Sept. 13, 1938. J. A. CLOSE ET AL 2,130,229

PRINTING MECHANISM

Filed May 15, 1936 5 Sheets-Sheet 1

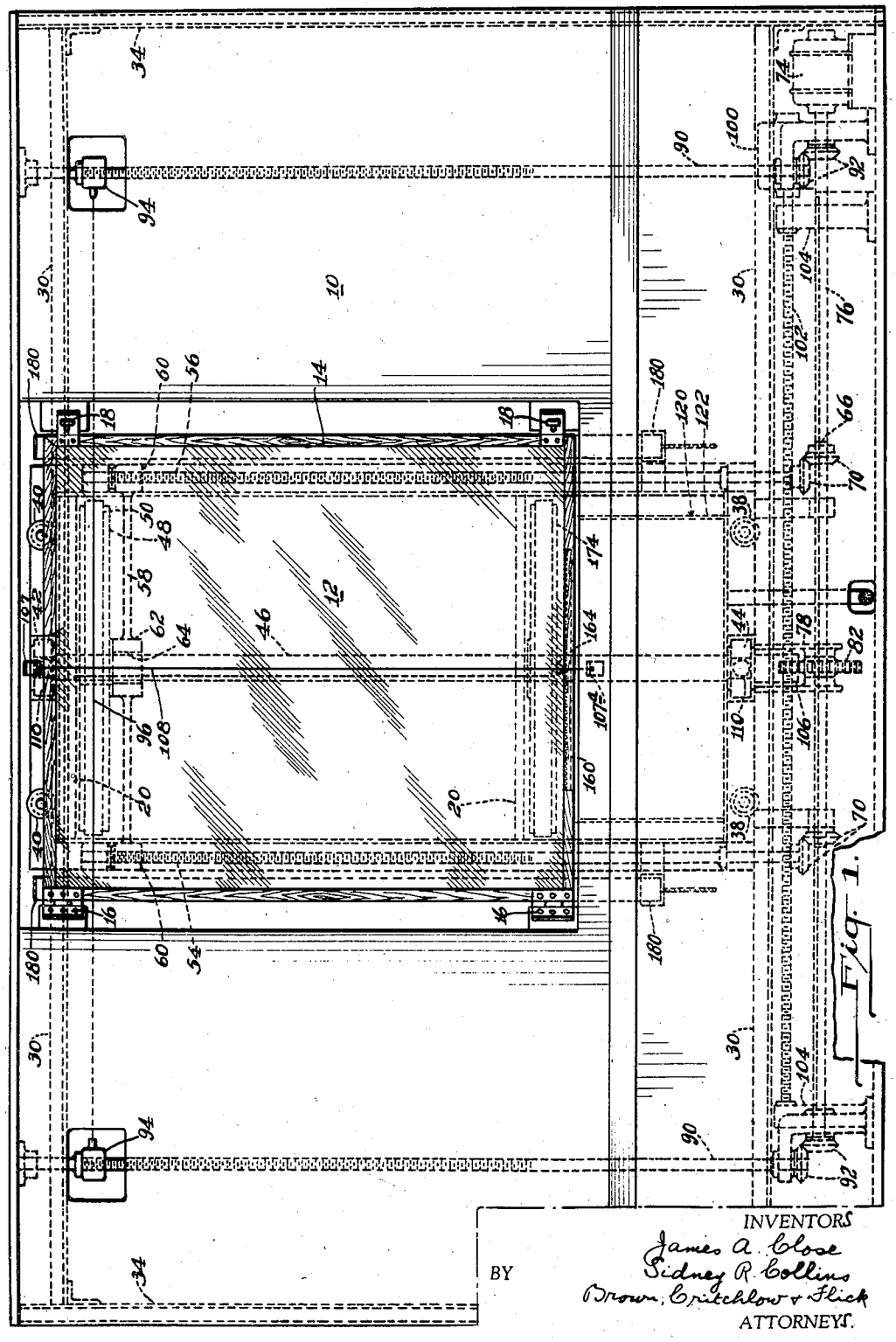

Fig. 1.

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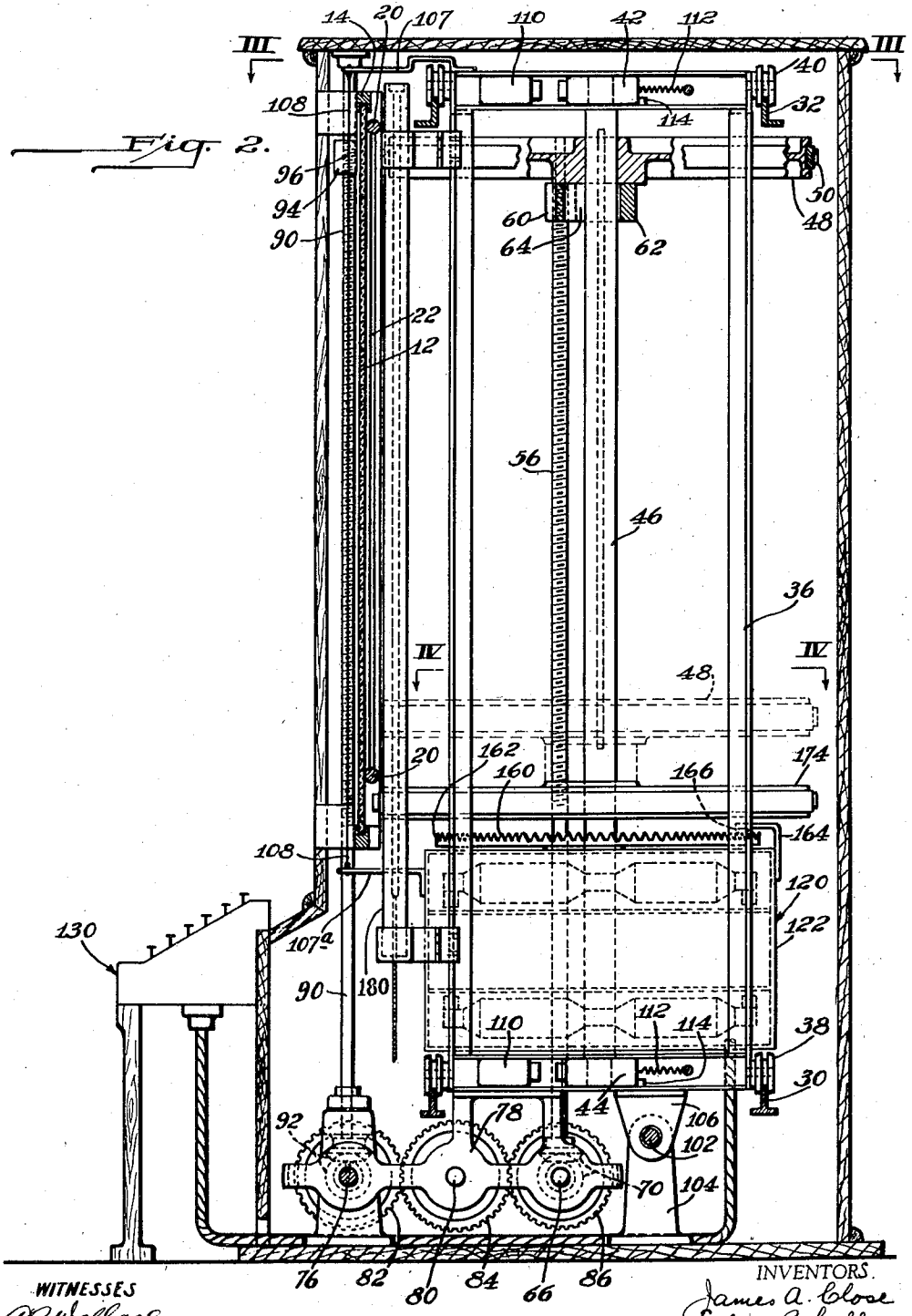
PRINTING MECHANISM

Filed May 15, 1936 5 Sheets-Sheet 2

Fig. 2.



WITNESSES

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PRINTING MECHANISM

Filed May 15, 1936 5 Sheets-Sheet 3

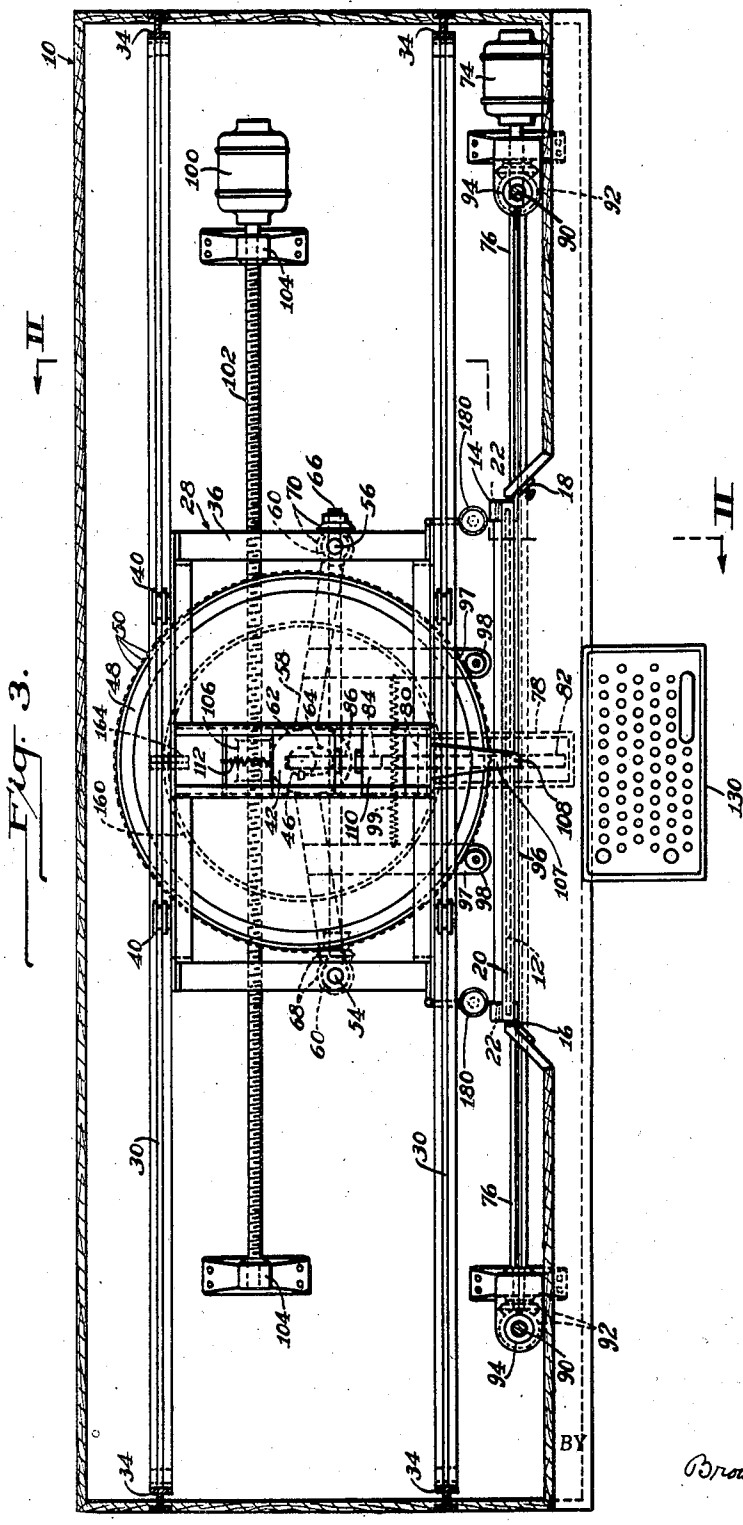

Fig. 3.

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PRINTING MECHANISM

Filed May 15, 1936 5 Sheets-Sheet 4

Fig. 4.

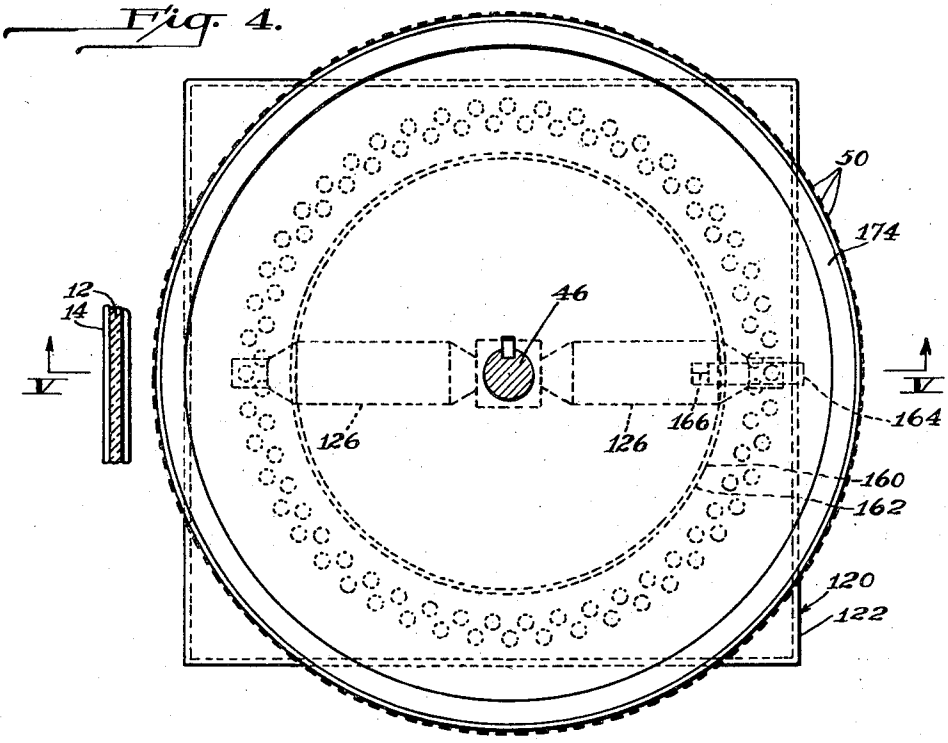
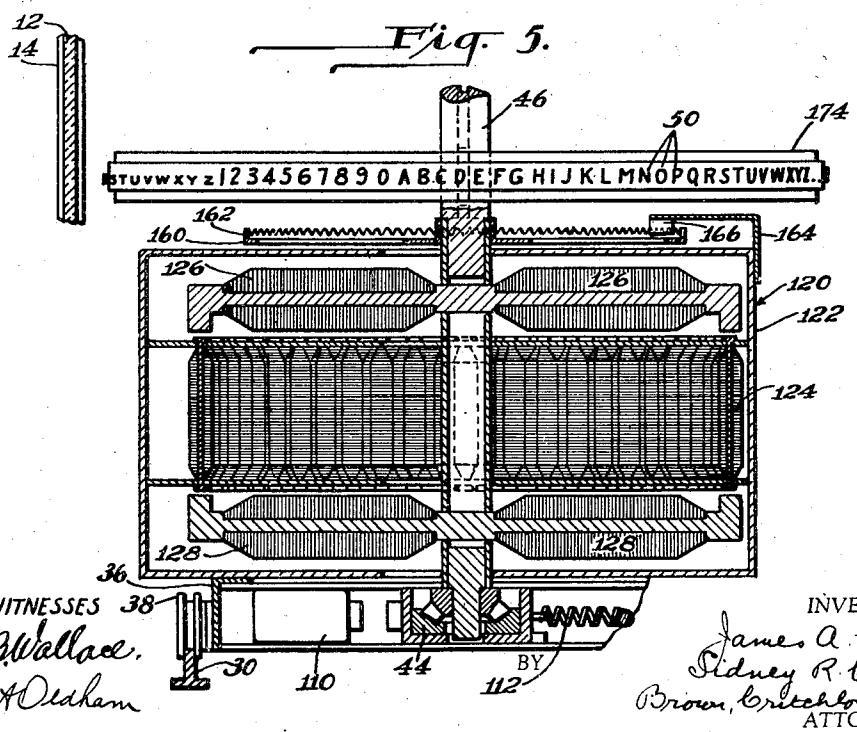


Fig. 5.



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PRINTING MECHANISM

Filed May 15, 1936 5 Sheets-Sheet 5

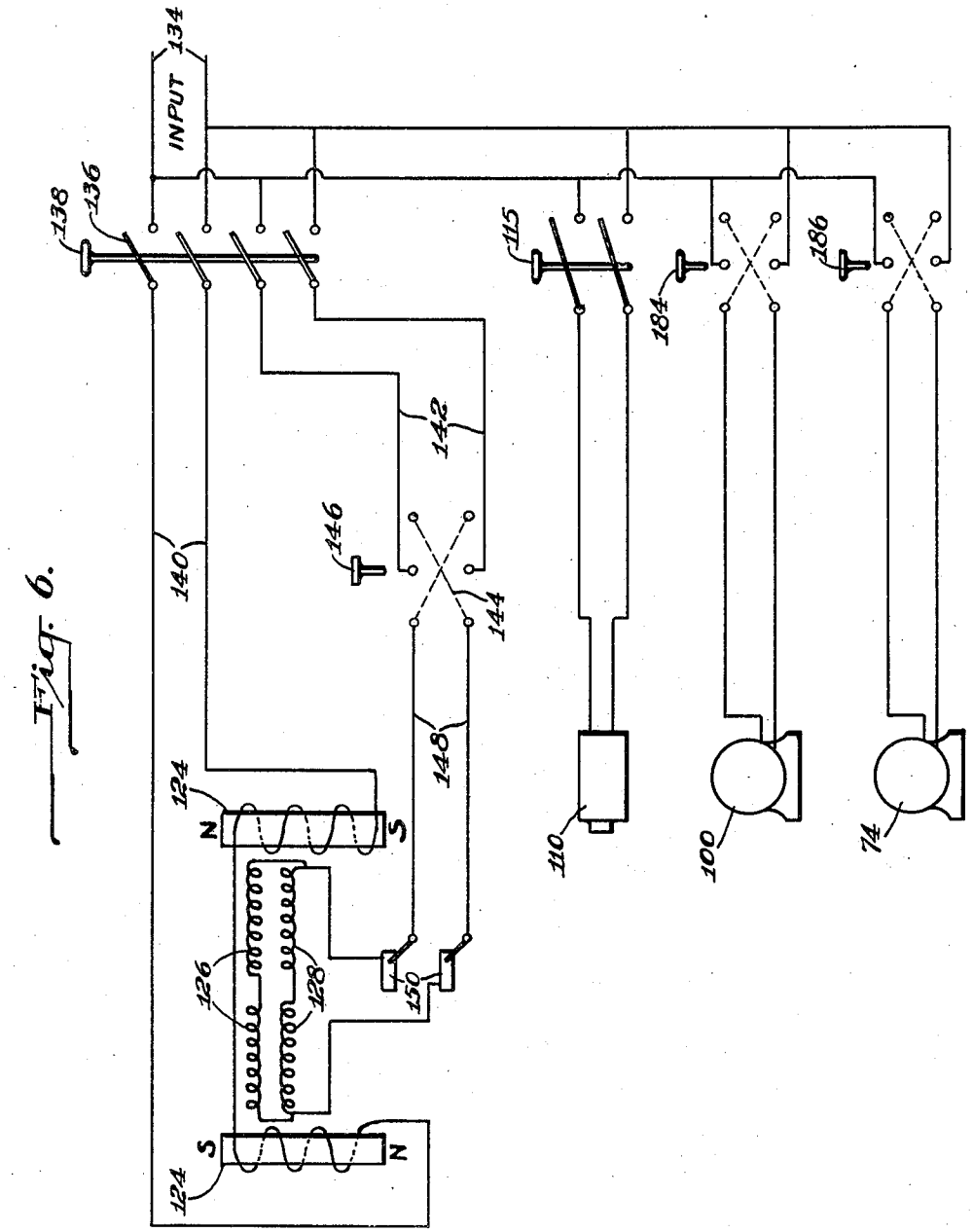

Fig. 6.

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Patented Sept. 13, 1938

2,130,229

UNITED STATES PATENT OFFICE

2,130,229

PRINTING MECHANISM

James A. Close, Du Bois, and Sidney R. Collins, Clearfield, Pa.

Application May 15, 1936, Serial No. 79,904

14 Claims. (Cl. 197—12)

This invention relates to mechanism for printing and more particularly is concerned with apparatus adapted to print desired insignia upon tracings, drawings, show-cards, and other relatively large individual sheet material.

Heretofore a number of mechanisms have been provided for printing or typing on relatively small pieces of sheet material. These specifically include the typewriter and like apparatus. However, in the printing of tracings, drawings and show-cards of considerable size no automatic printing mechanism has been employed, and it has been the usual practice to either print by hand or to employ individual rubber stamps for applying each letter. Needless to say, the hand methods are relatively slow, cumbersome, and entail high labor costs. In addition, the resulting job is often unsatisfactory due, of course, to the lack of uniformity of hand work and to the fact that, unless painstaking care is exercised by the skilled artisan, the resulting printing may be messy with improperly or poorly formed letters, as will be appreciated.

It is the general object of our invention to avoid and overcome the foregoing and other difficulties of prior known apparatus by the provision of an improved form of automatic keyboard control printing device particularly adapted to apply desired insignia, for example, letters and numerals, upon relatively large sheets such as tracings, drawings, and cards.

Another object of our invention is to provide a mechanism for typing or printing in combination with a blue-printing apparatus for producing blue-prints from a typed-on tracing, for example.

Another object of our invention is the provision of novel means for selecting any desired insignia to be printed which means are rapidly and accurately controlled by a keyboard.

Another object of our invention is to provide printing or typing apparatus of the character indicated in which the particular style, size and shape of the type employed is readily interchangeable with any desired type.

Another object of our invention is the provision of typing mechanism having a typing bed or plate which is transparent.

The foregoing and other objects of the invention which will become evident as the description proceeds are achieved by the combination of a transparent plate with means for releasably securing a sheet to be printed on the plate. A shaft extending substantially parallel to the plate supports a printing-wheel to which the individual type insignia are removably fastened and means are provided for changing the angular position of the wheel to present any desired insignia adjacent the plate. Mechanism is included in the combination for moving the shaft parallel to the plate with other means for moving the wheel along the shaft to thereby provide for printing the selected insignia at any point on the sheet. Additional means for relatively moving the wheel and plate towards each other to effect the printing of the sheet are likewise incorporated in the combination.

In the accompanying drawings Fig. 1 is a front elevation of one embodiment of apparatus constructed in accordance with the principles of our invention. Fig. 2 is a vertical transverse cross-sectional view of the apparatus illustrated in Fig. 1. Fig. 3 is a sectional plan view of the apparatus of Figs. 1 and 2 with the section being taken on line III—III of Fig. 2. Fig. 2, incidentally, is taken substantially on line II—II of Fig. 3. Fig. 4 is an enlarged sectional plan view of the electrical control mechanism forming a part of our invention and taken substantially on line IV—IV of Fig. 2. Fig. 5 is a vertical transverse cross-sectional view of the electrical control mechanism as taken on line V—V of Fig. 4. Fig. 6 is a wiring diagram of the electrical connections for part of the apparatus.

Referring to the drawings, the numeral 10 indicates generally a casing usually made of wood paneling secured to a suitable iron frame and having a transparent screen or printing bed 12 ordinarily made of plate glass and mounted in a frame 14 secured in an opening in the front of the casing. The screen 12 may be offset relative to the front of the casing, as best seen in Fig. 3, and is mounted for movement relative to the casing so that the back of the screen can be readily exposed. This is preferably accomplished by securing the frame 14 to the casing along one vertical side by hinges 16 with the other side of the frame being releasably secured, as by fastenings 18, to the casing so that when desired the fastenings 18 can be loosened and the screen moved like a door outwardly of the casing to expose the back side of the screen.

The tracing, drawing, placard, or the like, which is to be printed is removably secured to the screen 12 in any suitable manner. We preferably utilize rubber-covered rollers 20 adapted to be moved to opposite ends of the screen or to positions over the edges of the sheet material held on the screen. The rollers 20 are received at their ends in slotted bars 22 extending vertically of and secured to the frame 14. Its struc-

ture readily permits the rollers 20 to be moved by hand to any desired holding position to thereby removably secure the sheet material to the back side of the screen 12.

Adjustably mounted and positioned in the casing 10 is a printing mechanism forming part of our invention and indicated generally by the numeral 28. The mechanism includes horizontally extending rails 30 and 32 which are secured at their ends to vertically extending members 34 fastened to the ends of the casing 10. The rails 30 and 32 support a carriage 36 having wheels 38 and 40 engaging with tracks 30 and 32, respectively. The carriage 36 carries bearings 42 and 44 which rotatably journal a vertically extending shaft 46. Feathered to the shaft 46 is a printing-wheel or disc 48 which is formed with a grooved periphery adapted to removably mount type 50 of any desired size or character. Ordinarily the type 50 is of semi-hard rubber or, if desired, can be made of metal and backed with a cushioning strip of rubber.

The vertical position of the printing-wheel 48 on the feathered shaft 46 is controlled by vertically extending screws 54 and 56 which are journaled at their ends in the frame 36 and which carry a yoke 58 having threaded hubs 60 engaging with the threaded portions of the screws 54 and 56. The yoke 58 has a central hub portion 62 surrounding the shaft 46 but formed with an elongate opening 64 therein which permits movement of the shaft 46 towards the screen 12, as hereafter described. The lower ends of the screws 54 and 56 are connected by a shaft 66 and suitable bevel gears 68 and 70, and means are provided for driving the shaft 66. These means preferably will function regardless of the position of the carriage 36 on the tracks 30 and 32 and, in the embodiment of our invention illustrated, include a reversible motor 74 mounted on the bottom of the casing 10 and driving a shaft 76 extending along the bottom forward portion of the casing.

A driving connection between shafts 76 and 66 is provided by securing a frame 78 to the bottom of the carriage 36, which frame not only journals the shaft 66 but also journals an idler shaft 80 and extends to and surrounds the shaft 76. The shaft 76 is splined longitudinally and carries a gear 82 meshing with a gear 84 on the idler shaft 80 which, in turn, meshes with a gear 86 upon the shaft 66 carried with the carriage 36. By this mechanism even though the position of the carriage 36 on the tracks 30 and 32 is changed, the frame 78 moves the gear 82 along the splined shaft 76 so that a drive to the shaft 66 is effected.

Means may be incorporated with the drive positioning the yoke 58 so that the exact vertical printing position of the printing-wheel 48 with respect to the transparent screen 12 is indicated at all times. These means may comprise vertically extending shafts 90 positioned at each end of the casing 10 and connected by beveled gears 92 to the shaft 76. The shafts 90 are threaded and carry nuts 94 which are connected by a quickly removable gauge wire 96. The offset of the transparent screen 12, as best seen in Fig. 3, positions the gauge wire 96 in front of the glass, and, as will be evident, the arrangement of the parts is such that as the printing-wheel 48 is moved up and down on the shaft 46 the gauge wire 96 likewise moves up and down in front of the transparent screen 12 in suitable slots between the casing and the screen so that the vertical height of the printing-wheel behind the screen is indicated.

The yoke 58 preferably carries rollers or other means for inking the printing-wheel 48 and in the embodiment of the invention illustrated the yoke pivotally supports arms 97 having self-linking rollers 98 mounted on their ends. A tension spring 99 connects the arms 97 resiliently together and serves yieldably to hold the inking rollers 98 against the periphery of the printing-wheel 48. We further contemplate the use of inking ribbons rather than rollers as will be understood.

Any desired mechanism for controlling the lateral position of the carriage 36 on the tracks 30 and 32 can be utilized but we preferably employ a motor 100 which is mounted upon the bottom of the casing 10 and which drives a screw 102 journaled in suitable supporting bearings 104 secured to the bottom of the casing 10. The carriage, as best seen in Fig. 2 of the drawings, is formed with a downwardly extending bracket 106 which is threaded and receives the screw 102. This manner of operation of the motor 100 moves the carriage 36 in one direction or the other upon the tracks 30 and 32. In order to indicate the lateral position of the carriage 36, arms 107 and 107a are secured respectively to the top and bottom of the carriage and are connected by a quickly releasable gauge wire 108 which is positioned in front of the screen 12 and extends through slots formed between the screen and casing.

As above stated, the shaft 46 carrying the printing-wheel 48 is journaled in bearings 42 and 44 which are carried in the frame 36 for movement to and from the transparent screen 12 to effect the printing of any sheet material thereon. Preferably the movement of the bearings 42 and 44 to and from the screen 12 is controlled by electric magnets 110 with tension springs 112 being provided to return the bearings 42 and 44 to a position against stops 114 secured to the carriage. As best seen in Fig. 6, the magnets 110 are connected to a source of electric current by an operating key or jack switch 115.

The control or selector apparatus for determining the position of the printing-wheel 48 is indicated generally by the numeral 120 and, as best seen in Figs. 4 and 5 of the drawings, includes a housing 122 of non-magnetic material surrounding the shaft 46 and carrying a plurality of stator pole magnets 124 arranged in a double circle as shown in Fig. 4. The shaft 46 carries diametrically extending rotor magnets generally in the form of two pairs 126 and 128. The rotor magnets are formed with pole pieces extending into closely spaced relationship with the pole pieces of the stator magnets 124.

The operation of the selector mechanism is controlled by a keyboard indicated as a whole by the numeral 130 and operative to electrically energize the rotor magnets 126 and 128 and any selected set of stator magnets 124 so as to swing the printing-wheel 48 to a position so that the insigne to be printed corresponds to the particular insigne key operated. More particularly, Fig. 6 illustrates diagrammatically the wiring connections of our selector mechanism. The numeral 134 indicates the electrical input line connected by a four-way, single-throw, jack switch 136 to the stator and rotor magnets respectively. The jack switch 136 is controlled by a particular key 138 marked, for example, with the letter "Q". The key is, of course, positioned with various

other keys on the keyboard control mechanism 130.

From the jack switch 136 electrical leads 140 extend to one diametrically opposite set of stator magnets 124 and, as seen in the diagram, the opposite magnets are wound oppositely so that they present opposite poles both at their tops and bottoms. From the jack switch 136 electrical leads 142 extend to a two-pole double-throw jack switch 144 operative by a shift key 146 on the keyboard control mechanism 130, as hereafter more fully described. From the jack switch 144 electrical leads 148 are connected to slip rings 150 carried by the shaft 46 and electrically connected to the rotor magnets 126 and 128, as indicated. The rotor magnets 126 are oppositely wound so that a north pole is provided at one end and a south pole at the other and the rotor magnets 128 are also wound oppositely but with their positions reversed so that a south pole is provided at one end and a north pole at the other with the north pole of rotor magnets 126 being above the south pole of rotor magnets 128 and vice versa.

It will be recognized from the foregoing that when key 138, for example, representing the letter "Q", is depressed upon the control keyboard 130, the rotor magnets 126 and 128 are energized and that a certain diametrically opposite pair of stator magnets is also energized. Thus through magnetic attraction of unlike poles, the rotor magnets 126 and 128 rapidly swing shaft 46 and thus printing-wheel 48 to a position to bring the letter "Q" to printing position opposite the transparent screen 12. In an exactly similar manner the remaining keys of the control mechanism 130 are connected to the rotor and stator magnets so that by pressing the proper key the letter to be printed and carried by the printing-wheel 48 is moved to printing position.

An important part of our inventive concept is the provision of reversing mechanism for changing the polarity of either the rotor magnets 126 and 128 or the field magnets 124. Ordinarily this is accomplished by the provision of the double-pole, double-throw jack switch 144 connected in the electrical leads 142 to the rotor magnets and operated by the key 146 above described. It will be recognized that operation of the jack switch 144 changes the polarity of the rotor magnets 126 and 128 in accordance with known practice. Accordingly, we mount lower case letters on the printing-wheel through an arc of 180° and provide upper case or capital letters upon the 180° of remaining surface. Thus when "shift" key 146 is depressed the jack switch 144 functions to change the polarity of the rotor magnets 126 and 128 to bring the portion of the wheel carrying the capital letters to printing position with the proper capital being selected by the particular energized stator magnets 124. Normally when the shift key 146 is up, the polarity of the rotor magnets is unchanged and lower case letters are printed as will be understood. In operation the shift key 146 is used like the ordinary shift key on a typewriter, for example, and this key may be either locked in capital printing position or merely held down during the printing of capitals.

It should be understood that we contemplate making the jack switch 136 of a single-throw, double-pole construction or even of a single-pole, single-throw construction, and connecting the electrical leads 142 from the rotor magnets 126 directly with the input 134 at all times the machine is being operated. This modification, of course, reduces the electrical switching and wiring costs and is generally advisable. For purposes of simply illustrating the inventive principles the wiring diagram has, however, been made as illustrated. We also contemplate providing bars which extend below each line of keys on the keyboard control mechanism 130 so that when any key is operated the bar below the key is moved to operate a jack switch electrically connecting the rotor magnets in the electrical circuit.

The electrical selector mechanism just described provides a relatively inexpensive but rapidly operating and efficient mechanism for moving the printing-wheel 48 to position to print any desired insignia. By the use of the shift key arrangement either one half or the other half of the printing-wheel can be utilized. Ordinarily the strength of the combined rotor magnets 126 and 128 and the stator magnets 124 is entirely ample to swing the shaft 46 and printing-wheel 48 as desired even though the rotor magnets are stopped at a position a considerable arcuate distance from the particular stator magnets energized. We do, however, contemplate providing contact plates between the rotor and stator magnets so that, if the arcuate distance from the rotor magnets is sufficiently great from the selected stator magnets energized, certain of the stator magnets closer to the rotor magnets will be energized. This shunting arrangement lies well within the skill of the ordinary electrician and accordingly it has not been illustrated or described in detail.

Associated with the shaft 46 and the selector mechanism 120 are means for insuring accurate positioning of the printing-wheel 48 before and during the printing. These means may compose a disc 160 secured to the shaft 46 and formed with an upstanding edge flange 162 carrying a plurality of V-shaped notches spaced in accordance with the spacing of the letters upon the printing-wheel 48. A bracket 164 secured to the housing 122 is formed with a tapered guide 166 which in the normal non-printing position of the shaft 46 is spaced just inwardly of the flange 162. However, when magnets 110 are energized to move the shaft 46 and printing-wheel 48 toward the transparent screen 12, the tapered guide 166 engages in one of the notches positively aligned with the letters on the printing-wheel. Continued movement of the shaft 46 towards the transparent screen 12 causes a thicker part of the guide 166 to engage in the selected notch and in this manner a very accurate placement of the letter on the printed sheet is assured.

We preferably include means in the apparatus for indicating the particular angular position of the printing-wheel 48 and in the form of our invention illustrated these means comprise an indicating-wheel 174 which is substantially identical to the printing-wheel 48 except that the diameter of the indicating-wheel may be slightly smaller. The indicating-wheel is adapted to have mounted upon its periphery in exactly the same manner as the printing-wheel 48 the various insignia to be used for printing. The insignia on the respective wheels are in vertically aligned relation so that when the letter "Q," for example, is shown by the indicating-wheel to be in printing position, the printing letter "Q" carried by the printing-wheel 48 actually is in printing position. Ordinarily the indicating-wheel 174 is positioned closely adjacent to the trans-

parent screen 12 so that its characters can be seen by the operator even though a translucent or opaque sheet is held in printing position upon an upper part of the transparent screen 12. We also contemplate extending the transparent screen 12 down sufficiently low so that the indicating-wheel can be positioned at the lower portion of the screen so as not to interfere with the placing of sheet material to be printed upon the upper portion of the screen. Again, a separate transparent window may be provided in the front of the casing 10 opposite the indicating-wheel 174.

While for the sake of clearness and ease of illustration the indicating-wheel 174 and the guide disc 160 have been shown and described as independent of each other, we preferably unite them in the commercial form of our printing mechanism. More specifically, the disc 160 is inverted and secured to the under side of the wheel 174 and the tapered guide 166 is fastened on the upper side of bracket 164 so as to engage with the flange 162, so that the function of the parts is retained as will be understood.

Since our improved printing apparatus includes a transparent screen or plate upon which the material to be printed is held during the printing operation, our apparatus adapts itself particularly to associated blue-printing and like operations. Accordingly, we provide upon the carriage 36 blue-printing lights which may comprise vertically directed light sources 180 positioned at one or both ends of the carriage. In all events if a blue-printing operation is desired either in conjunction with or separate from the printing operation, the material to be blue-printed is placed upon the transparent screen 12 and one or both of the light sources 180 are energized and the carriage 36 is moved along in front of the screen by operation of the motor 100 to achieve the desired result. The blue-printing lights, suitably reduced in intensity as by a rheostat, may be used for illuminating the printing screen before, during, or after printing, and we further may include other illuminating means for the same purpose.

It is believed that the operation of the apparatus will be understood from the foregoing description. Briefly summarizing, however, when using the apparatus to print upon tracings, drawings, placards, and the like, the fastening means 18 at one side of the transparent screen 12 and the gauge wires 96 and 108 are released, the screen is swung forwardly of the casing and the tracing to be printed is secured to the back of the screen by the rubber-covered rollers 20. The screen is then returned to position and fastened in place and the gauge wires 96 and 108 are reconnected. Now an operator seated at the control mechanism 130 can readily position the printing-wheel at a position shown by the gauge wires 96 and 108 so that the printing mechanism when operated prints the desired insignia at the proper place on the tracing. Now the particular letter or other insignia desired as indicated upon the keyboard 130 is selected by depressing the particular key as, for example, that shown at 138 in Fig. 6, and with the letter selected the printing key 115 forming a part of the keyboard 130 is depressed to energize magnets 110 which pull shaft 46 and printing-wheel 48 toward the transparent screen 12 to positively force the particular printing insignia against the tracing carried by the screen. The motor 100 is then actuated by a spacing key 184 to move the carriage 36 one or more spaces along the tracing. No details of the spacing key have been illustrated, other than in Fig. 6, as the key merely comprises a switch for the motor 100. We do, however, contemplate making the spacing automatic with the incorporation of a controlled timing or operating switch on the motor so that the motor once started spaces any preselected distance and then stops. Likewise the motor 74 controlling the vertical position of the printing-wheel 48 relative to the screen 12 can also be energized by operation of a spacing key 186 to position the printing-wheel vertically of the tracing. The next letter or other insignia to be printed is then selected by depressing the proper key upon the control mechanism 130 and the printing operation is repeated. In this manner as many letters and the like can be printed upon the tracing or other sheet material held as may be desired.

The letters carried by the printing-wheel can be readily changed as to particular size or characteristic as will be understood. The apparatus functions in a substantially rapid and automatic manner to print accurately upon tracings and other similar sheet materials. In addition, the blue-printing mechanism can readily be used in conjunction with the printing operation. We contemplate employing the blue-printing light sources 180 as means for illuminating a tracing from the rear to assist in proper positioning of the tracing for printing. Likewise, mirrors can be incorporated in the apparatus in order to more properly position the printing-wheel at the desired printing station. We also contemplate broadly providing a transparent screen or window at the back side of the casing 10 and then positioning the control mechanism 130 at such window and operating the mechanism while looking through the window to insure the proper positioning of the printing-wheel.

Any portions of the mechanism which are apt to be magnetically affected are made of non-magnetic material where such effect is undesirable. Likewise the printing-wheel 48, indicating-wheel 174, and the disc 160 are made of aluminum or other light weight material to reduce the inertia thereof to facilitate easy and rapid operation of the apparatus.

While in accordance with the patent statutes one particular embodiment of our invention has been illustrated and described in detail, it should be understood that the invention is not limited thereto or thereby but is defined in the appended claims.

We claim:

1. In combination, a plate, means for releasably securing a sheet to be printed on the plate, a shaft adjacent the plate, a printing-wheel carried by the shaft, electrical magnet means for changing the angular position of the wheel to present any desired insignia in juxtaposition to the plate, electrically driven screw means for moving the shaft parallel to the plate, electrically driven screw means for moving the wheel along the shaft and relative to the plate, and electrical solenoid means for relatively moving the wheel and plate bodily towards each other to effect printing of the sheet.

2. In combination, a screen, means for releasably securing a sheet to be printed on the screen, a shaft extending substantially parallel to the screen, a printing-wheel carried by the shaft, electrical selector magnet means for changing the angular position of the wheel to present any desired insignia adjacent the screen, electrically

operated screw means for relatively moving the shaft parallel to the screen, electrically operated screw means for relatively moving the wheel parallel to the screen but at right angles to the last-named moving means, and electrical solenoid means for relatively moving the wheel and screen bodily towards each other to effect printing of the sheet.

3. A printing apparatus comprising a casing, a plate glass window removably forming a part of a wall of the casing, means for mounting a piece of sheet material to be printed on the back of the window, a carriage, means slidably mounting the carriage in the casing for movement parallel to the window, means controlling the lateral position of the carriage, a shaft, bearings journaling the shaft in the carriage in vertical position, a printing-wheel carried by the shaft, a plurality of printing insignia carried by the wheel, means controlling the vertical position of the wheel on the shaft, rotor magnets carried by the shaft, stator magnets mounted in a ring around the rotor magnets and supported by the carriage, a keyboard connected to the magnets and adapted to control the supply of electric current to any selected set of magnets upon operation of any key to move a selected insigne to printing station, and means for moving the shaft bearings toward the window to effect a printing operation.

4. A printing apparatus comprising a plate glass window, means for mounting a piece of sheet material to be printed on the back of the window, a carriage, means slidably mounting the carriage for movement parallel to the window, means controlling the lateral position of the carriage, a shaft, bearings journaling the shaft in the carriage in vertical position, a printing-wheel carried by the shaft, a plurality of printing insignia carried by the wheel, means controlling the vertical position of the wheel on the shaft, rotor magnets carried by the shaft, stator magnets mounted in a ring around the rotor magnets and supported by the carriage, a keyboard connected to the magnets and adapted to control the supply of electric current to any selected set of magnets upon operation of any key to move a selected insigne to printing station, and means for moving the shaft bearings toward the window to effect a printing operation.

5. A printing apparatus comprising a plate glass window, means for mounting a piece of sheet material to be printed on the back of the window, a carriage, means slidably mounting the carriage for movement parallel to the window, means controlling the lateral position of the carriage, a shaft, bearings journaling the shaft in the carriage, a printing-wheel carried by the shaft, a plurality of printing insignia carried by the wheel, means controlling the position of the wheel on the shaft, rotor magnets carried by the shaft, stator magnets mounted in a ring around the rotor magnets and supported by the carriage, a keyboard connected to the magnets and adapted to control the supply of electric current to any selected set of magnets upon operation of any key to move a selected insigne to printing station, and means for moving the shaft bearings toward the window to effect a printing operation.

6. A printing apparatus comprising a shaft, a printing-wheel carried by the shaft, a plurality of printing insignia carried by the wheel, means controlling the position of the wheel on the shaft, rotor magnets carried by the shaft, stator magnets mounted in a ring around the rotor magnets, and a keyboard connected to the magnets and adapted to control the supply of electric current to any selected set of magnets upon operation of any key to move a selected insigne to printing station.

7. A printing apparatus comprising a casing, a plate glass window removably forming a part of a wall of the casing, quickly releasable means mounting the window in the casing, means for mounting a piece of sheet material to be printed on the back of the window, a carriage, means slidably mounting the carriage in the casing for movement parallel to the window, means controlling the lateral position of the carriage, a shaft, bearings journaling the shaft in the carriage in vertical position parallel to the window, a printing-wheel carried by the shaft, a plurality of printing insignia carried by the wheel, means controlling the vertical position of the wheel on the shaft, means for controlling the angular position of the wheel, and means for moving the shaft bearings toward the window to effect a printing operation.

8. Printing mechanism comprising a plate adapted to support the material to be printed, an arcuate member, printing insignia removably mounted on the arcuate member, a plurality of pairs of rotor magnets movable with the arcuate member, a plurality of pairs of stator magnets defining a fixed circle surrounding the rotor magnets, means for supplying electric current to the rotor magnets and one selected pair of stator magnets, means for changing the direction of current flow in the rotor magnets, means for moving the arcuate member against the plate to effect a printing operation, means for positively centering the arcuate member and the plate, and means indicating the position of the arcuate member relative to the plate.

9. Printing mechanism comprising a plate adapted to support the material to be printed, an arcuate member, printing insignia mounted on the arcuate member, rotor magnets movable with the arcuate member, a plurality of pairs of stator magnets defining a fixed circle surrounding the rotor magnets, means for supplying electric current to the rotor magnets and one selected pair of stator magnets, means for changing the direction of current flow in the rotor magnets, means for moving the arcuate member against the plate to effect a printing operation, means for positively centering the arcuate member and the plate, and means indicating the position of the arcuate member relative to the plate.

10. Printing mechanism comprising a plate adapted to support the material to be printed, an arcuate member, printing insignia mounted on the arcuate member, rotor magnets movable with the arcuate member, a plurality of pairs of stator magnets defining a fixed circle surrounding the rotor magnets, means for supplying electric current to the rotor magnets and one selected pair of stator magnets, means for moving the arcuate member against the plate to effect a printing operation, and means for positively centering the arcuate member and the plate.

11. Printing mechanism comprising a plate adapted to support the material to be printed, an arcuate member, printing insignia mounted on the arcuate member, rotor magnets movable with the arcuate member, a plurality of pairs of stator magnets defining a fixed circle surrounding the rotor magnets, means for supplying electric current to the rotor magnets and one selected pair of stator magnets, and means for moving the ar-

cuate member against the plate to effect a printing operation.

12. Printing mechanism comprising a plate adapted to support the material to be printed, an arcuate member, printing insignia mounted on the arcuate member, rotor magnets movable with the arcuate member, a plurality of pairs of stator magnets defining a fixed circle surrounding the rotor magnets, means for supplying electric current to the rotor magnets and one selected pair of stator magnets, means for changing the direction of current flow in at least one of the sets of magnets, and means for moving the arcuate member against the plate to effect a printing operation.

13. Printing mechanism comprising a plate adapted to support the material to be printed, an arcuate member, printing insignia mounted on the arcuate member, rotor magnets movable with the arcuate member, a plurality of pairs of stator magnets defining a fixed circle surounding the rotor magnets, means for supplying electric current to the rotor magnets and one selected pair of stator magnets, and means indicating the position of the arcuate member relative to the plate.

14. In combination, a plate, means for releasably securing a sheet to be printed on the plate, a printing-wheel mounted adjacent the plate, means for changing the angular position of the wheel to present any desired insignia in juxtaposition to the plate, means for moving the wheel parallel to the plate in two directions at right angles to each other, means for relatively moving the wheel and plate towards each other to effect printing of the sheet, and means comprising wires crossed in front of the plate for indicating the position of the wheel in front of the plate.

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