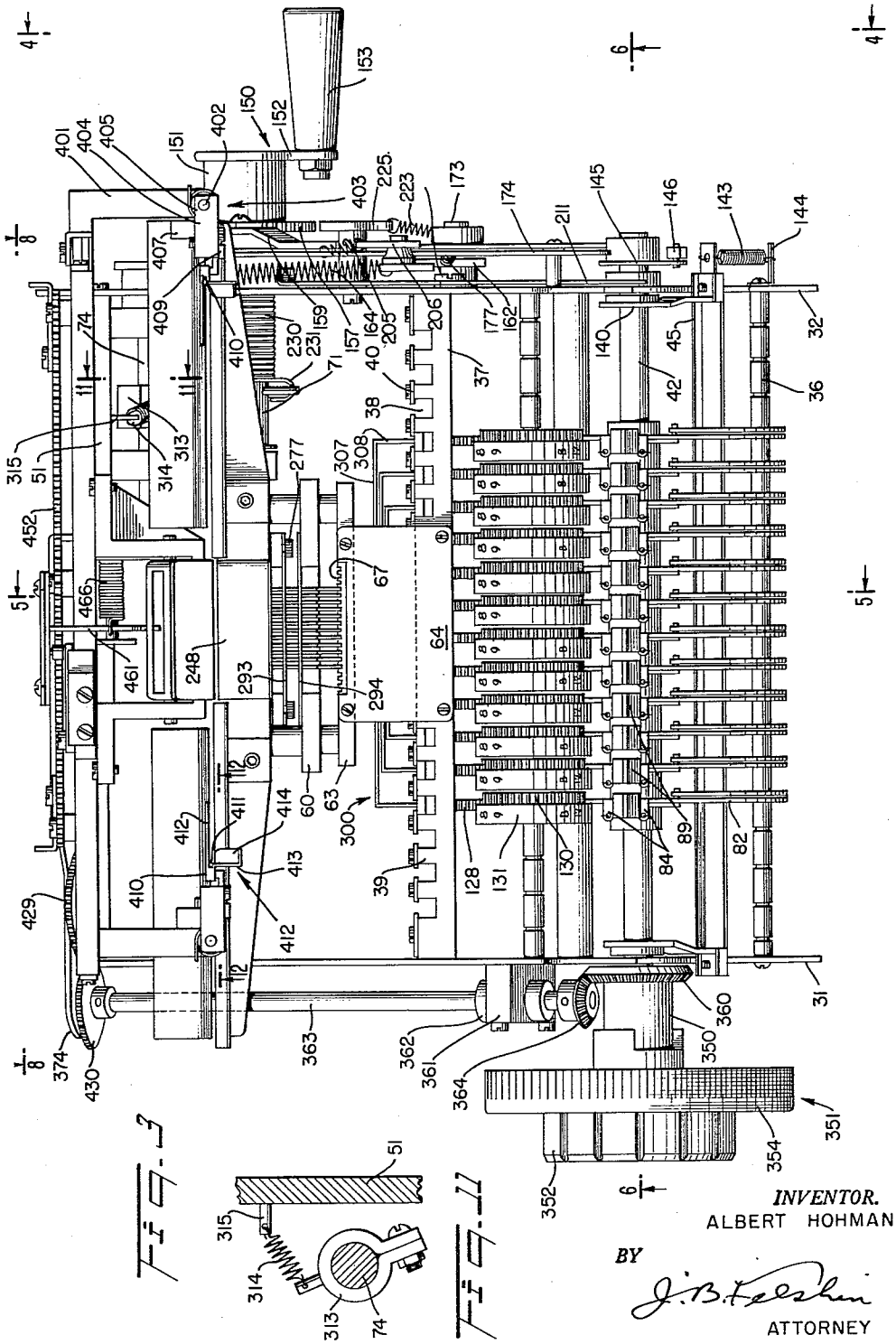


FIG. 1

FIG. 11

INVENTOR.
ALBERT HOHMANN

BY

ATTORNEY

Aug. 21, 1962 A. HOHMANN 3,050,244

MACHINES FOR PUNCHING TABULATING CARDS

Filed July 16, 1959 7 Sheets-Sheet 3

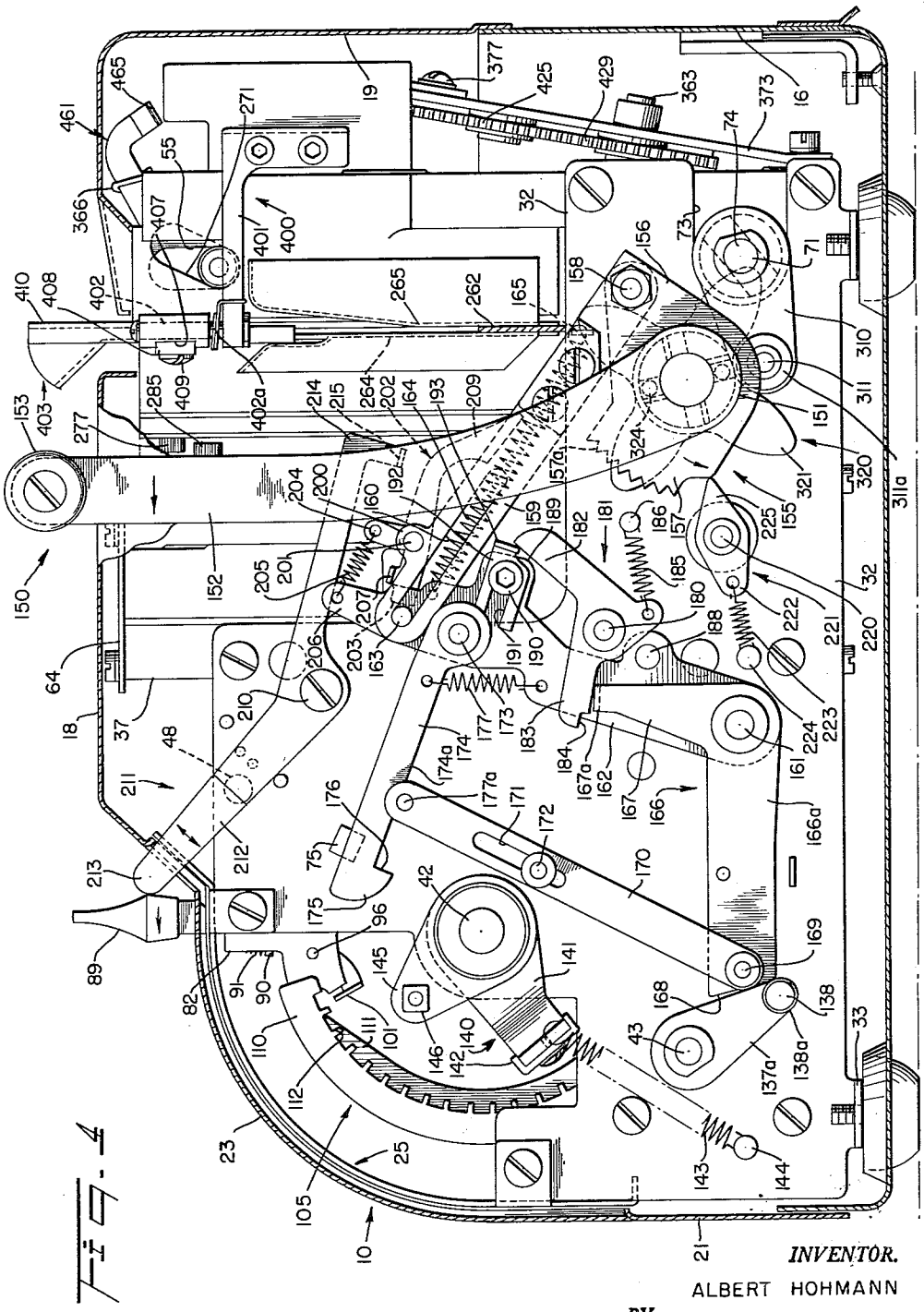


FIG. 4

INVENTOR.
ALBERT HOHMANN
BY
J. B. Felshin
ATTORNEY

Aug. 21, 1962 A. HOHMANN 3,050,244

MACHINES FOR PUNCHING TABULATING CARDS

Filed July 16, 1959 7 Sheets-Sheet 4

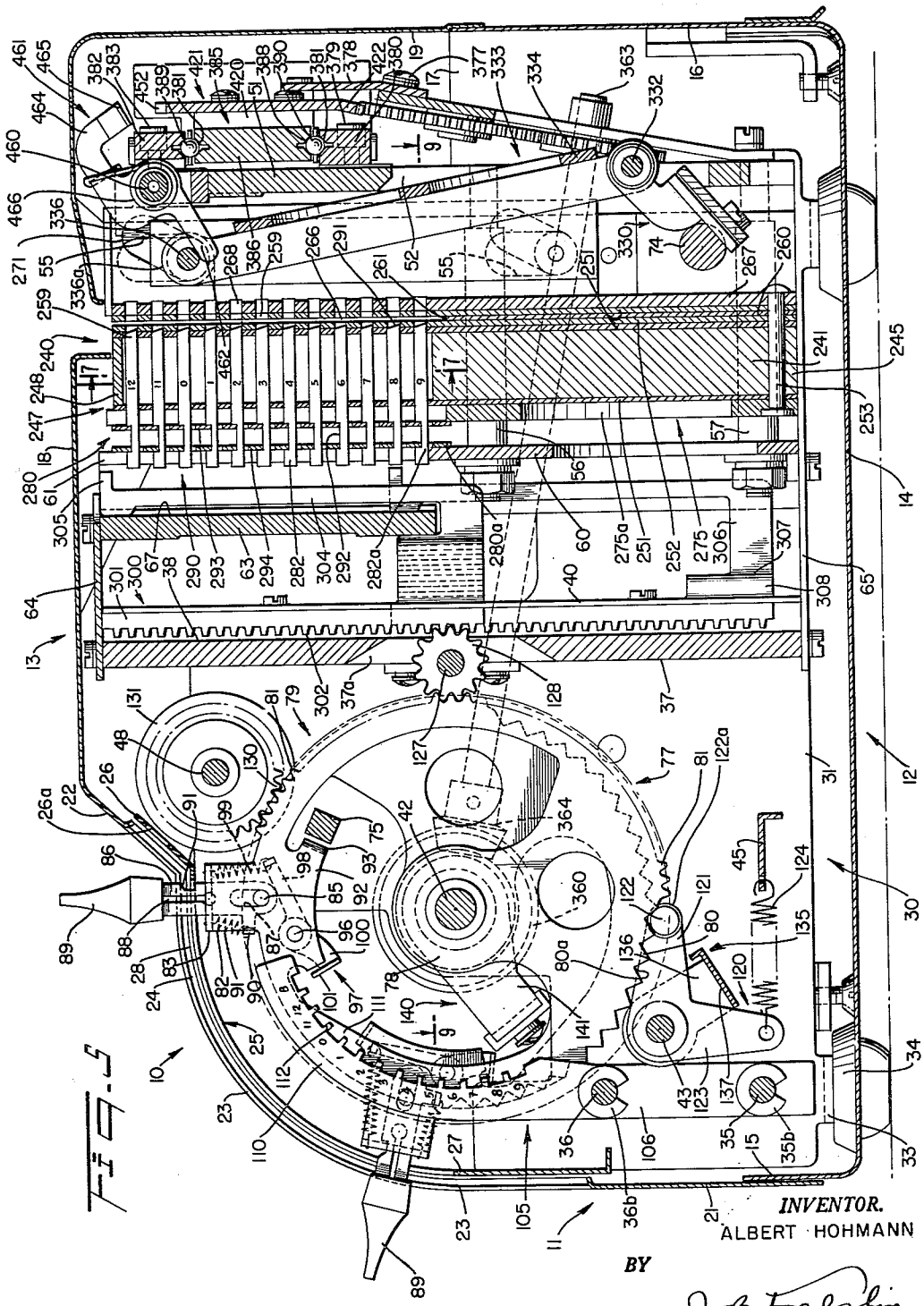


FIG. 5

INVENTOR.
ALBERT HOHMANN

BY

J. B. Felsher

ATTORNEY

Aug. 21, 1962 A. HOHMANN 3,050,244

MACHINES FOR PUNCHING TABULATING CARDS

Filed July 16, 1959 7 Sheets-Sheet 5

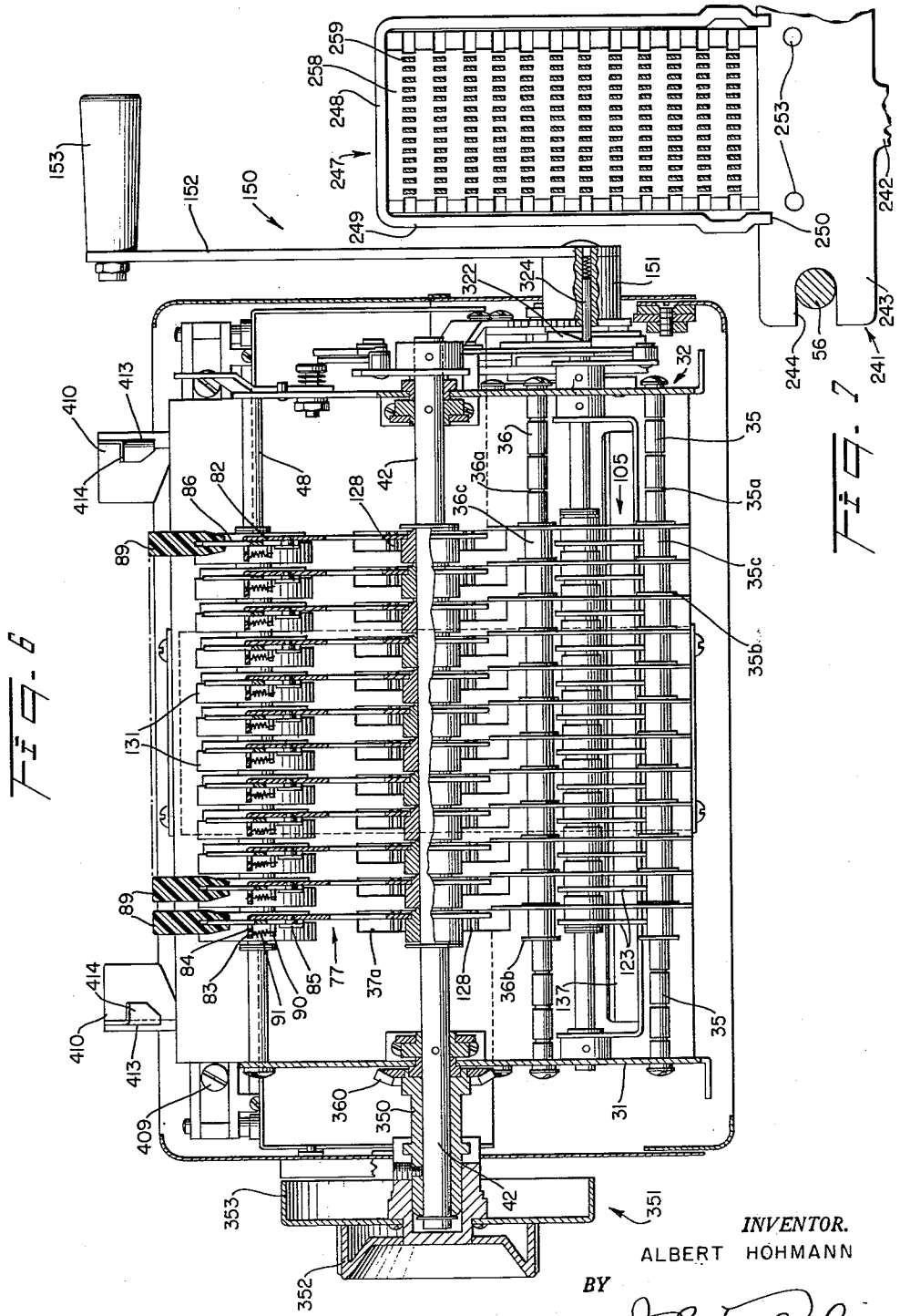


FIG. 6

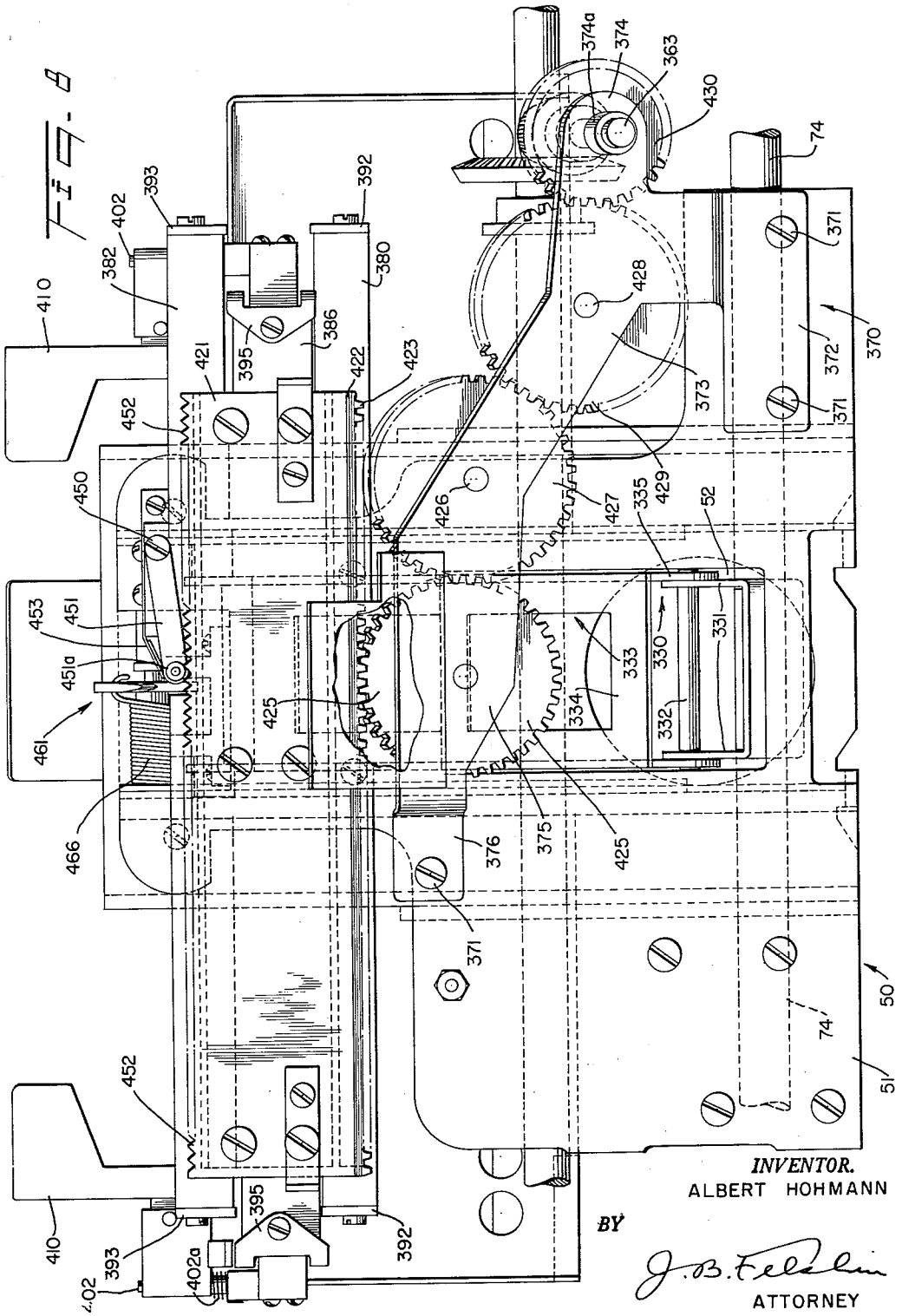
FIG. 7

INVENTOR.
ALBERT HOHMANN
BY
J. B. Feeling
ATTORNEY

Aug. 21, 1962 A. HOHMANN 3,050,244

MACHINES FOR PUNCHING TABULATING CARDS

Filed July 16, 1959 7 Sheets-Sheet 6



Aug. 21, 1962 A. HOHMANN 3,050,244

MACHINES FOR PUNCHING TABULATING CARDS

Filed July 16, 1959 7 Sheets-Sheet 7

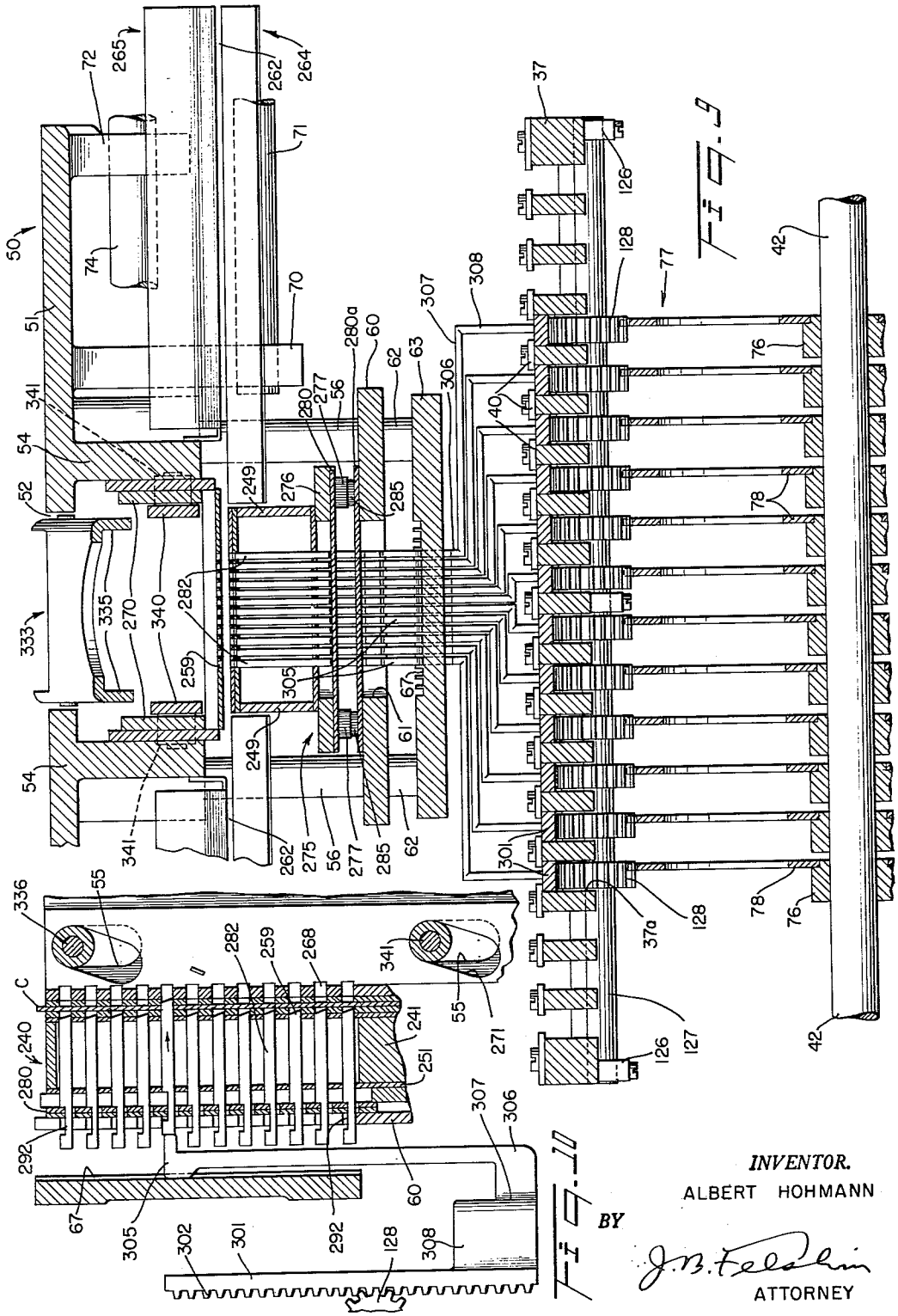


FIG. 9

FIG. 10

INVENTOR.
ALBERT HOHMANN
BY
J. B. Felsheim
ATTORNEY

United States Patent Office

3,050,244

Patented Aug. 21, 1962

3,050,244

MACHINES FOR PUNCHING TABULATING CARDS

Albert Hohmann, Brooklyn, N.Y., assignor to Taller & Cooper, Inc., Brooklyn, N.Y., a corporation of New York

Filed July 16, 1959, Ser. No. 827,569
12 Claims. (Cl. 234—112)

This invention relates to machines for punching tabulating cards. It is particularly directed to a portable mechanical card punching machine.

An object of this invention is to provide in a machine of the character described, a card carriage, a selector knob and gearing interconnecting the carriage with the selector knob for moving the card carriage to desired selected portions, to align selected portions of the card with a punch die, so that the selected portions of the card may be punched by means of the die.

Another object of this invention is to provide in a machine of the character described, a punch die for punching one hole in each column of a group of columns, means being provided to make the punch in a selected one of a plurality of positions in each column, the machine being provided with a selector knob numbered peripherally to correspond with the number of columns on the card, and the machine having adjacent the selector knob, a segmental index portion numbered to correspond to the number of columns in the punch die, so that the selector knob may be rotated to correlate the numbers designating the columns of the punch die, with the numbers designating the columns on the punch card to be punched, said machine having means whereby rotation of the knob causes sideways motion of the card carriage, so that the operator will know by comparing the punch die numbers on the index with the card column numbers on the selector knob, which die punch column corresponds to the column on the card to be punched by the punch in said die punch column. Thus, in a machine which has a punch die with twelve columns of punches, the index will be marked with numbers 1–12. If the card is an 80 column card, the selector knob will be numbered 1–80. By rotating the selector knob, the 12 numbers of the index will match up with 12 selected consecutive numbers of the selector knob. Thus, if No. 1 on the index matches with No. 5 on the selector knob, it means that the punch which is in the first column of the die will punch column 5 of the card. The punch in column 2 of the die will punch column 6 of the card, and so forth, so that the punch in No. 12 column of the die will punch column 16 on the card.

Still another object of this invention is to provide in a machine of the character described, a die punch and card holder to hold a card in position for punching upon moving said die and holder forwardly, and a card carriage slidable transversely to move the card on the card holder longitudinally to selected portions.

Still another object of this invention is to provide in a machine of the character described, a plurality of setting levers movable in segmental slots, there being one lever for each column in the punch die. Each setting lever can be moved to one of 12 positions indicating the number of vertical positions in each column of the card and in each column of the die. By moving the setting levers to selected positions, the operator may select in which vertical positions, the punch is desired for each column. Thus, there may be 12 positions for each column, and setting levers numbers 1–12 may be individually moved to one of 12 positions, the machine being provided with means to punch the card in the selected vertical positions of the selected columns of the card to be punched.

A still further object of this invention is to provide

swinging arms on the card carriage engaging the ends of the card on the card holder, to permit the card holder and punch die to move the card forwardly during punching operation.

Still another object of this invention is to provide in a machine of the character described, visual means to indicate by number the selected positions of the setting levers when they are set, so that the operator at a glance may check the setting of the machine.

A further object of this invention is to provide in a machine of the character described, a card carriage having spring means at one end to press one end of the card against a positive stop at the other end of the carriage, for positively locating the card on the carriage.

Another object of this invention is to provide in a machine of the character described, means to return the setting levers to initial position after each punching operation.

Yet another object of this invention is to provide in a machine of the character described, means to inhibit restoration of selected setting levers, if it is desired to repeat punches on successive cards for the selected settings.

Another object of this invention is to provide an improved machine of the character described in which the setting levers control interposers for backing up selected punches, the machine being provided with a die movable forwardly against the selected punches to punch the card on the die, means being provided to return all the punches to their normal positions after each punching operation.

Another object of this invention is to provide in a machine of the character described, an operating lever having a down stroke of 90°, means being provided for effecting a punching operation in the first 45° of the downstroke of the operating lever. With the improved machine herein, at the end of the downstroke, the punches have punched and retracted, and during the return of the operating lever the setting levers are restored to initial positions.

Still another object of this invention is to provide in a machine of the character described, a highly improved mechanical portable tabulating card punching machine in which the tabulating card is first inserted in a card carriage; in which the selector knob selects a desired group of consecutive columns to be punched on a card; in which each setting lever is then set in accordance with the data to be punched in each column, in which the data entry may be verified by glancing at an in-line window display of the data; in which the operating lever may then be pulled down for clean precision punching of the tabulating card; and in which the operating lever is then returned to automatically clear the machine.

Yet a further object of this invention is to provide in a machine of the character described, setting wheels controlled by the setting levers, means controlled by the setting wheels for moving interposers to adjusted positions, and means on the setting wheels and controlled by the setting levers to retain the wheels in adjusted positions, means being provided to return all of the setting wheels except those that have been actuated by their setting levers, to retain them in selected positions.

Yet another object of this invention is to provide in a machine of the character described, spring click means to releasably retain the setting wheels in the various positions to which they are adjusted, and means to release the clicking means during restoration of the wheels and their setting levers.

Yet another object of this invention is to provide a strong and durable machine of the character described, which should be relatively inexpensive to manufacture, easy to manipulate, which shall be sure and positive in operation, and practical and efficient to a high degree in use.

Other objects of this invention will in part be obvious and in part hereinafter pointed out.

The invention accordingly consists in the features of construction, combinations of elements, and arrangement of parts, which will be exemplified in the construction hereinafter described, and of which the scope of invention will be indicated in the following claims.

In the accompanying drawings in which is shown an illustrative embodiment of this invention,

FIG. 1 is a perspective view of a machine embodying the invention;

FIG. 2 is a partial top plan view of a tabulating card to be punched in the improved machine;

FIG. 3 is a top plan view of the machine with the cover removed;

FIG. 4 is a cross-sectional view taken along line 4—4 of FIG. 3, but showing the cover in cross-section;

FIG. 5 is a cross-sectional view taken along line 5—5 of FIG. 3;

FIG. 6 is a cross-sectinoal view taken on line 6—6 of FIG. 3;

FIG. 7 is a vertical view taken along line 7—7 of FIG. 5;

FIG. 8 is the rear view aaken along line 8—8 of FIG. 3;

FIG. 9 is a cross-sectional view taken on line 9—9 of FIG. 5;

FIG. 10 is a vertical, cross-sectional view illustrating the punching operation, and showing an interposer backing up a punch punching through a card;

FIG. 11 is a cross-sectional view taken on line 11—11 of FIG. 3; and

FIG. 12 is a cross-sectional view taken on line 12—12 of FIG. 3.

Referring now in detail to the drawing, **10** designates a tabulating card punching machine embodying the invention. The same comprises an outer casing **11** having a bottom or base portion **12** and a cover portion **13**. The base portion **12** has a bottom wall **14**, a front wall **15**, a rear wall **16** and side walls **17**. The cover portion **13** has a top wall **18**, a rear wall **19**, side walls **20** and a front wall **21**. Extending downwardly from the top wall **18** is an inclined wall **22** from which extends a curved wall **23** extending to the front wall **21**. The walls **20** and **23** are formed with a window opening **24**. Behind the window opening **24** is suitably mounted a bezel having an upwardly and rearwardly inclined wall **26** from which extends a downwardly and forwardly curved wall **27**. The wall **27** is formed with 12 equally inclined slots **28** disposed in vertical parallel equally spaced planes.

Disposed within the casing **11** is a frame **30**. The frame **30** comprises a pair of parallel side plates or walls **31** and **32** having feet **33** supported on suitable legs **34** formed on the bottom wall **14** of the casing. Said side plates are interconnected adjacent the front ends thereof by a pair of parallel spaced horizontal, vertically aligned tie rods **35** and **36**. Said side plates **31**, **32** are also interconnected by a vertical plate **37** disposed about halfway from front to rear of the casing. The plate **37** is formed at the rear surface thereof with a plurality of vertical equally spaced longitudinal slots **38**. Although 18 slots are shown in FIG. 3, in the embodiment of the invention herein, only 12 of the slots are used. This is so because the illustrated machine is for punching in 12 columns of a tabulating card. It is understood, however, that the machine may be modified for either 6, 12 or 18 punch columns. Between the slots **38** are walls **39**, and attached to the front of each wall **39** is a vertical plate **40** overlapping adjacent slots **38** and serving as guides for interposers as will be explained hereinafter.

Journalled on said plates **31** and **32** is a transverse shaft **42** disposed between the tie rods **35** and **36** and the plate **37**, and about halfway up in the casing. The axis of shaft **42** is the center of curvature for walls **23** and **27** of the bezel. Also journaled on the side plates **31** and **32** is a transverse horizontal shaft **43** disposed at a level between the tie rods **35** and **36** and somewhat rearwardly of said tie rods.

Interconnecting said side plates **31** and **32**, is a transverse plate **45** disposed substantially at the level of the lower tie rod **35** and between said tie rod and the plate **37**. Plate **45** is formed adjacent its front end with equally spaced openings **46** for the purpose hereinafter appearing. The vertical plate **37** is formed with a plurality of vertical equally spaced through slots **37***a*, communicating with slots **38**. The slots **37***a* are located substantially midheight of the plates **37**, and extend somewhat above and below the level of the shaft **42**.

Also supported by the side plates **31** and **32** is a horizontal transverse shaft **48** located rearwardly of, and somewhat below the inclined wall **26** of the bezel **25**. Said inclined wall **26** of the bezel is formed with a plurality of cutouts or windows **26***a* for the purpose hereinafter appearing.

Attached to and between the side plates **31** and **32** adjacent to the rear ends thereof, is a bracket **50**. Bracket **50** has a rear vertical wall **51** (see FIG. 9). Wall **51** is formed with a central, vertical cutout **52**. Extending forwardly from the back wall **51** are a pair of parallel side walls **54** disposed on opposite sides of the cutout **52**. Walls **54** are formed with upper and lower vertically aligned slots **55**. Fixed to the rear wall **51** and extending forwardly therefrom, are a pair of parallel upper guide rods **56** and a pair of lower parallel guide rods **57** aligned with the upper guide rods. The guide rods **56** and **57** are located at the outer sides of the parallel walls **54**.

Fixed to the front ends of the guide rods **56** and **57** is a vertical plate **60** formed with a rectangular cutout or opening **61** in its upper end. A plate **60** is disposed between the plate **37** and the bracket **50** (see FIG. 9). Attached to the plate **60** by four corner tie rods **62** is a vertical plate **63** disposed forwardly of the plate **60**. Plate **63** extends to the height of the upper end of plate **37** but only up halfway down said plate. The upper ends of the plates **37** and **63** are interconnected by top horizontal plate **64**. The bottom ends of the plates **60** and **37** are interconnected by a horizontal plate **65**. The plate **63** is formed at its rear surface with a plurality of closely spaced vertical through slots **67** aligned with the cutout **61**. The centers between the slots **67** are spaced similarly to the centers between columns on a tabulating card.

Extending forwardly from the rear wall **51** of bracket **50** is an arm **70**. Journaled in said arm **70** and in the side plate **32** is a horizontal shaft **71**. Extending from said wall **51** is another arm **72**. Journaled in said arm **72** and passing through a cutout **73** in the side plate **32** is a horizontal shaft **74** disposed rearwardly of and somewhat below shaft **71**.

Interconnecting the sideplates **31** and **32** is a transverse horizontal bar **75** disposed rearwardly and up above the shaft **42** and below and forwardly of the shaft **48**. The bar **75** may be of square cross-section, with a pair of surfaces thereof inclined to the horizontal and to the vertical, as shown in FIGS. 4 and 5 of the drawing.

Rotatably mounted on shaft **42** are a plurality of hubs **76** and mounted on and fixed to each hub is a setting wheel **77**. In the drawing, 12 such wheels are shown, although as stated above, the machine could be made with either 6, 12 or 18 of such wheels, depending upon the number of columns it is desired to punch at once on the tabulating card. Each wheel **77** has a central portion **78** mounted on one of the hubs **76**. Each wheel **77** is also formed with an annular rim portion **79**. The rim comprises a portion having a portion formed with V-shaped teeth **80** and V-shaped notches **80***a* between said teeth, and a gear tooth portion **81** extending from one end of the portion which has the V-shaped tooth **80**, and extending through an angle of somewhat less than 180°.

Adjacent the end of the gear tooth portion **81**, is a radial portion **82** which extends outwardly in the plane of the wheel, and formed at its outer end with an offset flange **83**. Flange **83** is formed with a longitudinal slot **84**. Fixed to one side of each wheel **77** adjacent the extension **82** is a headed pin **85**. Slidably mounted through each slot **84** is a radial setting lever arm or bar **86** formed with a radial slot **87** through which the pin **85** passes. The upper end of arm **86** is slotted and hence bifurcated as at **88**, and frictionally mounted on the upper end of said arm is a setting finger grip button **89**. Extending from the lower end of each arm **86** is a finger **90** connected by a coil tension spring **91** to the flange **83**. The arm or lever **86** may be pushed radially downwardly, the movement of each arm being limited by the length of slot **87**. At the rear edge of each arm **86** is a notch **91** forming a shoulder to engage the rear end of slot **84** of flange **83** to retain the depressed lever or arm **86** and its button **89** in depressed condition.

It will be understood that each arm **86** passes through one of the slots **28** in the bezel **25**. Arms **86** pass through the window opening **24** in wall **23** of the casing. It will be further understood that the wheels **77** may be selectively rotated by engaging the buttons **89** of the respective wheel and pulling the buttons downwardly and forwardly.

Each wheel **77** has an extension **92** disposed radially inwardly of the outward extension **82**. At the rear end of each extension **92** is a finger **93** adapted to contact the transverse stop bar **75** to limit rotation of the wheel **77** in a clockwise direction, looking at FIG. 5 of the drawing, back to initial position. On each extension **92** is a pin **96**, and pivoted thereto is a pawl **97** having an upwardly and rearwardly extending arm **98** connected by coil tension spring **99** to the flange **83**. Thus the springs **99** bias the pawls **97** in a clockwise direction, looking at FIG. 5 of the drawing. Each pawl **97** includes an arm **100** extending downwardly and forwardly and formed with an upwardly extending finger **101**. It will be noted that when a button **89** is depressed, spring **81** is tensioned and the lower end of the setting lever or arm **86** rotates the pawl **97** in a clockwise direction, thereby tensioning also the spring **99** and moving the offset finger **101** radially outwardly towards the outer rim edge of the wheel **77**. The arm **86** will remain in such a position if the arm is also tilted rearwardly to engage notch **91** with the rear edge of the slot **86**. Each button may be released by pushing it forwardly slightly to disengage the notch **91** from the flange **83**, permitting spring **99** to pull arm **86** radially outwardly and thereby permitting the spring **99** to swing pawl **97** in a counterclockwise direction.

Fixed to the tie rods **35**, adjacent to and to the right of each wheel **77**, is a member **105** which may be made in the form of a thin plate. Member **105** has a vertical portion **106** formed with openings, through which the tie rods **35** and **36** pass. The tie rods **35** and **36** may be formed with annular grooves **35***a* and **36***a* to receive C-clamps **35***b* and **36***b* contacting members **105**. On said shafts **35** and **36** are spacer sleeves **35***c* and **36***c*, interposed between members **105** and the C-clamps **35***b* and **36***b*, to retain members **105** in spaced, parallel relation adjacent to wheels **77**.

Each member **105** has at the upper end thereof, an upwardly and rearwardly curved arm **110** formed at its inner surface with 13 notches **111**, with stop fingers **112** between the notches. The notched portion of the arm **110** is located within the angular extension of the slots **28**. The first, middle and last portions **28***a* of the bezel between slots **28** may be divided into 13 equi-angular parts numbered successively from top to bottom, B, 12, 11, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 as shown in FIG. 1 of the drawing. Position B is the initial position. The intermediate portions **28***a* may be marked off into 13 equi-angular portions without numbering, also as illustrated in FIG. 1.

When wheel **77** has been rotated in a clockwise direction, looking at FIG. 5, to a point where the finger **93** contacts the shaft **75**, the setting button **89** will be at the upper end of slot **28** opposite a space marked B. When the setting lever **86** is disengaged from the flange **83** and is in its radial outermost position, the finger **101** of the pawl **97** associated therewith is disengaged from any of the notches **111** of the member **105** associated therewith. The setting button **89** may be pulled downwardly and forwardly by the operator to any desired angular position, opposite any number from 12 to 9.

Means is provided to releasably retain the setting wheels **77** in any positions to which they are moved. To this end there is pivoted to shaft **43**, 12 bell cranks **120**, each having a rearwardly extending arm **121** provided with a pin **122** carrying a roller adapted to engage in a V-shape notch **80***a* of wheel **77**. Each bell crank furthermore comprises a downwardly extending arm **123** connected to a horizontal coil tension spring **124** which engages one of the openings **46** of the transverse bar **45**. Thus, the springs **124** tend to retain the pins **122** in engagement with the notches **80***a* between the V-shaped teeth **80** of the wheel **77**. As the wheel is turned the pins **122** click into the notches so as to hold the wheels in one of 13 positions.

Supported on member **126**, at the ends of plate **37** is a horizontal shaft **127** on which are rotatably mounted pinions **128** meshing with the gear teeth **81** of the respective wheels **77**, for the purpose hereinafter appearing.

Mounted on shaft **48** are pinions **130**. Attached to each pinion **130** is an indicator wheel **131** marked on the outside of its periphery with the following, in succession: B, 12, 11, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9. The arrangement is such that for each wheel **77**, the location of the button will be indicated on the indicator wheel **131** as seen through a window **26***a*. There are 12 windows **26***a* one for each button. If a button is opposite "6" as indicated on portions **28***a* of the bezel, then "6" will show through the window associated with said button. In this manner, the operator by glancing at the window will have a quick visual indication of the location of the setting buttons, to make sure that the buttons have been correctly set.

Means is provided for simultaneously rotating all of the bell cranks **120** in a clockwise direction to release all the settings of wheel **77** so that they can be returned to their initial positions indicated by the letter "B." To this end there is mounted on the shaft **43** a cross-bail **135** having radial arms **136** interconnected by a longitudinal transverse portion **137**. The portion **137** is located between arms **121** and **123** of the bell cranks, as shown in FIG. 5. Attached to the portion of shaft **43** which projects to the right of the side plate **32** is an arm **137***a*, formed at its outer end with an offset pin **138** carrying a rack **138***a*. When arm **137***a* is moved, in a manner to be explained hereinafter, in a clockwise direction, the bail **135** will engage all of the clamps **120**, rotating said clamps in a clockwise direction, permitting restoration of the wheel **77**, in the manner hereinafter explained, to the initial position.

Means is provided to return the wheels **77** to their initial positions when released. To this end there is mounted on shaft **43**, a bail **140** comprising arms **141** interconnected by a transverse portion **142**. One end of the cross portion **142** is connected by coil tension spring **143** to a pin **144** fixed to the side plate **32**, normally retaining the bail in its downmost position, as shown in FIG. 4 of the drawing. When any button **89** is pulled down with the button radially extended, the finger **101** of the pawl **97** will lie in the path of the bail portion **142**. Fixed to the right end of the shaft **42** which extends beyond the side plate **32** is an arm **145** provided at its outer end with a square pin **146**. After the buttons have been set, movement of the arm **45** in a clockwise direction, in a manner to be explained hereinafter, will cause the bail **140** to rotate in a clockwise direction, engaging the pawls **97** to return the wheel **77** to initial position. However, if it is desired to inhibit restoration of any

selected wheel or wheels **77**, the operator need only push the selector buttons **89** radially inwardly and then tilt them rearwardly to engage the notches **91** with the flanges **83** for retaining the buttons in engaged condition. Such action of the buttons will rotate the pawls **97** associated therewith radially outwardly into engagement with one or another of the notches **111**, depending upon the angular position or the setting of the button. Thus, not only will the wheel so adjusted be retained in said position, but the finger **101** of the pawl **97** will have moved radially outwardly of the path of the bail so that the next time the arm **145** is rotated in a clockwise direction, the wheels which have been so preset will not be restored by the bail.

Means is provided for accomplishing the release of the clicker bell cranks **120** and for restoring the wheels **77**. To this end, there is mounted on the portion of the shaft **71** which projects beyond the side plate **32**, an operating lever **150**. The operating lever **150** comprises a sleeve **151** received in said shaft and from which extends an arm **152** provided with a crank handle **153** at its outer end. Normally, the operating lever extends upwardly and is located at the outside of the casing, the sleeve **151** passing through a suitable opening in the casing. Fixed to the sleeve **151** is a bell crank **155** having an upwardly and rearwardly inclined arm **156** and a forwardly and upwardly inclined arm **157**. Pivoted to a pivot pin **158** on arm **156** is a link **159** which is inclined forwardly and upwardly and is formed at its outer end with a longitudinal slot **160**.

On side plate **32**, forwardly of shaft **71**, is a short shaft **161** projecting through side plate **32**. Provided on said shaft **161** is an arm **162** inclined normally rearwardly and upwardly (see FIG. 4). Adjacent the outer end or arm **162** is a pin **163** passing through slot **160** in link **159** and normally located at the forward end of said slot. The outer end of arm **162** is connected by a coil tension spring **164** to a fixed lug **165** located on side plate **32** above and rearwardly of shaft **71**. The spring **164** biases the arm **162** in a clockwise direction, looking at FIG. 4 of the drawing. Pivoted to the shaft or stud **161** is a bell crank **166** comprising an arm **167** extending upwardly and normally overlying arm **162**. Bell crank **166** furthermore comprises a forwardly extending arm **166***a* having an upwardly and forwardly inclined cammed front edge **168**. The lower end of edge **168** normally contacts the roller **138***a* on the pin **138** of the arm **137** which controls the clicker release bail. Pivoted to the forward end of arm **166***a*, as at **169** is a link **170**. Link **170** is formed with an intermediate longitudinal slot **171**. Fixed to the side plate **32** is a headed pin **172** passing through slot **171**. It will be noted that link **170** is normally inclined upwardly and rearwardly.

Pivoted to the arm **162** below the pin **163**, as at **173**, is a pawl **174** inclined forwardly and formed at its forward end with a downwardly extending hook **175** having an inner rear straight edge **176** normally inclined downwardly and somewhat forwardly. At the upper end of link **170** is a pin **177***a* contacting the under edge **174***a* of the pawl **174** to retain said pawl in an upwardly and forwardly inclined position. The pawl **174** is normally biased downwardly or in a counterclockwise direction, looking at FIG. 4, by a coil tension spring **177** which interconnects an intermediate portion of the pawl with a portion of the arm **162** disposed below pivot pin **173** of the pawl to said arm.

Pivoted to the side plate **32** on a stud shaft **180** located above shaft **161** and rearwardly of arm **162** is a bell crank **181** having an upwardly and rearwardly inclined arm **182** and a forwardly and upwardly inclined arm **183**. At the forward under edge of the arm **183** is a notch **184**. The bell crank **181** is biased in a counterclockwise direction (FIG. 4) by means of a coil tension spring **185** which connects the bell crank to a fixed post or pin **186** on side plate **32**. The lower edge of arm **183** normally contacts an offset finger **167***a* at the upper arm **167** and is held against said finger by said spring **185**. On arm **162** and below the bell crank **181** is a pin **188** normally spaced from arm **167** but adapted to engage said arm when arm **162** is swung forwardly in a manner hereinafter appearing.

On arm **162** is a rearward extension **189**. Adjustably mounted on said extension **189**, by means of a headed bolt **190** passing through a slot **191** is a plate **192** having an offset finger **193** at its outer end normally contacting the upper end of arm **182** of the bell crank **181**.

Pivoted to an upwardly extending ear **200** of link **159** as by pivot pin **201**, is a bell crank pawl **202** having an arm **203** projecting forwardly into engagement with the pin **163** on the arm **162**. The bell crank **202** has an upwardly extending arm **204** connected by coil tension spring **205** to an upwardly extending finger **206** at the upper end of arm **162**. Spring **205** tends to rotate bell crank **202** in counterclockwise direction, looking at FIG. 4 of the drawing. An offset stop finger **207** on the arm **203** contacts the upper edge of link **159** to retain the forward end of arm **203** in an abutment with pin **163**. The bell crank **202** further comprises a rearwardly and downwardly curved arm **209** for the purpose hereinafter appearing.

Pivoted to the side plate **32** as on pivot **210**, rearwardly of the transverse stop bar **75**, and somewhat thereabove is a lever **211**. Lever **211** comprises a forwardly and upwardly extending arm **212** projecting through a suitable opening in the casing and having its forward tip **213** exposed so that the operator can swing the lever up or down. Said lever **211** further comprises a downwardly and rearwardly extending arm **214** having an offset finger **215** overlying arm **209** of the lever **202**. Normally the finger **215** is out of contact with pawl **202**. However, by pushing the finger **213** upwardly, finger **215** will press down on the arm **209** of pawl **202** against the tension of spring **205**, to move arm **203** out of the path of pin **163**.

With the lever **211** in normal position out of contact with pawl **202**, when the handle **153** is pulled down by the operator, the link **159** will be moved upwardly and forwardly to cause arm **162** to rotate in a counterclockwise direction. This is done after the setting buttons have been moved to selected positions.

Means is provided to prevent retraction of the operating lever **150** once it has started to be pulled down. To this end, arm **157** of plate **155** is formed with serrated teeth **157***a*. On side plate **32** of the frame is a pin **220**. Pivoted to said pin **220** is a pawl **221** having a rearwardly extending arm **222** connected by a coil tension spring **223** to a fixed pin **224** on the side plate **32**. The pawl **221** has a rearwardly projected pointed arm **225** adapted to be engage by the teeth **157***a* to prevent retraction of the operating lever until all of the said teeth move past the pawl, thereby insuring complete operation of the operating handle before it is retracted or swung upwardly.

The operating handle has a total movement of 90°. As the handle starts to be swung down, arm **162** is swung in a counterclockwise direction due to engagement of arm **203** of pawl **202** with the pin **163**. As arm **162** starts to rotate, the hooked pawl **174** is moved forwardly. When the pin **188** on the arm **162** engages arm **167**, the bell crank **166** is rotated in a counterclockwise direction, thereby causing the cammed edge **168** on the arm **166***a* engaging roller **138***a* on the pin **138**, to rotate arm **137** in a clockwise direction, thereby causing the bail **135** to swing in a clockwise direction, looking at FIG. 5 of the drawing, to release the clicker levers **120** from engagement with the wheels **77**. The swinging movement of the bell crank **166** in a counterclockwise direction will permit lowering of the pawl **174** as the latter is moved forwardly. Continued movement of the operating lever will cause the hook **175** to engage the square stud **146** on arm **145**. The edge **176** of the hook **175** will engage one surface of said square stud. As the

bell crank 166 is swung in a counterclockwise direction, furthermore, the finger 167*a* on the arm 167 of said bell crank will move outwardly of arm 183 of the locking pawl or bell crank 181, permitting the spring 185 to rotate said locking pawl in a counterclockwise direction, to engage the finger 167*a* within the notch 184. At this time the operating lever is at the bottom of its stroke.

Means is provided for swinging the operating lever upwardly to its normal position after it has been pulled down through an angle of 90° and released. To this end there is mounted on shaft 71 a torsion spring 230 (FIG. 3). Having one end 231 engaging a radial pin 232 on said shaft, the other end of said torsion spring may be fixed to any suitable post at the inside of side plate 32. As the operating lever is pulled down, shaft 71 is rotated, thereby tensioning the torsion spring 230 to raise the operating lever when the latter is released.

After the operating lever has been pulled down and released, it starts moving upwardly, thereby swinging arm 162 in a clockwise direction thereby causing pawl 174 to rotate arm 145 in a clockwise direction, thereby causing bail 140 to swing in a clockwise direction, to thereby restore the wheels 77 back to initial position, due to engagement of the bail with the pawls 97. Of course, if any setting button 89 has been pushed in and engaged with the flange 83, the wheels that carry said setting buttons will not be restored. During this retracting movement of the operating lever and the restoring of the uninhibited wheels 77, bell crank 166 remains locked by the pawl 181. Near the upper end of the upward stroke of the operating lever, member 170 will lift the pawl 174 in a manner hereinafter appearing to disengage the stud 146 permitting the bail 140 to move back to its initial position under the influence of spring 143. The spring 177 keeps the pawl against pin 177*a* of member 170. At the upper end of the retraction of the operating lever, finger 193 of member 192 engages arm 182 of the locking pawl 181, to swing said locking pawl in a clockwise direction disengaging arm 167. The pull of the springs 124 will cause the bell cranks 120 to swing in a counterclockwise direction to again engage the rollers 122*a* with the setting wheels, and at the same time will press arm 137 in a counterclockwise direction causing the bell crank 166 to swing in a clockwise direction to thereby raise the link 170 for lifting said pawl 174 as heretofore described. Pin 188 limits the swinging movement of bell crank 166. If it is desired to inhibit restoration of all of the setting wheels, then finger 213 is swung upwardly to rotate pawl 202 so that as the operating lever is swung down, pin 163 will merely move through the slot 160 without rotating arm 162.

When the pawl 202 is swung down by actuating lever 211, spring 164 will pull arm 162 against pin 180. The spring 164 is tensioned when arm 162 is rotated in a counterclockwise direction.

The machine is provided with a tabulating card holder and punch die assembly for punching the card in accordance with the settings of the setting wheels. The tabulating card C is partially shown in FIG. 2. This card may have a number of columns, as for example 90 columns. Each column may be divided into 12 vertically aligned sections. In a 12 wheel machine the die will have means to punch simultaneously one punch in each of 12 consecutive columns and the punch may be in one of 12 positions in each column. There may be successively from top down, 12, 11, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, as indicated on the card shown in the drawing. The machine is further provided with means to move the card sideways so as to punch in any selected 12 columns. The mechanism for accomplishing this will be explained hereinafter. Thus in the card shown in FIG. 2, for purpose of illustration, there are punch holes P in 12 columns numbered 5 to 16 inclusively. The punch holes are in pre-selected positions in accordance with the setting of the setting buttons 89.

The card holder and punch die mechanism will now be described. This mechanism or assembly 240 comprises vertical plate 241 having a stem portion 242 and a top cross head portion 243. The cross head portion 243 is formed at the ends thereof with horizontal, outwardly opening notches 244 slidably engaging the upper horizontal guide pins 56. The plate 241 has at the bottom thereof a leg 245. Mounted on the cross head 241 is a spacer frame 247 having a top wall 248 and side walls 249, the lower ends of which are received in notches 250 in the top surface of the cross head. Attached to the rear of plate 241 are a pair of similar, registering die plates 251. The plates 251 have lower portions 252 riveted to plate 241 by four corner rivets 253. The upper portions 258 of the plates 251 engage the side edges of the frame or spacer 247 and are formed with 12 columns of rectangular punch die openings or slots 259 of a size to produce the punch holes P on the tabulator card C. In each of the 12 columns there are 12 vertically aligned slots or punch die openings, equally spaced apart, the spacing being similar to the spacing of 12 punch positions in each column of the card C. Thus, there are 144 punch holes or die openings 259 in each of the plates 251.

Contacting the rear of the rearmost plate 251 is a vertical thin spacer plate 260 likewise riveted to the die assembly by the rivets 253 passing through suitable openings in said spacer plate. Said spacer plate 260 has a horizontal upper edge 261 spaced below the lowermost punch holes 259 and somewhat below the upper edge of the cross head 243. The level of the edge 261 is such as to locate the lower edge of the tabulating card mounted thereon so that the punch holes will be properly located when the card is punched. The plate 260 has at its upper end side extensions or wings 262 extending to both sides of the spacing frame 247. The card C when placed in the machine rests on the upper edge 261 of the plate 260 and its wing extension.

Attached to the front of the wing extensions 262 are card guide plates 264 extending upwardly above said wings, and disposed on opposite sides of the spacer member 247. Attached to the rear of the wings 262 are upwardly extending card guide plates 265 extending upwardly therefrom and disposed on opposite sides of walls 254. Attached to the rear of plate 260 is another plate 251 aligned with the first mentioned plates 251 and likewise having slots 259, there being 12 rows of these slots, with 12 slots in each row, aligned with slots 259 in the first two plates 251. Between the two plates 251, on opposite sides of plate 260 and above the edge of plate 261 is formed a slot 266. The spaces between the guide plates 264 and 265 form extensions of the slot 266. The tabulating card is placed in said slot and the bottom edge of said card rests on the edge 261. Contacting the back of the last mentioned plate 251 is a thick plate 267 likewise riveted to all the plates 251 and 260 by said rivets 253. Said plate 267 is formed with 12 rows of slots 268 similar to and aligned with the slots 259 in the three plates 251. Extending rearwardly from plate 267 are parallel walls 270 lying inside of and adjacent to the wall 54 of bracket 50. The walls 270 are formed with upwardly and rearwardly inclined slots 271. The lower ends of the slots 271 register with the lower ends of the slots 55 in walls 54.

At the front of plate 241 is a fourth plate 251 similar to the other three such plates, and likewise assembled to plate 241 by means of said rivets 253. The upper portion of the last mentioned plate 251 contacts the front edges of the spacer frame 247. At the front of the last mentioned plate 251 is a plate 275 thicker than the plates 251 and attached to the assembly by said rivets 253. The plate 275 may be formed adjacent its lower end with a central opening 275*a* to reduce weight. At its upper

end, plate 275 is formed with a rectangular cutout forming parallel side portions 276 disposed on opposite sides of the group of punch slots in the plates 251. Fixed to said side portions 276 of plate 275 are guide pins 277 projecting forwardly thereof. Fixed to the plate 275 and located in the front of the side portions 276 thereof, is a retractor plate 280. Said retractor may be attached to said side portions 276 by screws or in any other suitable manner, and is formed with suitable openings through which the guide pins 277 project forwardly of the front face of said retractor plate. It will now be understood that punch die assembly 240 as a whole is supported on the upper guide pins 56 and may be slidably moved forwardly and rearwardly, the attached assembly being held together by the rivets 253 and by the attaching means which attach the retractor plate 280 to plate 275.

The retractor plate 280 is formed with 12 horizontally transverse slots 282. The height of the slots 282 is equal to the height of the slots 259. However, the lower edges of the slots 282 are below the lower edges of the corresponding row of slots 259, and the upper edges of slots 282 are below the upper ends of the slots 259 in the corresponding row of slots. In other words, the 12 slots 282 are offset downwardly from the 12 slots 259 in the plates 251.

Attached to the rear face of plate 260 is a plate 280*a* similar to plate 280 and aligned therewith and having rows of slots 282*a* aligned with the rows of slots 282 in plate 280. Plate 280*a* and plate 60 are formed with suitable openings to receive the guide pins 277, and attached to plate 60 are guide pins 285 passing through suitable openings in plate 280*a* and in the plates 280 and in portions 276 of plate 275. Thus, guide pins 277, 285, serve to insure perfect alignment of movement of the die assembly 240 relative to plate 60.

Slidably mounted on the openings 259 of plates 251, and in the slots 282, 282*a* of plates 280, 280*a*, are punch die elements 290. There are 12 columns of punch elements 290, with 12 elements in each column, making it a total of 144 punch elements. The punch elements are horizontal and extend from front to rear. They are of rectangular transverse cross-section. Their front edges are sloped downwardly and rearwardly as at 291. Normally, when the machine is at rest, the front ends of the punch die elements are located adjacent the slot 266 which receives the tabulating card. Adjacent their rear ends the punch elements 259 are formed in their upper edges with notches 292. The plates 280 and 280*a* are normally located at the ends of the notches 292. The lower edges of the transverse portions 293 of plate 280 between the slots 282 and the lower edges of the transverse portions 294 of the plate 280*a* between the slots 282*a*, contact the lower edges of the notches 292.

Slidably mounted in each of the slots 38 of plate 37 is an interposer 300. There are 12 interposers for the 12 setting wheel machine. Each interposer has a vertical rack portion 301 slidable in the slot 38 and held in the slot by one of the front plates 40. The rack portions 301 have front rack teeth 302 meshing with the pinions 128. There are 12 pinions which mesh with the gear teeth 81 of the 12 setting wheels 77 and with the rack teeth of the 12 interposers 300. The interposers 300 further comprise thin front upwardly extending arms 304 sliding in the respective slots 67 of the plate 63. When the machine is at rest the racks 301 are in their up positions with the upper ends of the racks contacting plate 64, and with the upper ends of the arms 304 contacting said plate. The lower ends of the interposers are located just below the pinions 128. At the upper end of each arm 304 is a forwardly extending head 305. It will be noted that the heads 305 are aligned with the 12 vertical columns of punch element 290 and are spaced close together, whereas the rack portions 301 are spaced far apart. The lower ends of the arms 304 are connected to their respective rack portions by means of rearwardly extending portions 306, from which extend outward portions 307, from which extend again rearward portions 308 (see FIG. 9). Thus the interposers are all the same except that the lengths of the portions of 306, 307 and 308 vary, as shown in FIG. 9. The 6 interposers on one side of the machine are symmetrically disposed with respect to the interposers on the opposite side of the machine. It will now be understood that as any setting wheel is rotated, its associated interposer is slidably moved to bring its heads 305 to one of 12 vertical positions. Thus, if a button 89 is moved to "3" position, its corresponding interposer will be moved down to bring its head 305 down to a position where it is located directly in back of position "3" in the associated column of the die.

It will now be understood that when the setting wheels are set, the interposers are correspondingly set behind the punches which are to punch the desired punch holes in the card. Means is provided for moving the die punch assembly together with the card forwardly to effect a punching operation. It will be observed that the shaft 74 extends across the machine and passes through suitable bearings in the walls 54. At one end, the said shaft 74 projects beyond side plate 32 and attached to the extending portion is an arm 310 carrying at its outer end a pivot pin 311 carrying a roller 311*a*. Fixed on said shaft 74 is a collar 313 (FIG. 11) connected by coil spring 314 to a fixed post 315 on the back wall 51. The spring 314 tends to rotate the shaft 74 in a clockwise direction, looking at FIG. 11 of the drawing. Rotatably mounted on shaft 71 and between the side plate 32 and the sleeve 151 of the operating lever is a star wheel 320 having four equiangularly spaced cammed arms 321 extending from a central sleeve. The roller 311*a* on arm 310 fits into the notches between said arms. On the star wheel are four equi-angularly arranged cammed ratchet teeth 322. Slidable in the sleeve 151 of the operating lever are a pair of diametrically opposed spring pressed pins 324 held in abutting relation with the teeth 322. As the operating lever 150 is pulled down, the pins 324 engaging the abutment ends of a pair of diametrically opposed ratchet teeth 322, will move the star wheel in a counterclockwise direction, looking at FIG. 4, through an angle of 90°. During this operation, arm 310 will be moved in a counterclockwise direction until the roller 311*a* passes the high part of the cammed arm 321 which engages the roller. The spring 314 will then move the arm 310 in a clockwise direction as the cammed arm passes said roller 311*a* and the roller then moves into the next notch between the cammed arms. Thus, each time the operating lever makes a full 90° down stroke, arm 310 and hence shaft 74 is oscillated. On the up-stroke of the operating lever 150 the pins 324 are pushed outwardly against their spring by the cammed portions of the ratchet teeth 322, so that the star wheel only moves in one direction, and only during the downstroke of the operating lever.

Attached to shaft 74 and located centrally of the machine in front of the cut-out 52 of the backwall 51 is a yoke 330 (see FIGS. 5 and 8). The yoke 330 has apertured ears 331 supporting a transverse horizontal shaft 332. Attached to shaft 332 is a channel member 333 having an upwardly and forwardly inclined back wall 334 and parallel side flanges 335 having apertures at their lower ends receiving the outer ends of shaft 332. Supported by the upper ends of the side walls or flanges 335, is a transverse horizontal shaft 336 the outer ends of which pass through the upper vertical slots 55 and the upper inclined slots 271. On said shaft 336 are rollers 336*a* engaging within said slots. Normally, when the operating lever is in its up position, the shaft 336 will be at the lower meeting ends of the slots 55, 271. It will be noted that the flanges 335 of member 333 are disposed parallel to and in inwardly spaced relation to side walls 270. Between the flanges 335 and the side walls or flanges 270 are vertical side plates 340 formed at their upper ends with openings through which the transverse shaft 336

passes. On the lower ends of plate 340 are stud shafts or rollers 341 passing through the openings 55 and 271 at the lower ends of the walls 54 and 270. It will now be understood that as the operating handle is swung downwardly, shaft 332 will be swung upwardly and forwardly to move the shaft 336 upwardly for causing the entire die assembly 240 to move forwardly. During such action the punches 290 which have interposers backing them up will punch through a card in slot 266. In FIG. 10 is illustrated the punching position of the die after it has been moved forwardly. During the punching action, the plate 280 will move toward plate 280*a*. When the operating lever is released and swings upwardly, yoke 330 will be swung down or in a clockwise direction, looking at FIG. 5, pulling the rollers 336*a* downwardly to again move the punch and die assembly rearwardly. During the forward stroke of the die assembly, the punches which are backed up by interposers punch through the card. However, the remaining punches are pushed back by card C. During the rearward movement of the punch die assembly 240, the plate 280 will move all the punches which have been moved forward by the card, in a rearward direction toward their initial positions. This is due to the engagement of plate 280 with the forward end of the notches 292.

Means is provided for moving the card on the die assembly. To this end there is rotatably mounted on said shaft 42, and to the left side of side plate 31, as shown in FIG. 6 of the drawing, a sleeve 350 projecting through the adjacent side wall of the casing. Mounted on the sleeve 350 for rotation therewith, is an index wheel 351 to which is attached a hand wheel or knob 352. The wheel 351 has a rim flange 353 which is divided into angular subdivisions 354 corresponding to the angular subdivisions on the portions 28*a* of the bezel. For an 80 column tabulating card there are 80 subdivisions 354 numbered from 1 to 80, successively, as shown in FIG. 1 of the drawing. Mounted on the adjacent side wall of the casing and between the casing and wheel 351 is a segmental index or indicator bracket 355 which is also divided into 12 angular subdivisions corresponding to the subdivisions on portions 28*a* of the bezel, and to the subdivisions 354 of wheel 351. However, the 12 of the subdivisions 355 on the index are marked with numbers from 1 to 12. Upon turning the wheels 352, wheel 351 will be rotated to align the 12 subdivisions 355 with any selected 12 successive subdivisions 354. Means is provided to bring selected 12 consecutive columns of a card C mounted on the punch and die assembly, into registry with the 12 punch columns of the assembly. To this end there is mounted on sleeve 350 a bevel gear 360 (see FIGS. 3 and 6). Mounted on side plate 31 is block 361, carrying a bearing 362 through which passes a downwardly and rearwardly inclined shaft 363. At the forward end of this shaft is a bevel gear 364 meshing with gear 360.

Fixed to the rear of bracket 50 is a plate 370 attached to the bracket by screws 371. Said plate 370 has a flat portion 372 contacting the back of wall 51. Extending upwardly and inclined rearwardly from portion 372 is a portion 373 provided with an extension 374 carrying a bearing 374*a* in which is journaled the rear end of shaft 363. It will be noted that the portion of member 370 above portion 372 inclines away from wall 51. Said member 370 has a portion 375 which traverses the cutout 52 and terminates in an offset finger 376 contacting the back of plate 51, and attached thereto. Fixed to portion 375 of member 370, as by screws 377, is an upwardly extending apron 378. Fixed to the back of plate or wall 51 of bracket 50, as by screws 379, is a lower horizontal rail member 380 formed in its upper edge with a V-shaped groove 381. Also attached to the rear of said wall 51 is an upper rail member 382 spaced from and aligned with the lower rail member 380 and fixed to said wall 51 by screws 383. Rail 382 is symmetrical to rail 380 and has in its lower edge a V-shaped groove 384. Mounted for sliding movement on and between the rails 380, 382 is a card carriage member 385. Said carriage member 385 comprises a plate 386 which is in a vertical plane but extends horizontally. Plate 386 is formed with a V-shaped groove 387 in its upper edge and with a V-shaped groove 388 in its lower edge. Between the grooves 384 and 387 are balls 389. Between the grooves 388 and 381 are balls 390. Thus, the plate 386 has ball bearing movement on the upper and lower rail members. Plates 392 fixed to the ends of the lower rail members 380 project upwardly overlapping the ends of the groove 381 and plates 393 fixed to the ends of the upper rail member 382 projects down to overlap the groove 384. Brackets 395 attached to plate 386 have fingers overlapping the ends of grooves 387 and 388, thus preventing the balls 389 and 390 from coming out from between the plate 386 and the upper and lower rail members.

Fixed to the ends of plate 386 are brackets 400 having forwardly extending arms 401. Mounted on the forward ends of arms 401 are vertical pins 402 located in the plane of slot 266 which receives the tabulating card. The arms 400 are at a level below the upper end of the punch and die assembly and above the card guides 264 and 265.

Rotatably mounted on said vertical pins 402 are card guides 403. Said card guides are substantially similar and symmetrically disposed. Each card guide comprises a channel shaped member 404 provided with a vertical through-opening 405 to rotatably receive the pin 402. Torsion springs 402*a* or pins 402 may be provided to rotate members 404 inwardly and rearwardly. Extending from the lower end of the channel shaped member 404 is a stop arm 407 adapted to contact arm 401 under influence of opening 402*a* to limit the rotation of member 403 to positions where said members are in alignment. Each channel shaped member 403 is formed with a channel 407 in which is slidably mounted an arm 408 attached to the channel shaped bracket in horizontally adjusted position by screws 409. At the inner end of arm 408 is a vertical arm 410 extending upwardly and downwardly therefrom and formed to its inner side with a vertical groove 411. The grooves 411 are in the plane of card slots 266. Extending from the upper ends of the arms 410 are inwardly extending wings 412 disposed at the back of the slots 411. Also extending from arms 410 adjacent the upper ends thereof are wings 412 each having a triangular portion 413 projecting forwardly with an upwardly and forwardly inclined flange 414. Thus, when a card is inserted in the carriage, the lower end of the card may engage in front of the wings 412 and in back of the inclined flange 414 so as to be guided to slots 414.

Attached to the rear of plate 386 are spacers 420 to which is attached a plate 421. The lower end 422 of the plate 421 is inclined downwardly and forwardly and is formed at its underside with rack gear teeth 423. Journaled in portion 375 of plate 370 and disposed in front of said portion is a pinion 425 meshing with the rack gear teeth 423. Journaled on plate 370, as at 426, is a pinion 427 meshing with pinion 425. Also journaled on plate 370, as at 428, is a pinion 429 meshing with pinion 427. Mounted on the rear end of the shaft 363 in front of extension 374 of plate 370, is a pinion 430 meshing with pinion 429. It will be understood that when wheel 352 is rotated, shaft 363 will rotate the pinions 430, 429, 427 and 425 for moving the entire card carriage in one direction or the other, depending upon the direction of the rotation of the wheel. As the card carriage moves to the right or left, the card on the punch and die assembly will be moved to the right or left to bring the desired 12 columns of the card directly in back of the 12 columns of the punch die. As the operating lever is moved downwardly and the punch and die assembly 240 is moved forwardly, the portion of the tabulating card in back of the die assembly will be pressed forwardly, thereby causing the ends of the card engaging in the grooves 411, to swing the inner ends of the

card guides **403** forwardly on the pivot pins **402**. Within the groove **411** of the card guide **403** at the left side of the machine, is a small leaf spring **415** to engage one end edge of card C, for resiliently pressing the card against a positive stop of the other card guide **403**, to insure proper alignment of the card in the machine.

Means is provided to retain the carriage in any position to which it is moved by turning the selector wheel or knob **352**. To this end there is pivoted to back wall **51**, as by pin **450**, an arm **451** carrying a roller **451***a* pressed down against teeth **452** formed in the upper edge of plate **421** by a spring **453**. Roller **451***a* clicks over the teeth **452** which correspond to the teeth **423** at the lower end of said plate **421**.

Mounted on bracket **50**, between side walls **54** thereof, and adjacent the upper end thereof, is a transverse horizontal shaft **460**. Rotatably mounted thereon is a lever **461** having a forwardly and downwardly extending arm **462** engaging beneath shaft **336**. Lever **461** has a rearwardly projecting arm **464** having a knife edge **465** at its underside. A coil torsion spring **466** on shaft **460** tends to rotate lever **461** in a clockwise direction, looking at FIG. 5, to move knife edge **465** down. Shaft **336** normally keeps edge **465** raised. When the operating lever is pulled down, shaft **336** moves up to allow knife edge **465** to engage between a pair of teeth **452**, to lock the carriage during the punching operation.

It will thus be seen that there is provided an apparatus in which the several objects of this invention are achieved and which is well adapted to meet the conditions of practical use.

As possible embodiments might be made of the above invention, and as various changes might be made in the embodiment above set forth, it is to be understood that all matter herein set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

I claim:

1. In combination, a support, a punch die assembly, means to mount said assembly for movement forwardly and rearwardly of the support, means on the assembly to support a tabulating card on its lower edge, means on the assembly for punching holes in each of a plurality of columns of the card, less than the total number of columns on the card, a carriage mounted for transverse movement on the support, and having means to engage a card on the assembly, to move the card lengthwise thereof, with the carriage, a segmental index on the support marked with indicia corresponding to the columns of punches on the assembly, a hand wheel rotatably mounted on the support coaxially of the index, and having an annular portion adjacent said segmental index, carrying indicia complementary to the indicia on the index and corresponding to the columns on the card, and means controlled by rotating the wheel for moving said carriage through distances corresponding to angle of movement of the wheel to indicate which columns of the card are in position to be punched.

2. The combination of claim 1, in combination with means ot move the assembly, and means controlled by movement of the assembly to lock the carriage against movement during movement of the assembly.

3. In combination, a support, a punch die assembly mounted on the support, only, for forward and rearward movement, means on the assembly to slidably support a tabulating card on its lower edge, a carriage slidably mounted on the support for transverse movement, a pair of pivoted arms on said carriage extending toward each other and having means at their inner ends to engage the end edges of the card, means to slidably move said carriage transversely on the support at right angles to direction of movement of said assembly, and resilient means on one arm to press against one edge of the card to move said card against positive abutment means on the other arm.

4. In combination, a support, a shaft on said support, a bezel on said support having a plurality of segmental parallel slots, wheels rotatably mounted on said shaft, a fixed plate parallel to and adjacent each wheel and having a segmental portion formed with notches at its inner edge, a pawl pivoted to each wheel having a finger engageable with one of the notches of the plate associated therewith, to lock the wheel in various rotated angular positions of the wheel away from initial portions thereof, spring means to rotate each pawl to move its finger out of the notch, and manually actuated means on each wheel passing through one of the slots in the bezel to releasably lock its pawl in notch engaging position.

5. The combination of claim 4, in combination with a member rotatable on said shaft and having means to engage the fingers of pawls which are not locked in notch engaging position, when said member is rotated, to rotate the wheels carrying such pawls, to restore such wheels to the initial positions of said wheels.

6. In combination, a support, a punch die assembly, means to mount said assembly on said support for sliding movement, forward and rearward, said support having a portion formed with a vertical slot, said assembly having a portion formed with an inclined slot, a shaft having means passing through said slots, an operating lever pivoted on said support, a star wheel mounted for rotation on the support, coaxially with said lever, clutch means connecting said lever with said star wheel to rotate said star wheel in one direction each time the lever is rotated in said direction, an arm pivoted to said support and having means to be engaged by the star wheel for rotating said arm each time the star wheel is rotated, and means controlled by said arm to slidably move said shaft for slidably moving said assembly, each time the lever is moved in said one direction.

7. In combination, a support, a punch die assembly, means to support said assembly for back and forth movement, said assembly having a slot to receive a tabulating card, a punch die plate on one side of the slot formed with a plurality of vertical columns of die openings with a plurality of openings in each column, horizontal punches slidable on the assembly and having front punch ends engaging in said openings, said punches having notches, interposers slidably mounted on said support in alignment with each column, each interposer having a head adapted to back up a punch in each column, to prevent movement of the backed up punches upon moving said assembly forwardly to punch holes in the card, and whereby a card in the slot of the assembly will move the unbacked up punches as the assembly moves forwardly, a retractor plate on said assembly having means to engage ends of notches of the forwardly moved punches to move said punches rearwardly after a punching operation, and as the assembly is moved rearwardly, and a second retractor plate fixed to said support and having means engaging opposite ends of the notches to restrain the backed up punches from moving rearwardly as said assembly is moved rearwardly after a punching operation.

8. In combination, a support, a transverse shaft on the support, setting wheels rotatably mounted on said support, a punch die assembly mounted on said support for forward and rearward movement, only, a card carriage slidably mounted on said support for movement at right angles to direction of movement of said assembly and having means to engage ends of a card, said assembly having a slot through which a card engaged by said card engaging means, passes, means on the support to move the carriage at right angles to movement of the punch assembly punch interposers slidably mounted on said support, means on each setting wheel to move one of said interposers, manually actuable means movably mounted on said support, means controlled by movement of said manually actuable means to move said assembly, and means controlled by said manually actuable means.

to restore said setting wheels to initial positions, indicator wheels rotatably mounted on said support, means on each setting wheel to rotate one of the indicator wheels, a hand wheel rotatably mounted on said support, said carriage moving means including means connecting said hand wheel with the carriage to slidably move the carriage a distance corresponding to the angle of rotation of the hand wheel, and indicia means on said hand wheel and indicia means on said support cooperating with the first mentioned indicia means, to indicate the position of the carriage relative to said assembly.

9. The combination of claim 8, in combination with means to lock the carriage against movement while the assembly is being moved.

10. In combination, a support, a carriage mounted for reciprocation on said support, means movably mounted on the carriage and engaging the ends of a card on the carriage and holding the card so that said card moves in its own plane when the carriage is reciprocated, a punch card assembly mounted on said support for reciprocation in a plane perpendicular to said plane of movement of the card, said assembly having a slot through which a portion of the card between its ends, passes, means to reciprocate said carriage, and means to reciprocate said assembly, said means engaging the ends of the card being adapted to move relative to the carriage while retaining engagement with the ends of the card when said punch assembly moves at right angles to the carriage.

11. The combination of claim 10, and spring means to move said movable card end engaging means.

12. The combination of claim 11, and stop means to limit movement of said movable card end engaging means.

References Cited in the file of this patent

UNITED STATES PATENTS

934,994	Carroll	Sept. 28, 1909
1,100,986	Powers	June 23, 1914
1,320,673	Carroll et al.	Nov. 4, 1919
2,580,756	Furman	Jan. 1, 1952