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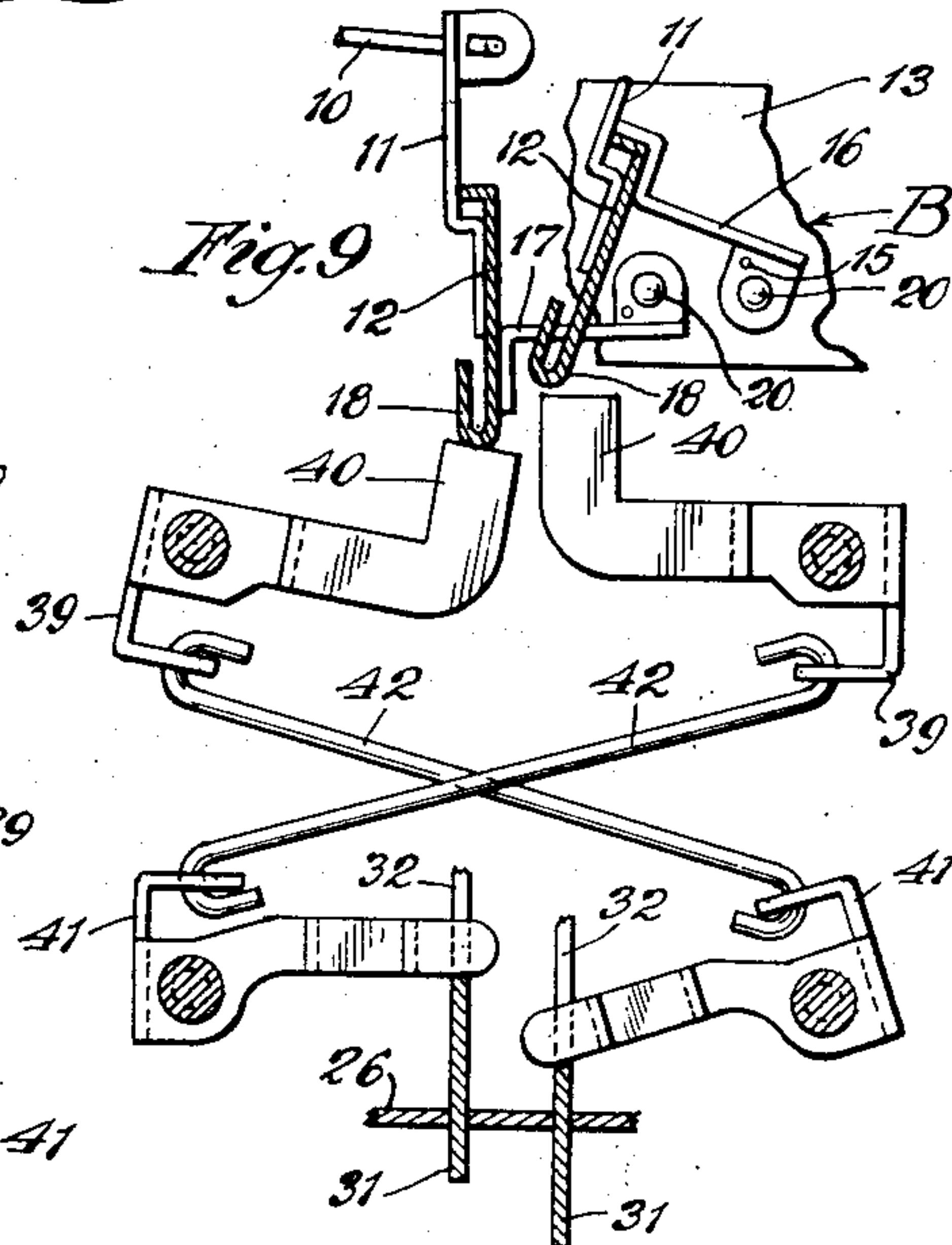
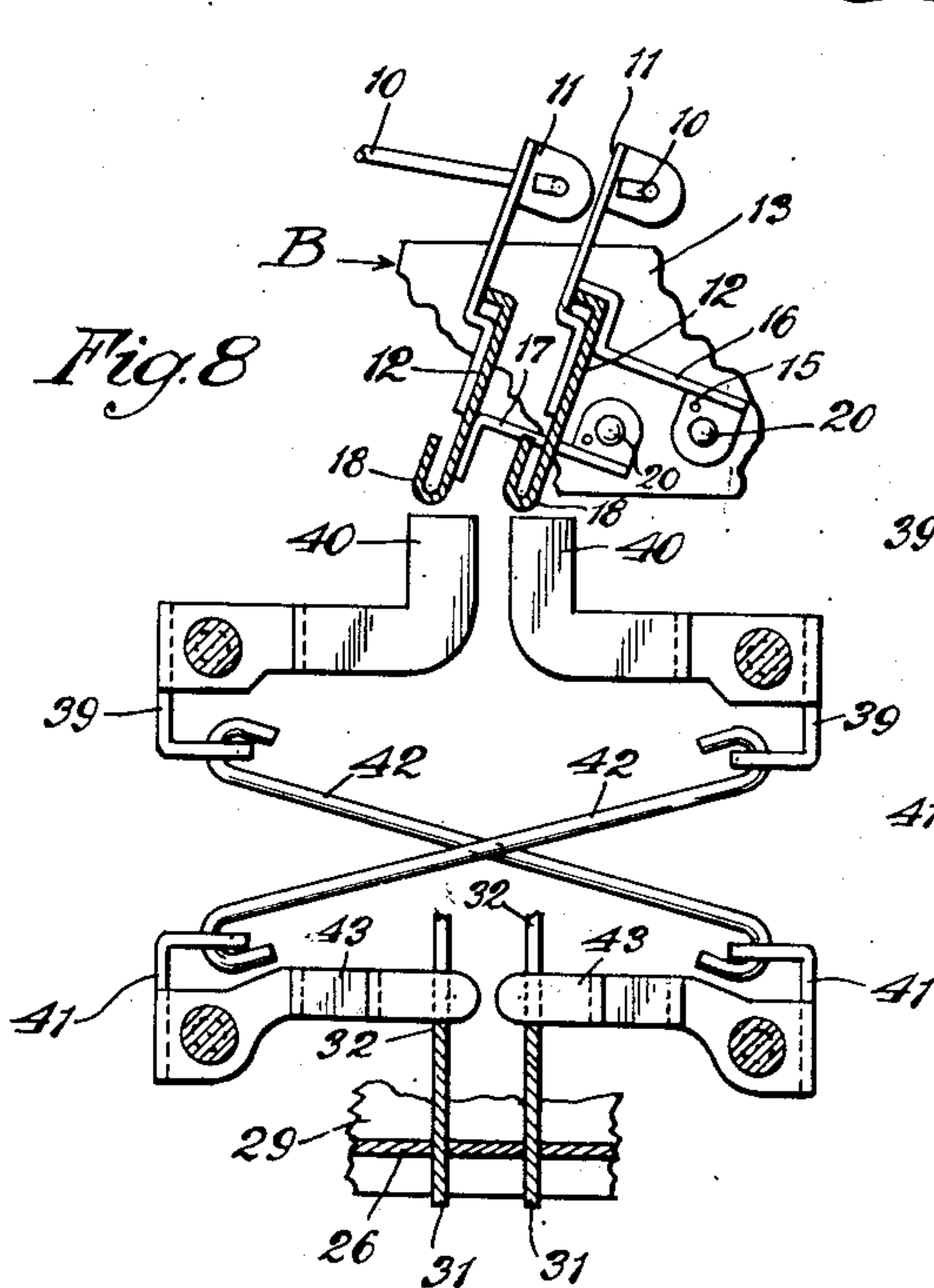
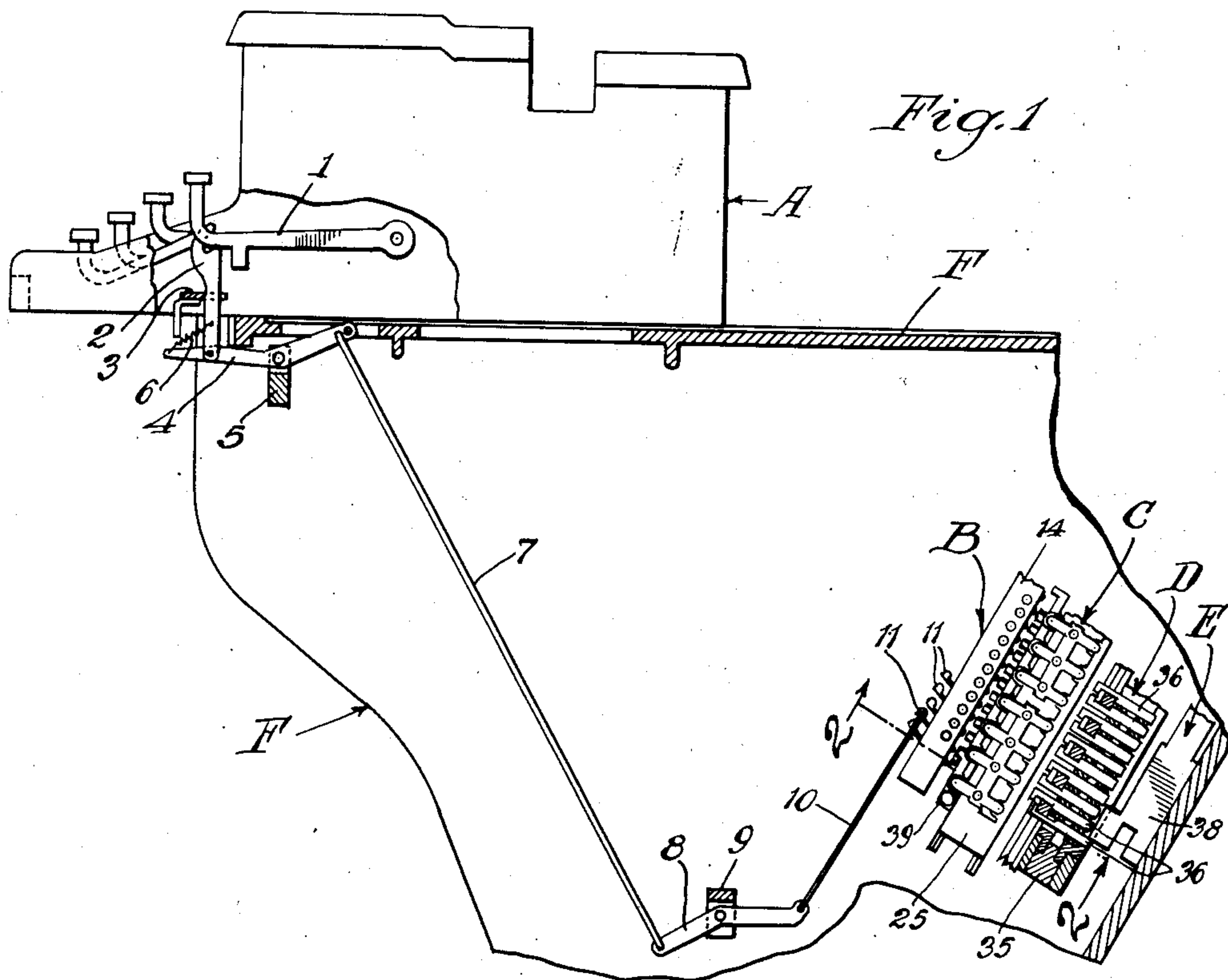
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2,659,299

CHARACTER SELECTING MECHANISM

Filed Nov. 2, 1948

7 Sheets-Sheet 1



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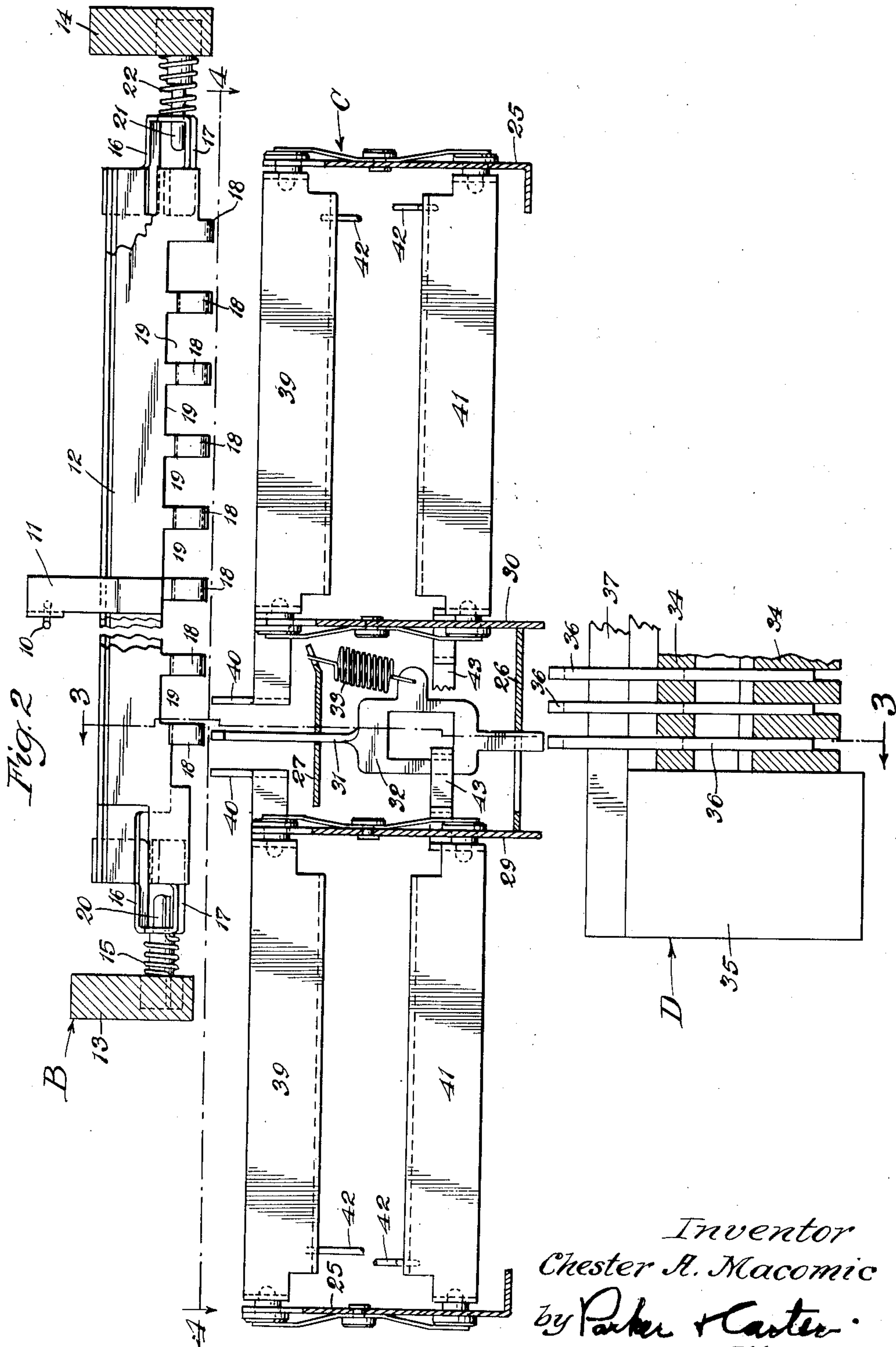
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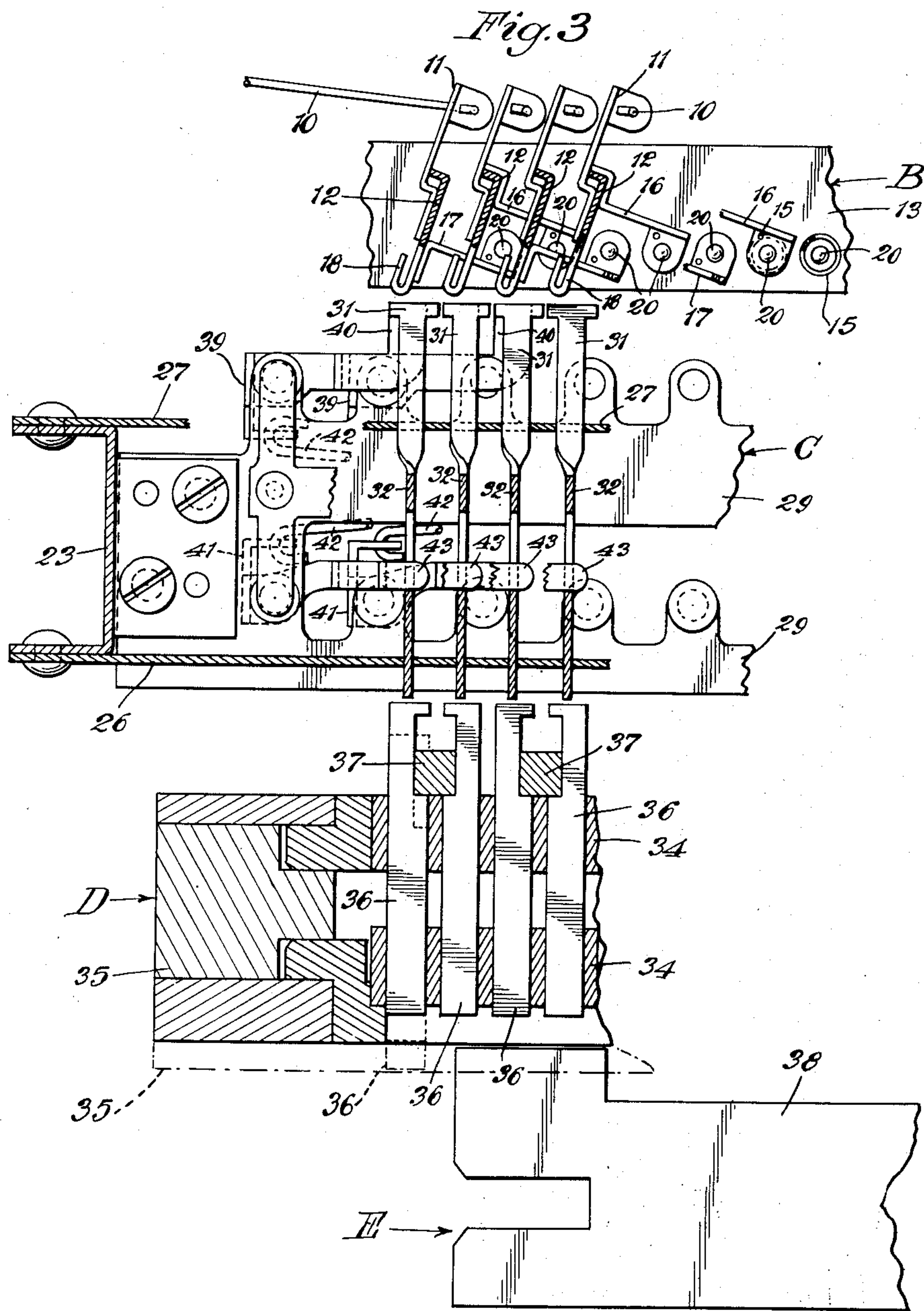
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CHARACTER SELECTING MECHANISM

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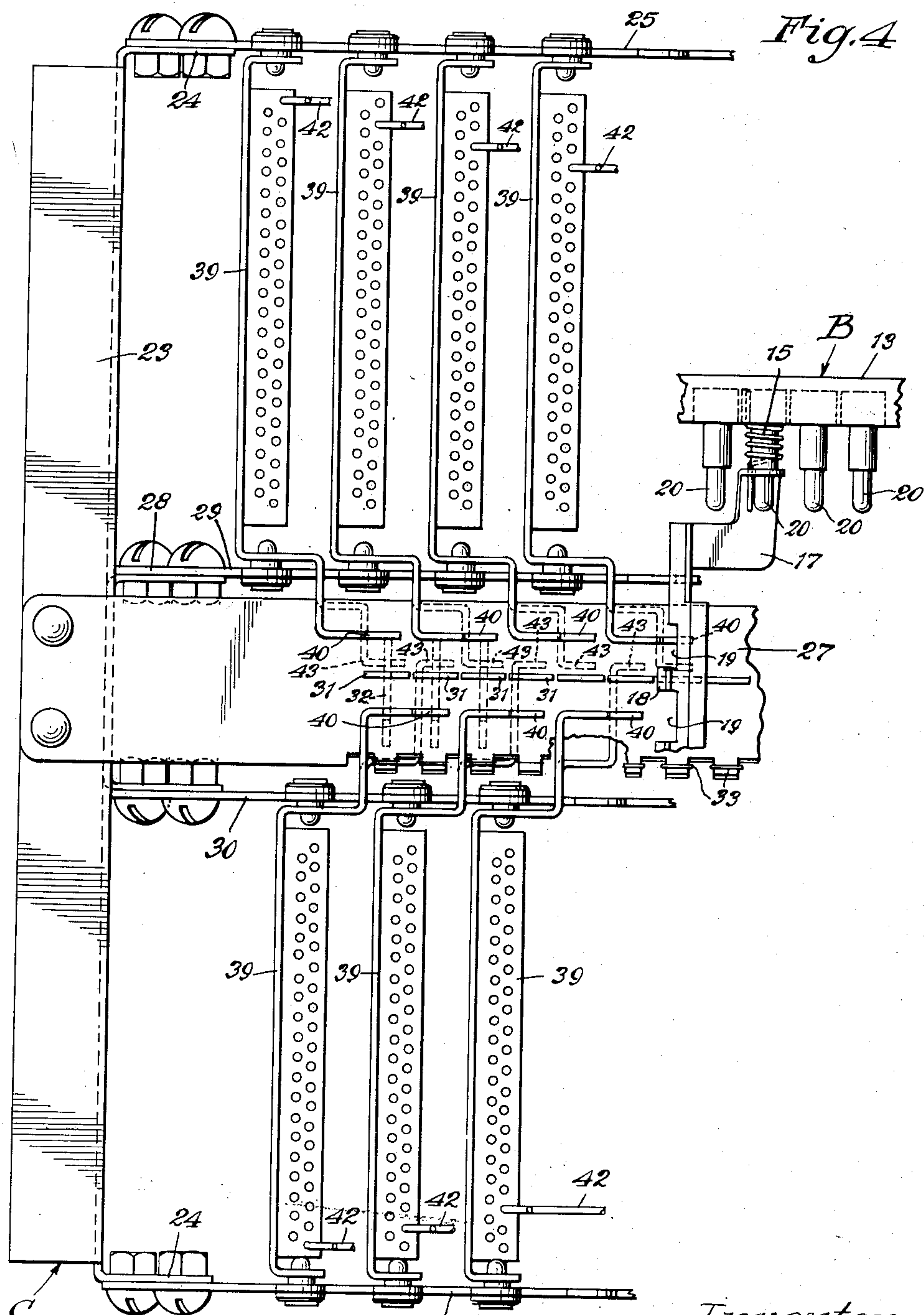
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CHARACTER SELECTING MECHANISM

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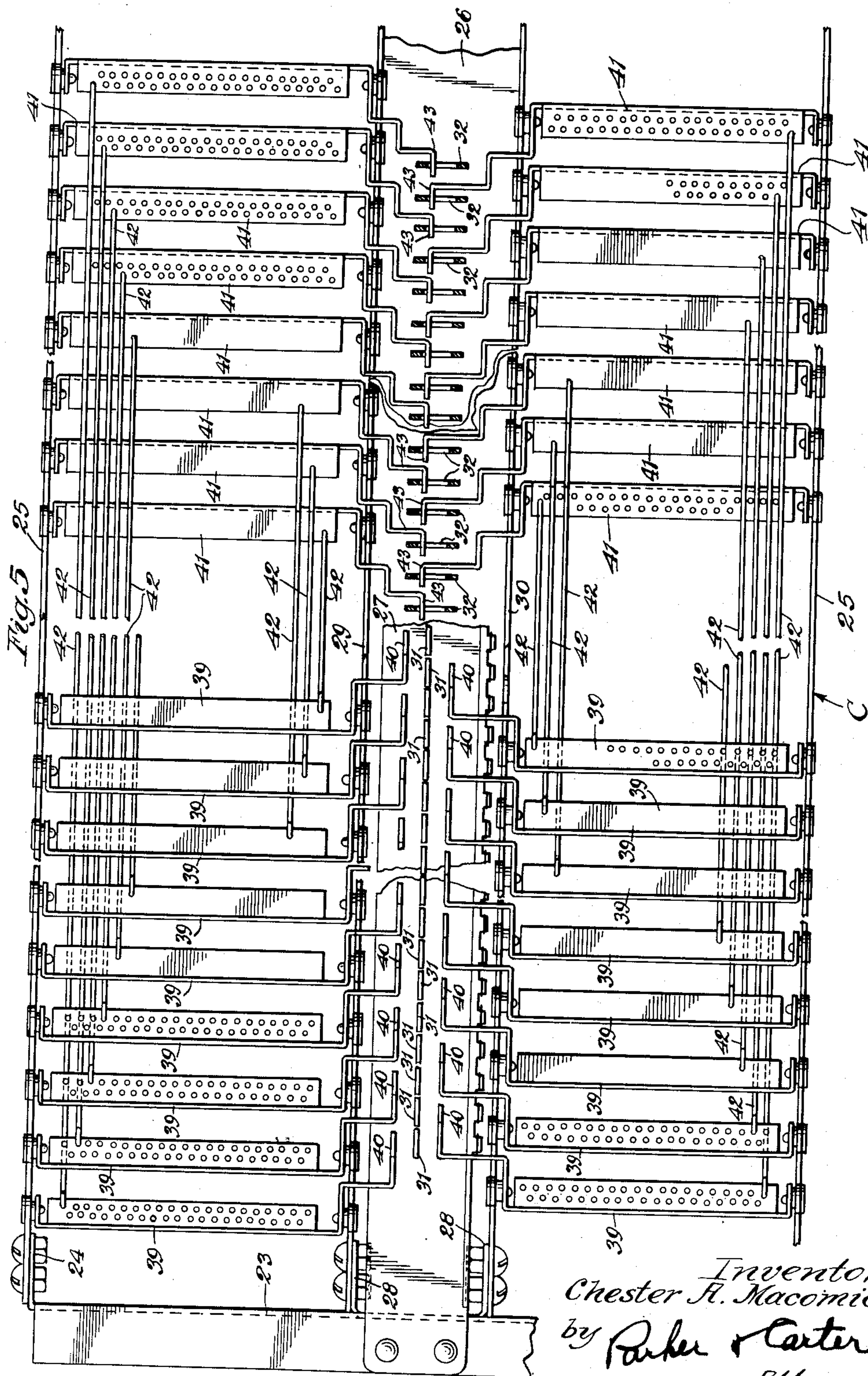
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CHARACTER SELECTING MECHANISM

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7 Sheets-Sheet 5



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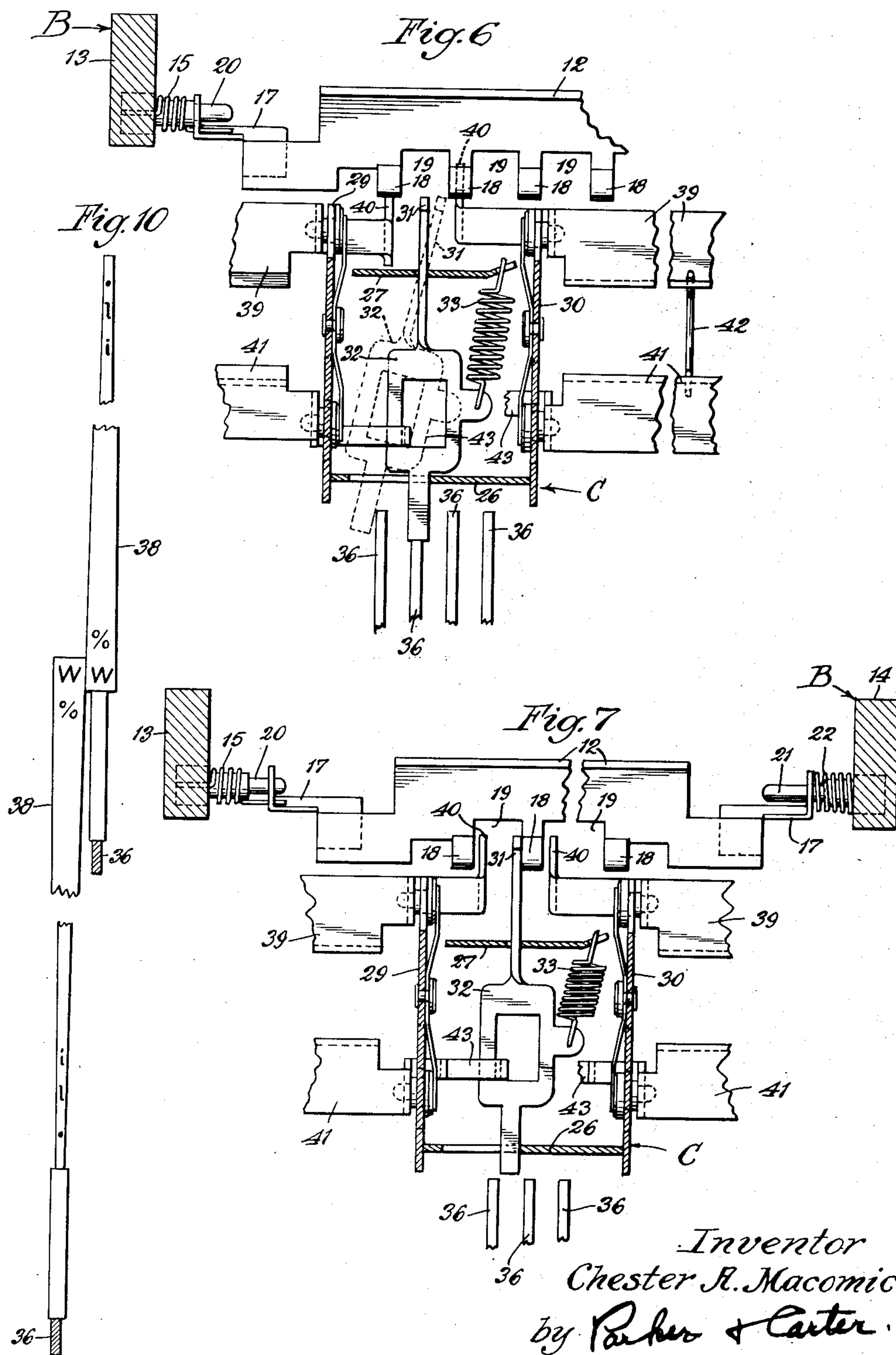
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CHARACTER SELECTING MECHANISM

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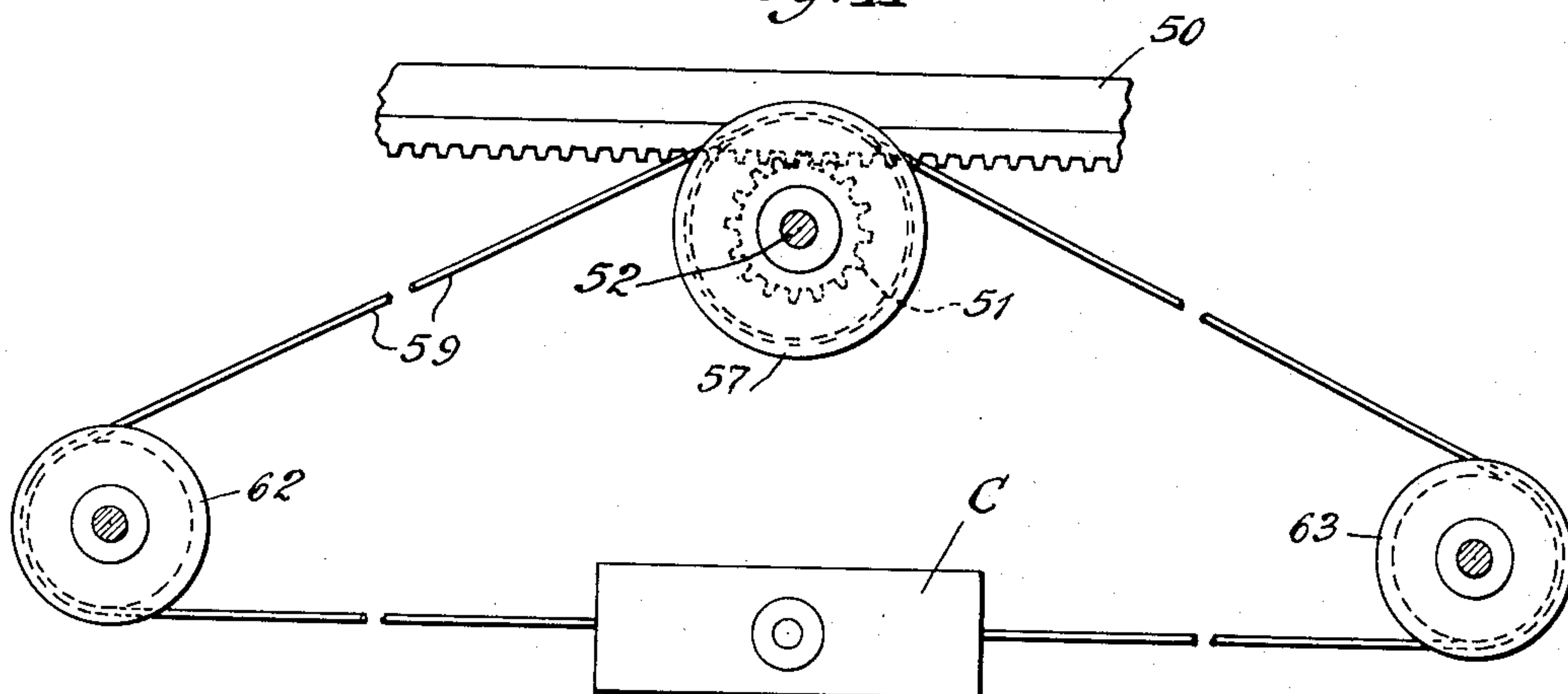
C. A. MACOMIC  
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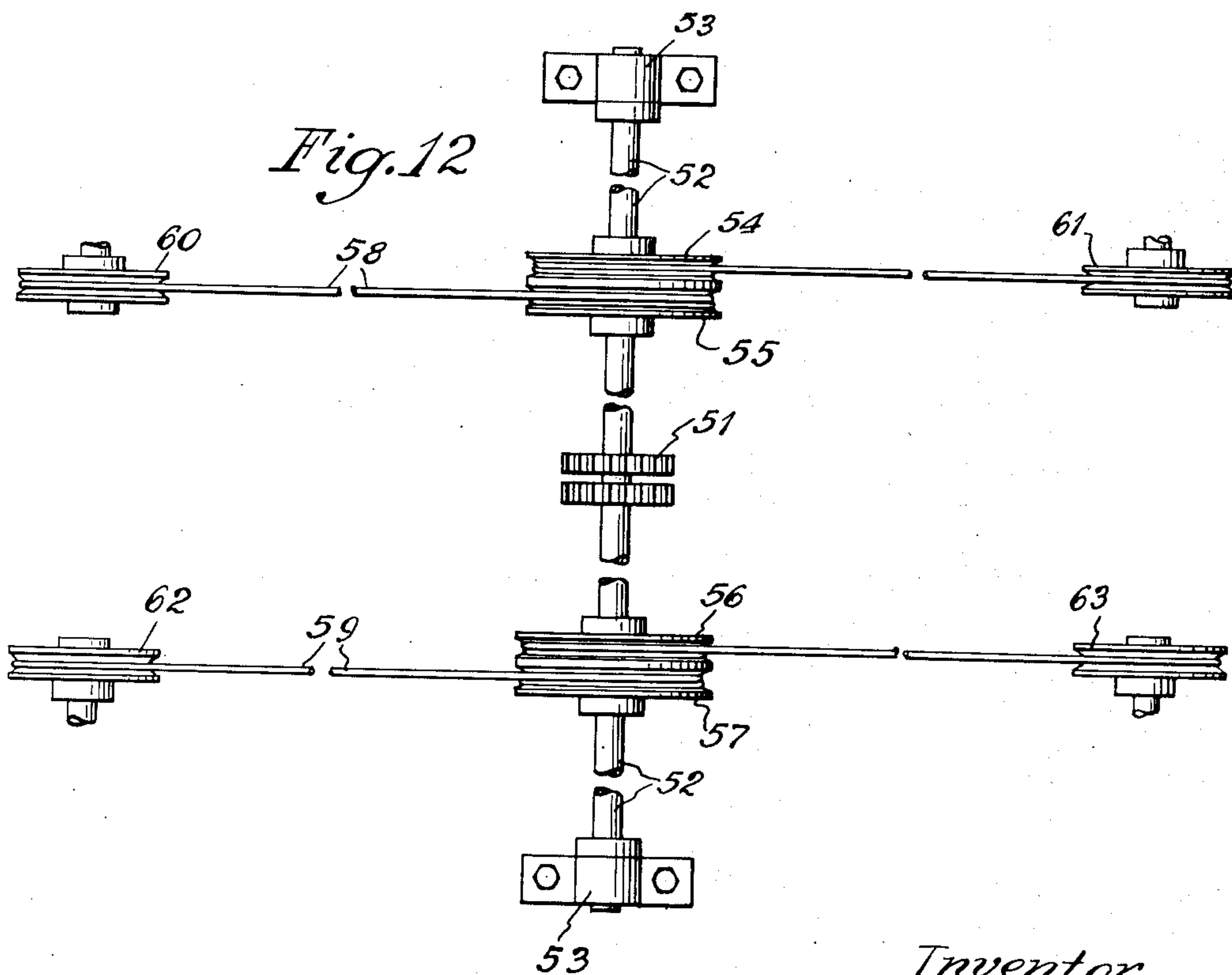
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7 Sheets-Sheet 7

*Fig. 11*



*Fig. 12*



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## UNITED STATES PATENT OFFICE

2,659,299

## CHARACTER SELECTING MECHANISM

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Application November 2, 1948, Serial No. 58,003

18 Claims. (Cl. 101—46)

1

My invention relates to improvements in character selecting mechanisms and has for one object to provide typewriter actuating means which will select and arrest a series of movable members in predetermined relationship.

Another object is to provide a typewriter actuated mechanism associated with a plurality of longitudinally movable type or character bars which will, responsive to the operation of the typewriter, displace and arrest those longitudinal bars in their longitudinal movements in such wise that a row of aligned characters, one on each bar, may be assembled in a selected line of type or other characters.

Another object of my invention is to provide means whereby a series of longitudinally movable, tapered, type or character bars may be arrested in their longitudinal movement so as to assemble a line of characters, one character on each bar.

Another object is to provide means for character selection, in a line printing composition machine, which are manually actuated from a keyboard, or automatically actuated from previously prepared punched cards, tapes, or other control means.

Other objects will appear from time to time in the course of the specification.

For the sake of convenience in illustration, I have shown my invention as applied to a typewriter and a plurality of type bars which are longitudinally displaced and then arrested under the control of the typewriter to bring into line a line of type characters, one on each type bar, but it will be obvious that the assembling and arresting of these bars might be accomplished and controlled through mechanisms other than a standard typewriter, and it is equally obvious that the bars might carry not merely printing type, but characters for other purposes. And so, broadly stated, my invention involves a pattern selecting mechanism.

A standard typewriter may be used. When the keys are struck, the typewriter writes a line of letters on a sheet of paper and the writing on the typewriter requires no special skill beyond that characteristic of a competent typist.

Associated with the typewriter is a group of type or character bars with means for longitudinally displacing them. Adjacent the group of character bars is a stop bed, there being a plurality of lines of stops, one line adapted to be associated with each character bar, and in each line of stops there are at least as many stops as there are characters on the bar.

2

Between the stop bed and the typewriter is a plunger or selector carriage. It is driven in consonance with the typewriter carriage and every time the typewriter carriage moves one space forward the selector or plunger carriage moves one space forward. The linear movement of the typewriter carriage and the plunger carriage may or may not be the same though they are in parallel. The plunger carriage, whenever the typewriter carriage moves one space forward, moves forward from one line of stops to the next line of stops.

There is interposed between the plunger carriage and the typewriter an operating mechanism which depresses a plunger, no matter what the position of the plunger carriage, to depress a stop into the path of the character bar conforming in position in the line to the character written by the typewriter, and this mechanism is so disposed that it depresses the proper stop so as to arrest the character bar in such position that the character on that bar conforming to the letter struck by the typewriter is positioned in the desired line of type.

Since the characters with which we are dealing—in this case, the letters of the alphabet—vary in width, they are placed on character bars which taper from one end to the other, the widest character at the wide end, the narrowest character at the narrow end, and the characters between the ends being placed in the order of their width. In order that the letters when assembled may be properly spaced in line, each character bar is longitudinally reversed with respect to its neighbors so that when the bars are all assembled in the starting position the bed of bars is of generally the same width and the wide end of one bar is immediately adjacent to the narrow ends of the bar on either side of it.

Starting with all the bars in the initial position spaced longitudinally from the position of the line which it is desired to assemble, all the bars must be moved longitudinally and each bar must be arrested in such position that the selected character will be on the line. Because the order of characters on adjacent bars is reversed, the longitudinal movement of any two adjacent bars must be arrested at different points to present the same character on the two bars for alignment.

If, for instance, we are going to select the widest character on the bar and we want it to appear twice in the line, the two characters being side by side, the bar having its widest end nearest the line will move only a short distance



3

whereas the adjacent bar having the widest character at the other end will have to move practically the whole length of the bar. Thus, the operating means between the typewriter and the plunger must be so related that two widely spaced stops in any pair of lines of stops will be depressed to bring this about. And an important factor in the present invention is the means by which movement of the plunger carriage in consonance with movement of the typewriter carriage will select not merely a stop to arrest the type bar, but will select that particular stop which will allow the type bar to move the desired distance, and will on the next position select a stop to allow the next type bar to move a totally different distance so as to align the two letters.

This difference in character bar movement is essential and applies no matter what letter is selected. If we take the letter "e" the movement to bring "e" on the bar having its wide end forward will always be different from the movement to bring "e" on the bar with the narrow end forward into alignment.

My invention is illustrated more or less diagrammatically in the accompanying drawings wherein:

Figure 1 is a diagrammatic showing, in part section and part elevation with parts omitted, illustrating especially the connection between the typewriter and the pattern or character selecting mechanism;

Figure 2 is a section along the lines 2—2 of Figures 1 and 3 showing part of the stop bed, the plunger or selector carriage and the typewriter actuated toothed rotating bar;

Figure 3 is a section along the line 3—3 of Figure 2 through the typewriter actuated rotating bars, the plunger carriage and the stop bed with character bar in side elevation;

Figure 4 is a section along line 4—4 of Figure 2 showing in top plan view the plunger carriage and associated parts;

Figure 5 is a top plan view of the plunger carriage with parts broken away and parts in section;

Figure 6 is a section similar to the section of Figure 2 showing the plunger in the plunger carriage and illustrating the escapement of the plunger with respect to the stop bed;

Figure 7 is a view similar to Figure 6 showing the parts in a different position to illustrate the escapement of the plunger with respect to the toothed rotating bar;

Figure 8 is a section parallel to the section of Figure 3 illustrating the relation between the toothed rotating bar and the auxiliary plunger actuating fingers;

Figure 9 is a section similar to Figure 8 showing the parts in a different position; and

Figure 10 is a plan view of two of the character bars showing the relationship between them.

Figure 11 is a side elevation with parts omitted illustrating the driving connection between the typewriter carriage and the plunger carriage;

Figure 12 is a plan view with parts omitted illustrating a driving connection between the typewriter carriage and the plunger carriage.

Like parts are indicated by like numbers throughout the specification and drawings.

In general, referring to Figure 1, A indicates the typewriter. B indicates the bed of toothed rotating bars actuated by the typewriter keys. C indicates the plunger carriage adapted to be

4

moved transversely in consonance with movement of the typewriter carriage and containing plungers adapted to be longitudinally displaced by the toothed rotating bars, D the stop bed containing stops which are adapted to be contacted by the plungers and be projected into the path of the character bars, and E the group of character bars, each one adapted to be arrested by a stop in the stop bed. F illustrates the frame supporting all the above generally disclosed elements.

Since the present invention is directed primarily toward the selection of the proper stop to arrest the character bar in such position that the characters thereon will form a line of characters or type, means for controlling the typewriter, printing means, etc. are not here illustrated.

1 is a typewriter key. When struck, it actuates the usual typewriter mechanism to strike a type against a piece of paper on the roller on the typewriter carriage and it also releases the typewriter carriage for movement one space in the usual manner. Associated with each typewriter key is a push bar 2, traveling in a slotted comb or guide 3, pivoted on a bell crank lever 4, which lever is pivoted on a supporting frame 5. 6 is a spring tending to hold the push bar 2 in position. 7 is a pull rod anchored at one end on the free end of the bell crank lever 4, at the other end on one end of a bell crank lever 8, which lever is pivoted on a frame abutment 9 and carries at its other end a tension member 10 anchored on an operating lever 11 on a rotating toothed bar 12.

There are a large number of rotating toothed bars 12. They are pivotally supported in frame members 13 and 14. Springs 15 tend to yieldingly return them to the position shown in Figures 2, 3 and 8 when they have been rotated out of that position by the typewriter key into the position, for instance, shown on the lefthand side of Figure 9. There is one of these rotating toothed bars associated with and actuated by each of the typewriter keys. They are arranged, as indicated in Figures 1 and 3, in a parallel bed.

Each rotating toothed bar 12 has rearwardly extending arms 16 or 17 at each end, one bar having the arm 16, the next alternate bar having the lower arm 17 to avoid interference between the arms and the individual toothed rotating bars. The axes of all the bars are in a common plane, however, and when any bar is rotated by tension applied through the member 10 from the typewriter key, the bar rotates, as indicated in Figure 9 or as indicated in Figure 7.

Along the lower edge of each of the toothed rotating bars are a plurality of teeth 18, the width of the space 19 between adjacent teeth being substantially twice the width of the tooth itself, and the sole purpose of these teeth is, when the bar is downwardly rotated, to longitudinally displace a selected one of the plungers. The bed in which the rotating toothed bars are mounted is fixed in position. The bars rotate in the bed but are not otherwise normally displaced except as will hereinafter appear. There is a possibility that the bar might in operation be longitudinally displaced slightly so the pins 20 and 21 on which the bars are pivoted are long enough to permit such displacement. 22 is a spring encircling the pin 21 just as the spring 15 encircles the pin 20. If the bar 12 should be longitudinally displaced, the spring 22 yieldingly returns it to the proper position as soon as the



5

displacing force has been released, and this may take place without in any way interfering with the function of the spring 15 which is to raise the bar away from the plungers back to its starting position.

The plunger carries, generally indicated at C in Figure 1, and Figure 3 is mounted for movement in a plane parallel with the toothed rotating bar bed B. The means for moving and guiding the plunger carriage are, in the interest of simplicity and to avoid confusion, not here illustrated. Suffice it to say that the plunger carriage is maintained positively and accurately in parallelism with its starting position. It is held spaced equally throughout its entire travel below the toothed rotating bar bed, and it is so connected to the typewriter carriage that it moves step by step in consonance therewith so that every time the typewriter key is struck and the typewriter carriage moves a step forward the plunger carriage moves a step forward also.

The relationship between these two carriages, the means provided to maintain a fixed relation to insure a proper step by step forward movement of the plunger carriage, form no part of the present invention and so have not been illustrated.

The plunger carriage comprises an end channel member 23, there being one at each end, only one being illustrated. Each end of the channel member has an inwardly turned flange 24 on which is mounted an outer side bar 25. Extending parallel with the side bars 25 is a slotted lower plate 26 and a slotted upper plate 27. Extending inwardly from the channel member 23 immediately adjacent the upper and lower plates 26 and 27 is a short channel member 28, the arms of the channel member each carrying an inner side plate 29 and 30. Thus, the plunger carriage is a stiff rectangular structure which lies in a plane parallel with and spaced below or to one side of the plane of the toothed rotating bars B.

31 is a plunger guided in the slots in the plates 27 and 26, the slot in the plate 27 being parallel with the longitudinal axis of the plate 27, the slot in the plate 26 being perpendicular to the longitudinal axis of the plate 26. The plunger 31 is made of relatively thin flat material and twisted, as indicated, so that the lower part of the plunger may ride in the slot in the plate 26, the upper part may ride in the slot in the plate 27. It is the upper part of the plunger 31 that is adapted to be contacted by the teeth 18 and the lower part of the plunger 31 which, when forced down by a tooth 18, will engage one of the stops as will hereinafter appear.

Each plunger has intermediate its end an apertured widened portion 32. A spring 33 anchored at one end on the plate 27 and at the other end on an ear on the plunger tend to hold the plunger in its upper position and in a vertical position, as indicated in Figure 2, its upper excursion being limited as will hereinafter appear.

There are as many plungers arranged in a line parallel with the axis of the plunger carriage as there are characters on the character bar, and each plunger when downwardly depressed projects a stop into the path of a character bar.

In Figure 2, I have illustrated the toothed rotating bar in the position when the plunger carriage is at its extreme lefthand excursion and the parts are so disposed that if the toothed rotating bar is rotated, it will depress the plunger 31 and cause the plunger to extend a stop into the path of the character bar, as is illustrated in

6

Figure 3 in dotted lines. Figure 3 is a section at right angles to the section in Figure 2 which illustrates the manner in which the stops are bent and enlarged at their heads so as to present a relatively wide surface to the impact of the toothed rotating bar while they present a relatively wide surface at right angles thereto to engage the wide surface of the stop.

Leaving for the time being the further details of the plunger carriage, attention is now called to the stop bed D. This stop bed includes upper and lower grid members 34 supported in a frame structure 35 and carrying a plurality of stop pins 36. 37 indicates reset bars for the stop pins which limit the downward movement of the stop pin, as indicated in dotted lines at the left of Figure 3, and may be raised upwardly to reset the stop pins into the full line position of Figure 3. The details of the stop supports, resets, etc. form no part of the present invention. Suffice it to say that the stops are so held by friction that they remain in the upper position until one of the plungers engages the stop and pushes it down, and when it does, the stop remains in the down position—that is, the dotted line position of Figure 3—until it is subsequently retracted. The stop may thus be projected into the path of the character bar 38, as shown in Figure 3.

The stop bed is maintained in a plane parallel with the plane of movement of the plunger carriage and also in a plane parallel with the character bar bed.

There is in the character bar bed a character bar for each character or letter to be selected in the line of type; that is, there is a character bar corresponding to each step which can be taken by the typewriter carriage, and the limit to the number of character bars is the number of steps the typewriter carriage may take in its escapement. The stop bed has the same number of lines of stops that there are character bars, each line of stops being parallel with the line of movement of the character bars.

In each line of stops there is a stop for each character on the character bar because any selected character may be arrested in the selected line position, and so there must be a stop at least for every character. There may be more stops than there are characters.

Going back now to the plunger carriage, it would be simple enough if the characters were identically arranged on each character bar. All that would be necessary would be to move the plunger carriage from line to line of the stops and let the typewriter rotate the toothed rotating bar to engage the plunger to push the plunger down to project the stop into the line of character bars. Unfortunately, this is not the case because, while the plunger can project the stop to arrest the bar at the proper position for all the bars in one group, it cannot do that for the reversed bars. The plunger might select the stop for the bars with their narrow ends forward, but it cannot do it for the bars with their wide ends forward because the positions are different. In order to accomplish the desired result, the following mechanism is required.

Pivoted between the side bars 25 and 30 on one side and between the side bars 25 and 29 on the other side of the plunger carriage are a plurality of rotatably mounted finger levers 39 having fingers 40 extending upwardly parallel with the plungers 31 but to each side thereof. Pivoted between the side plates 25 and 30 and 25 and



29 on the lower portion of the plunger carriage are a plurality of plunger levers 41. Each finger 40 is paired with a stop 31. Each finger lever 39 is connected by a connecting rod 42 to a plunger lever 41 and each plunger lever 41 has a plunger arm 43 engaging the plunger intermediate its ends—in this case, penetrating the aperture in the plunger body 32. It is this plunger arm 43 which limits the upward movement of the plunger 31 under the urge of the spring 33.

Referring again to Figure 2, when the tooth 18 depresses the plunger 31 the stop 36 is projected into the path of the character bar, but when the plunger carriage makes its escapement and moves one step forward the tooth 18 will no longer be in register with the plunger 31. So if at the next escapement the toothed rotating bar rotates, it will not affect the plunger 31. However, as the plunger carriage has moved to the position shown in Figure 6, the tooth 18 will contact and depress the finger 40 on the left-hand finger lever 39 and rotate that lever. Since that lever is connected by one of the connecting links 42 to a plunger lever at a different part of the plunger carriage, a different plunger will be depressed to set a stop in the path of the character bar at a different place in the stop bed corresponding to the different positions of the characters on the character bar.

It will be noted, by reference to Figure 4, that these fingers 40 are arranged in two parallel lines on either side of the row of plungers—they might all be on one side if it were not for the difficulty of getting room for them—and it will be noted that the fingers themselves are staggered with respect to the plunger members so that, as indicated in Figure 6, when the finger 40 on the left is depressed by the tooth 18 the finger 40 on the right is behind the tooth 18 and not actuated; and, in fact, under these circumstances, the righthand tooth 40 is not associated with the plunger 31, we see in Figure 2, but with a plunger behind it so that only one plunger and one finger can be contacted by the teeth as movement of the plunger carriage takes place. As we see in Figure 2, the plunger 31 may be hit. Neither finger is touched. In the next step, the lefthand finger 40 can be struck, the plunger will not be touched, and the same thing happens as the plunger carriage moves laterally to the right. If, however, the typewriter keyboard caused actuation of a different one of the toothed plunger bars, and assuming that Figure 3 shows the first plunger, the same plunger shown in Figure 2, if the typewriter actuated the second bar it would actuate the second plunger, but on the escapement movement it would actuate not a finger on the left but a finger on the right of the row of plungers.

Referring now specifically to Figures 4 and 5, it will be noted that the finger levers 39 are arranged in two parallel banks on the upper portion of the plunger carriage and the plunger levers 41 are arranged in two banks on the lower portion of the plunger carriage. The parts are cut away in Figure 5 so as to show some of both finger levers and plunger levers and, for example, the finger lever 39 on the upper bank at the lefthand end of the plunger carriage is connected by a tension member or connecting link 42 with the plunger lever 41 at the righthand end of the carriage. Going toward the left, the next finger lever 39 is connected by a similar connection 42 to the plunger lever 41 which is the next inwardly from the right, and this relationship continues

clear down to the central portion of the carriage where adjacent fingers are found in Figure 8 and a finger lever 39 is connected by the connection link 42 with the plunger lever 41.

Thus, if the rotating toothed bar strikes the lefthand plunger 31, as shown in Figure 5, that plunger by direct contact with the tooth on the rotating toothed bar will be depressed to set a stop. If now the plunger carriage is moved laterally one step the tooth on the bar will no longer be in register with the lefthand stop but will be in register with the lefthand finger 40, so rotation of the toothed bar will depress not the stop but the finger 40. That will rotate the finger lever 39. Its rotation will rotate by the tension member 42 the plunger lever 41, and the plunger lever 41 when rotated will cause the plunger arm 43 to depress the plunger 31 at the extreme righthand end of the plunger carriage so that the stop at the lefthand end would arrest one of the character bars to arrest the character at the desired point, whereas the stop at the other end would arrest the adjacent character bar and bring the character into the same line because of the reversed relationship of the characters on adjacent bars, and this relationship continues from both ends inwardly because of the reversed relationship of the characters on the character bar.

The reason why there are two banks of finger levers and plunger levers on both sides of the plunger carriage and the reason why there are two parallel lines or rows of fingers aligned with the plungers is that more space longitudinally is required for the finger and plunger levers which must be laterally extended, as shown, than is required for the individual plunger which merely reciprocates instead of rocking. Thus, in Figure 4, the plunger 31 has alongside of it a finger 40 and a tooth on the rotating toothed bar may, depending upon the relative position of the parts, depress either the plunger 31 or the finger 40. Then on the lefthand side, the second plunger 31 has alongside it on the left a finger 40 which is in line with it, and so a tooth on the rotating toothed bar may depress either that second plunger 31 or its associated finger 40. If there were more room, it would be equally satisfactory to have all the fingers in one line and all the plungers in another, and the operation would be the same so long as there was room for the finger lever, the plunger lever and the connections; and the operation of the device is, in a sense, just as if there were but two lines.

Referring now to Figure 6, the parts are shown in the position that they would assume as the plunger carriage escapes to the right after a selection of a stop has been made by the plunger. As soon as the toothed bar rises after the selection has been made, the plunger follows the rise under the urge of the spring 33, but the action is rapid and the clearances are small and there is always the possibility that as the plunger carriage moves to the right the plunger might be caught, as shown in dotted lines, on the next stop. If this happens no harm is done because the plunger swings to the left, as indicated in dotted lines. The spring 33 will then be free to pull the plunger up and snap it back into the starting position, and this can happen as the plunger carriage is moving without any interference and the spring will snap the plunger into the starting position before the toothed rotating bar has been actuated for the next stop selection.

Referring now to Figure 7, a similar difficulty might arise in connection with the relationship



between the plunger and the tooth. If it should happen that after a movement downward of a tooth on the toothed bar the lateral movement of the plunger carriage caused the end of the plunger or the end of a finger to bind on the side of a tooth, no harm would be done because as the rotating toothed bar is rising, the bar is free to slide laterally on its pivot until the spring 22 is compressed, and as soon as further upward movement of the toothed bar clears the tooth from contact with the plunger or the finger, the spring 22 will displace the bar longitudinally back to its normal position in time for the next selection to be made.

Referring to Figures 11 and 12, 50 is a drive rack on the carriage of the typewriter shown in Figure 1. The details of the typewriter, the typewriter carriage are not illustrated because they form no part of the present invention and because they are entirely conventional and well known in the art. 51 is a gear in mesh with the drive rack 50 and fixed in position on the shaft 52. 53 indicates bearings supporting the shaft 52. Sheaves 54, 55, 56, 57 are fixed in position on the shaft 52. The sheaves 54, 55 and the sheaves 56 and 57 are closely spaced together but the pairs are widely spaced along the shaft so that cables 58 and 59 anchored respectively on the sheaves 54, 55 and 56, 57 and traveling over idler sheaves 60, 61, 62, 63 will move the plunger carriage C including for example the channel bar 23 shown in section in Figure 3, in elevation in Figure 4. The reason for the use of the two cables is that both ends of the plunger carriage must be moved simultaneously and equally to prevent warping or bending of the plunger carriage and to insure that the entire plunger carriage moves as a unit remaining in fixed angular position at right angles to the path of movement.

The particular fastening and mounting of the cables and of the idler sheaves is not illustrated and it is thought that the diagrammatic showing will make the parallel movement relationship between the plunger carriage and the typewriter carriage sufficiently clear.

It will be realized that, whereas I have described and illustrated a practical and operative device, nevertheless, many changes may be made in the size, shape, arrangement, number and disposition of parts without departing materially from the spirit of my invention. I wish, therefore, that my showing be taken as, in a large sense, illustrative or diagrammatic rather than as limiting me to my precise showing.

I claim:

1. Character selecting means including longitudinally tapered bars, each bar being reversed with respect to the next whereby the wide end of one bar is adjacent the narrow ends of the bars on either side of it, characters on the bars arranged with the widest characters at the wide end and the narrowest at the other, the remaining characters being spaced along the bar in accordance with their variation in width, means for longitudinally displacing the bars, stop means adapted to be projected into the path of each bar, a typewriter having typewriter keys, operating connections between the keys and the stops, the connections being so disposed that for any selected letter the stop corresponding to a typewriter key is projected into the path of the type bar when the key is struck, the stops for one bar being reversed in position with respect to the stops for the next bar whereby when longitudi-

nal movement of bars takes place, each bar is arrested by a stop, and characters are positioned in line irrespective of the reversal of the position of characters on the bars, the stop in one row of stops for positioning a particular character on the character bar is reversed in its position in the row of stops with respect to the stop in the next adjacent row of stops for positioning the same particular character on the next adjacent character bar.

2. In combination a plurality of longitudinally movable character bars, a stop bed having a plurality of stops in general alignment with each character bar, a plunger carriage movable in a plane parallel with the plane of the stop bed, a plurality of toothed rotating bars arranged in a group parallel with the stop bed on the side opposite to the plunger carriage, a typewriter, an operating connection between each typewriter key and one of the toothed rotating bars, the typewriter having a carriage, a driving connection between the typewriter carriage and the plunger carriage whereby they move in unison, each plunger being adapted when struck by a tooth on a bar to depress a stop in alignment therewith, plunger actuating fingers arranged at one side of the plungers and a connection between each plunger actuating finger and a plunger distant therefrom whereby when a tooth engages an actuating finger a plunger distant from the point of contact between the toothed rotating bar and the actuating member will be depressed to actuate a stop.

3. In combination a plunger carriage having a row of plungers arranged longitudinally thereof, a toothed rotating bar adjacent one side of the plunger carriage and adapted to be associated with one of the plungers, means for moving the plunger carriage laterally step by step along the toothed rotating bar, each step movement being related to the space between the teeth whereby in one position when the toothed rotating bar is rotated a tooth engages the plunger to depress it and in the next position when the toothed rotating bar is rotated the plunger penetrates the space between the teeth and it is not actuated, a row of plunger actuating fingers parallel with the plungers, the space between the plunger actuating members and the plungers being such that when the plunger is engaged by a tooth the actuating member penetrates between the teeth of the toothed rotating bar, and when the plunger penetrates between the teeth of the toothed rotating bar one of the actuating members is engaged by a tooth, a connection between each actuating member and a plunger other than the plunger adjacent the actuating member whereby depression of the actuating member by engagement with a tooth causes the depression of a plunger other than the plunger associated with the actuating member, the connection between the actuating member and such plunger comprising two rotatable levers, one adapted to rotate when the actuating member is struck, the other adapted to rotate to engage the associated plunger and a tension connection between said two rotating levers.

4. In combination a plunger carriage, plungers mounted for longitudinal movement therein, yielding means for holding the plunger in a retracted position, means adapted to contact one end of a plunger to displace it longitudinally, against the yielding means and separate means adapted to engage a plunger intermediate its



## 11

ends to move it in the same direction as the first mentioned means.

5. In combination a plunger carriage, plungers mounted for longitudinal movement therein, separate means adjacent the carriage for moving each plunger longitudinally across the carriage, a separate plunger actuating connection on the carriage adapted to engage each plunger intermediate its ends to longitudinally displace it, said separate means adjacent the carriage being adapted selectively to engage a plunger itself or a plunger actuating connection.

6. In a pattern selecting mechanism, a carriage, a plunger mounted for longitudinal movement therein, yielding means tending to retract the plunger to initial position when it has been longitudinally displaced, a finger paired with each plunger carried by the carriage, a rotating toothed bar adjacent the carriage, there being one bar for each finger and plunger, the carriage being movable along the axis of the rotating bar, an operating connection between the finger and a plunger whereby rotation of the toothed bar causing the tooth to engage a finger displaces the second plunger and rotation of the toothed bar causing the tooth to engage the plunger directly displaces the plunger of its pair, the carriage being adapted to move step by step so that the tooth engages first a finger and in the next position the tooth engages a plunger and so on.

7. In a pattern selecting mechanism, a longitudinally movable plunger, guide means loosely containing it, yielding means adapted to hold the plunger in the guide means, maintain it in parallel position yieldingly resist lateral movement and return it to its initial position in the event of lateral movement, means intermediate the ends of the plunger for longitudinally displacing it, a loose connection between said means and the plunger adapted to remain in working relationship with the plunger independent of lateral movement thereof.

8. In a pattern selecting mechanism, a row of longitudinally movable plungers, a plurality of rows of longitudinally movable fingers parallel with the row of plungers, the fingers and plungers being arranged in longitudinally staggered relationship in pairs, there being a finger and a plunger in each pair, a series of rotating toothed bars, one for each finger-plunger pair, means for rotating the toothed bar to selectively depress fingers and plungers, the fingers and plungers being laterally movable in a path perpendicular to the rotating toothed bars whereby in one position when the bar is rotated a tooth engages a plunger and in the next position a tooth when similarly rotated engages a finger.

9. In a pattern selecting mechanism, a plurality of rotatable lever members arranged in two parallel beds, there being a plurality of members in each bed, all members being rotatable about parallel axes, the members in the two beds being located generally one above the other, a connection between each rotating member in one bed and a rotating member in the other, the member at one end of the upper bed being connected to the member at the other end of the lower bed and each successive member spaced inwardly from the end of the upper bed being connected to a member spaced inwardly an equal amount from the other end of the other bed, the central two members of each bed being connected across so that no member is connected to the member immediately below it.

10. In a pattern selecting mechanism, a plural-

## 12

ity of fingers arranged in parallel rows, a plurality of toothed rotating bars spaced along said rows, the fingers being adapted to be bodily moved along a path perpendicular to the rotating bars, means for rotating the rotating bars to cause the teeth thereon to selectively engage the fingers, yielding means for returning each rotating bar to starting position, the bars being longitudinally movable, and yielding means for resisting such longitudinal movement.

11. In a pattern selecting mechanism, a longitudinally movable plunger, guide means therefor, yielding means for retracting the plunger, means adapted to engage one end of the plunger to move it in opposition to the yielding retracting means, separate independent means adapted to engage the plunger intermediate its ends to move it in the same direction, the second means being independent of the first means.

12. In a pattern selecting mechanism, a longitudinally movable plunger, guide means therefor, a rotatable toothed bar, means for rotating it to cause a tooth on the bar to engage and longitudinally displace the plunger, the plunger being mounted for lateral movement in a path parallel to the axis of the rotating bar, clearance between the teeth being such that when the plunger is aligned with a tooth, rotation of the bar displaces the plunger longitudinally, but when the plunger is aligned with the space between the teeth such rotation will not displace the plunger, a finger adjacent the plunger terminating in the same plane as the end of the plunger, a lever carried by the finger, the finger being located adjacent but at one side of the plunger, the space between the finger and the plunger being such that when the plunger is in alignment with a tooth the finger is in alignment with the space between the teeth, and when the finger is in alignment with the tooth the plunger is in alignment with the space between the teeth, a second plunger and a driving connection between the finger carrying lever and said plunger so that rotation of the toothed bar, depressing the finger, longitudinally displaces the second plunger.

13. In a pattern selecting mechanism, a longitudinally movable plunger, guide means therefor, a rotating toothed bar, means for rotating it to cause a tooth on the bar to engage one end of the plunger to displace it longitudinally, the clearance between teeth being such that when the plunger is engaged by a tooth as the bar rotates, the plunger will be depressed, but when the plunger is presented to a space between the teeth the plunger will not be depressed, a lever associated with each plunger having a finger, bar removed from the plunger, terminating in a plane perpendicular to the plunger which plane is also tangent to that end of the plunger engaged by the toothed bar, a second lever having a member adapted to engage another plunger intermediate its ends, an actuating connection between the two levers, the space between the plunger and the finger associated with the plunger being such that when the plunger is beneath a tooth on the bar and the bar is rotated the plunger will be depressed, and when the plunger is presented to a space between the teeth the finger on the lever will be depressed when the bar is rotated to depress a different plunger.

14. In a pattern selecting mechanism, a plunger mounted for longitudinal and transverse movement, a toothed, plunger actuating member, movable toward and from the plunger, and mounted for limited longitudinal movement,



13

yielding means for resisting such longitudinal movement of the actuating member and returning it to starting position.

15. In a pattern selecting mechanism, a row of stop projecting plungers, two rows of fingers parallel with the row of plungers, means interposed between each finger and a plunger distant from the plunger adjacent the finger for causing plunger operation when the finger is depressed, the fingers in each row being related to alternate plungers.

16. In a plunger carriage, a row of stop selecting plungers, a bank of finger levers arranged on each side of said row, a finger associated with each lever, the fingers arranged in rows parallel with the plungers, a bank of plunger levers beneath the finger levers on each side of the plunger carriage, a connection between each plunger lever and a finger lever, a plunger actuating member associated with each plunger lever and a plunger, the fingers and plungers being arranged in adjacent staggered pairs, a finger on one side of the carriage being paired with one plunger, a finger on the other side being paired with the next plunger, each finger lever being connected to a plunger lever distant therefrom.

17. In a character selecting mechanism, a plurality of longitudinally movable tapered character bars, each alternate bar being oppositely tapered, each bar carrying characters thereon arranged to increase in width from the small to the large end whereby the characters on adjacent bars are oppositely arranged in inverse order, a bed in which said bars are loosely mounted without permanent attachment for free longitudinal movement, a pattern bed parallel with the bed of bars, there being a row of pattern pins movable transversely of the pattern bed into and out of alignment with the character bars, there being a row of pins for each character bar, a pin in each row corresponding to each character on the character bar, a plunger carriage mounted for movement in a plane parallel with the pattern bed in a direction perpendicular to the line of movement of the character bars, a single line of plungers in the plunger carriage, each plunger being transversely movable in the carriage toward and from the pattern bed, there being a plunger associated with each stop pin whereby movement of the plunger carriage may present the line of plungers

14

to any selected line of stop pins, means associated with each plunger for actuating it to project it against a stop, means adapted selectively to engage a plunger directly, or engage plunger actuating means to project the plunger into engagement with a stop, to displace such stop to control the selection of only one of two characters on the character bars, one character on each of two adjacent oppositely tapered bars.

18. In combination, a stop bed having a plurality of parallel rows of transversely movable stop pins, a plunger carriage mounted for movement in a plane parallel with the plane of the stop bed, a single line of plungers mounted for transverse movement across the plane of movement of the plunger carriage, there being one plunger associated with each stop in a single line, the movement of the plunger carriage being adapted to present the line of plungers selectively to any line of stops, a selector bed parallel with the stop bed on the side of the plunger carriage opposite to the stop bed, a plurality of movable selecting means mounted in the selector bed, each said means extending across the entire line of movement of the plunger carriage, means adjacent to each plunger so related to the plunger and the selecting means that when the plunger carriage is in line with one line of stops, movement of the selector means will impart transverse movement to the plunger and when the plunger carriage is in line with the adjacent line of stops, movement of the selector means will impart movement to a member associated with the plunger, a connection between such member and a different plunger in the plunger carriage.

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