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APPARATUS FOR TIP GLUING PAPER SHEETS AND THE LIKE

Filed May 18, 1934

3 Sheets-Sheet 1

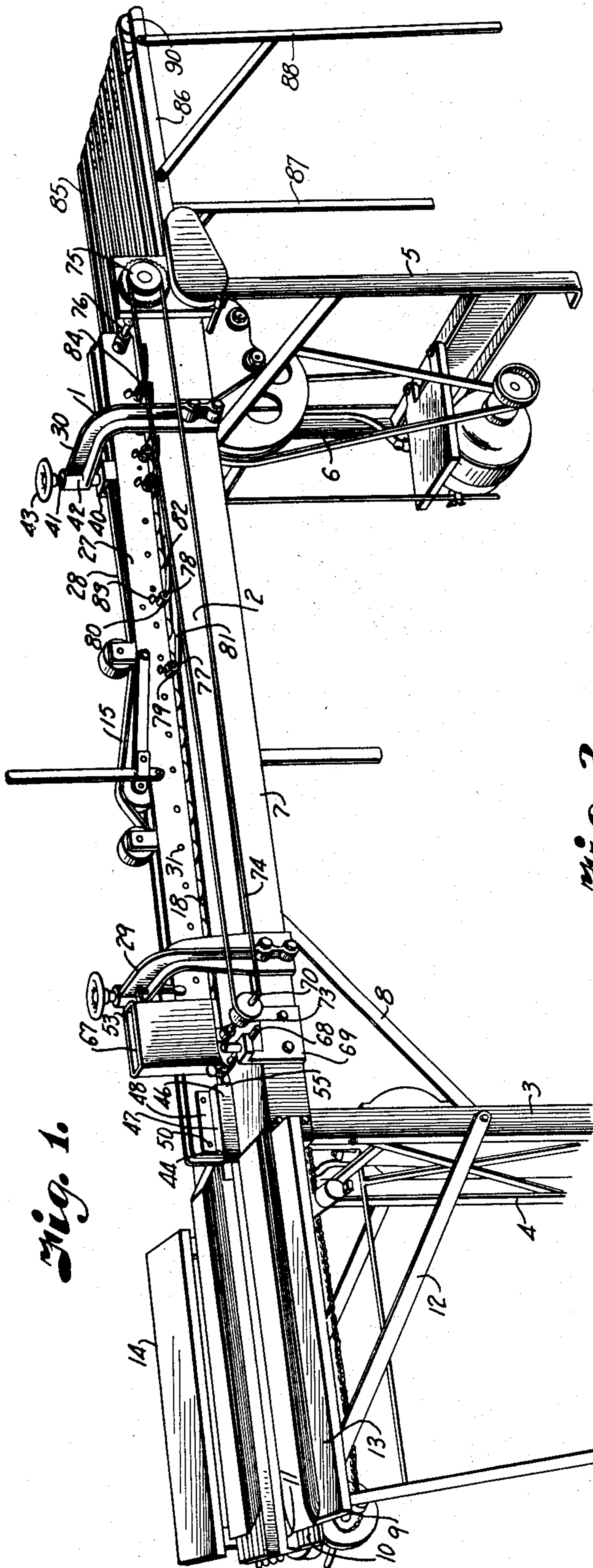
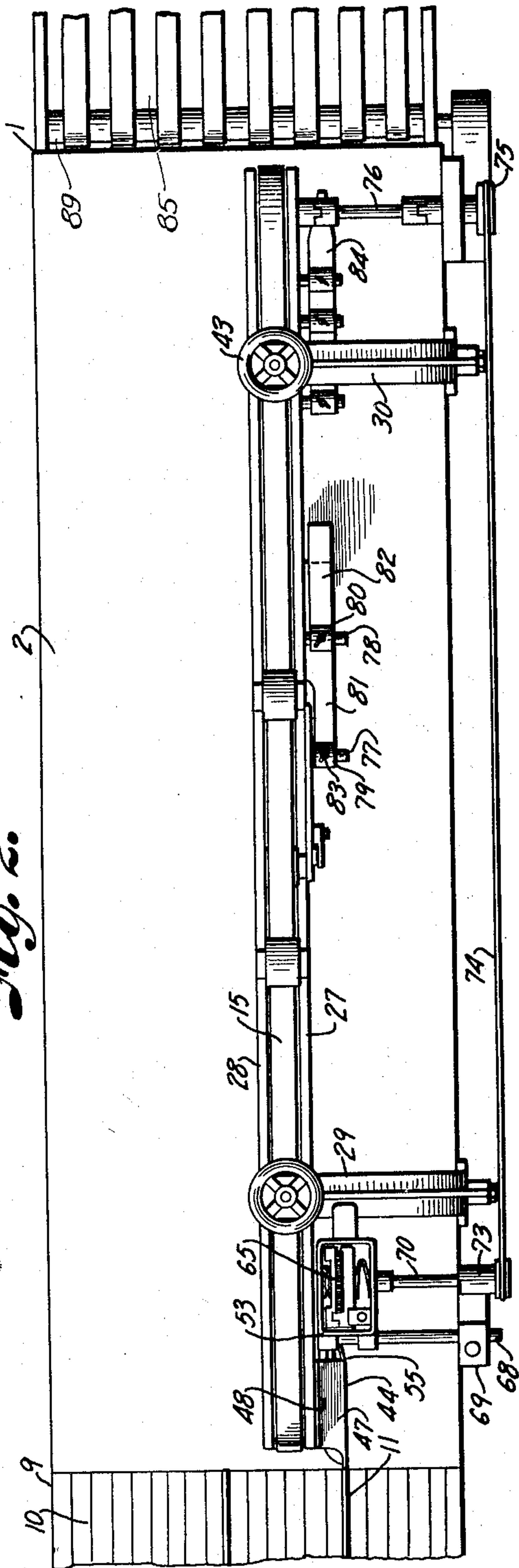


Fig. 1.

Fig. 2.



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Fig. 4.

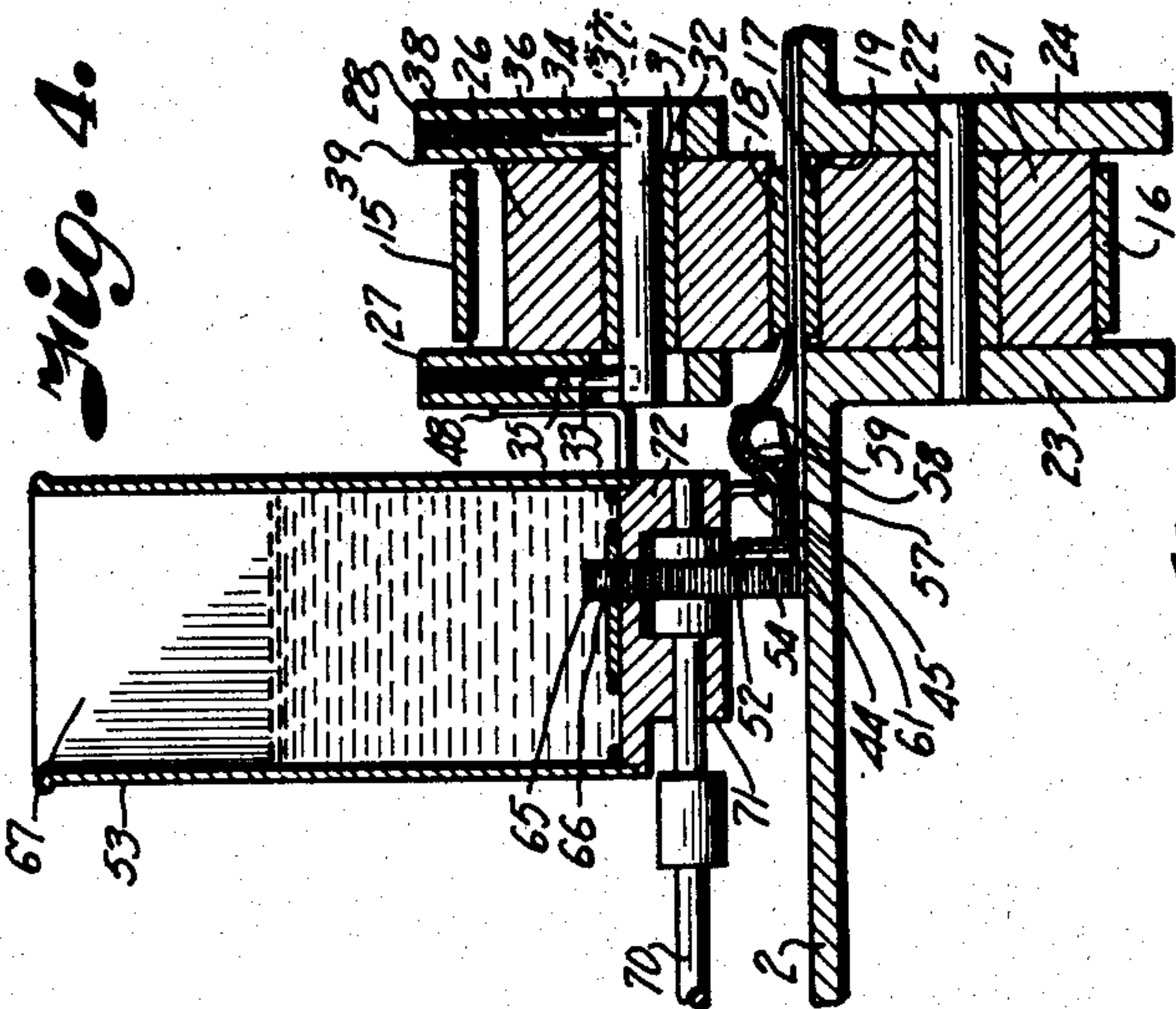


Fig. 6.

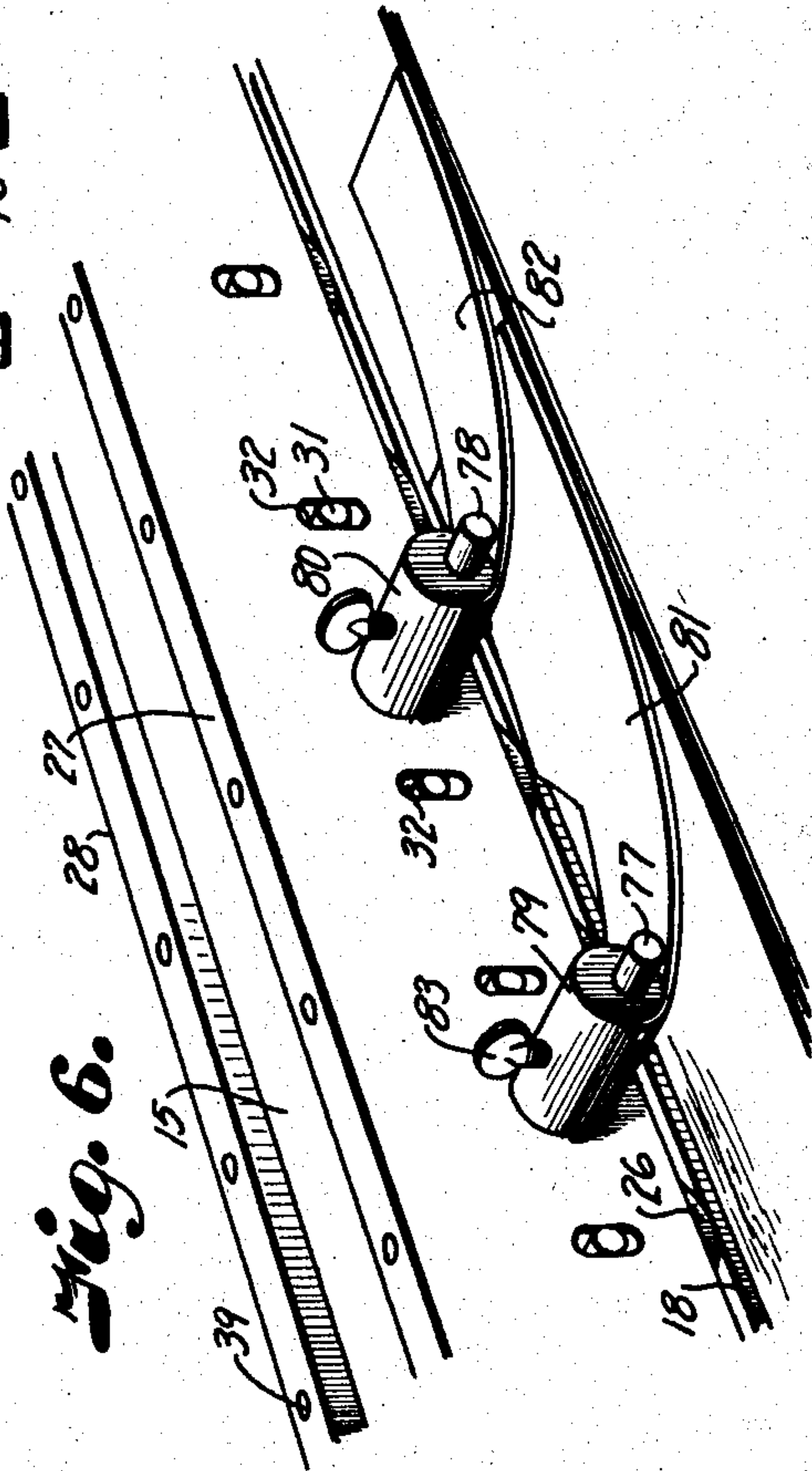


Fig. 3.

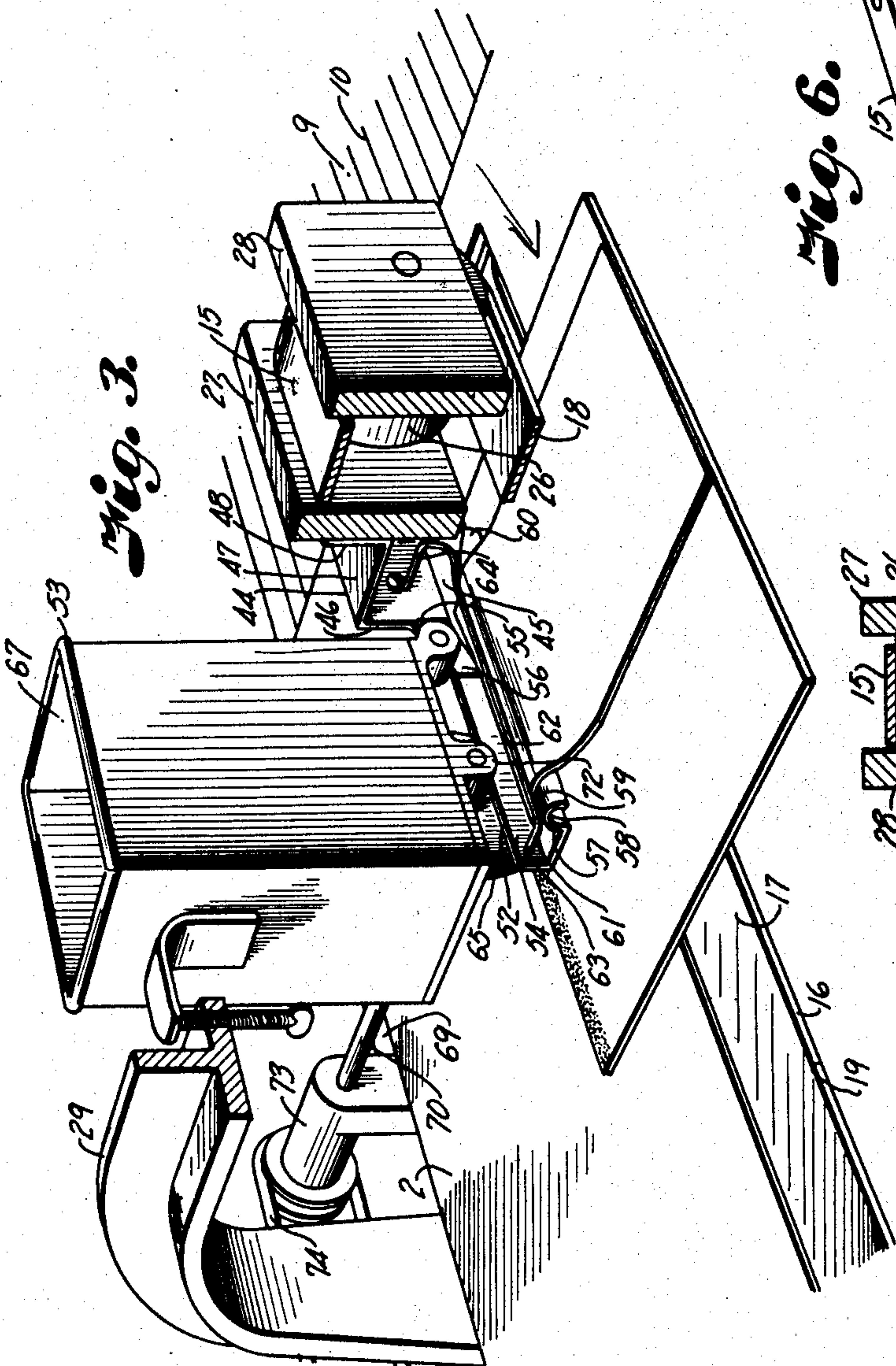
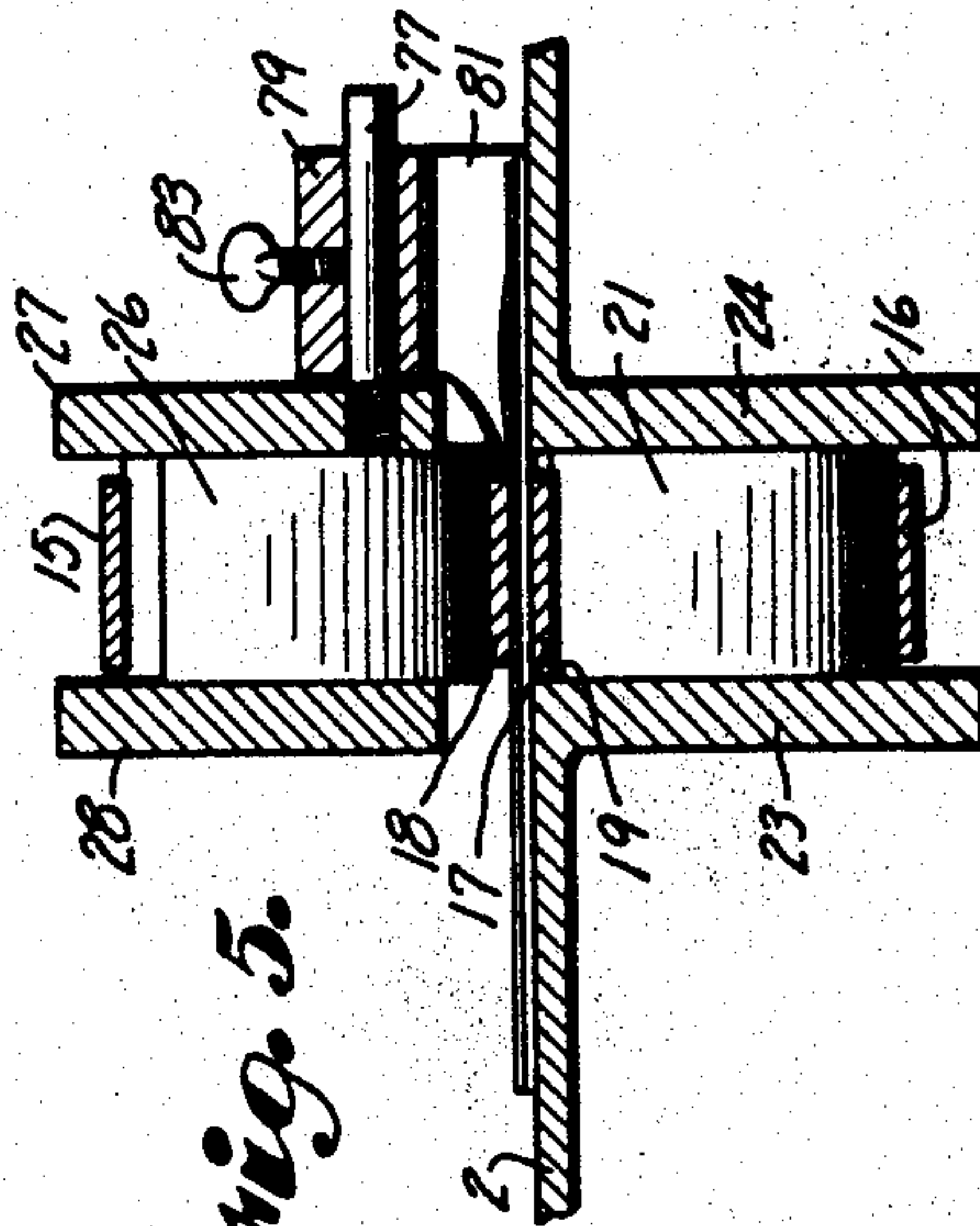


Fig. 5.



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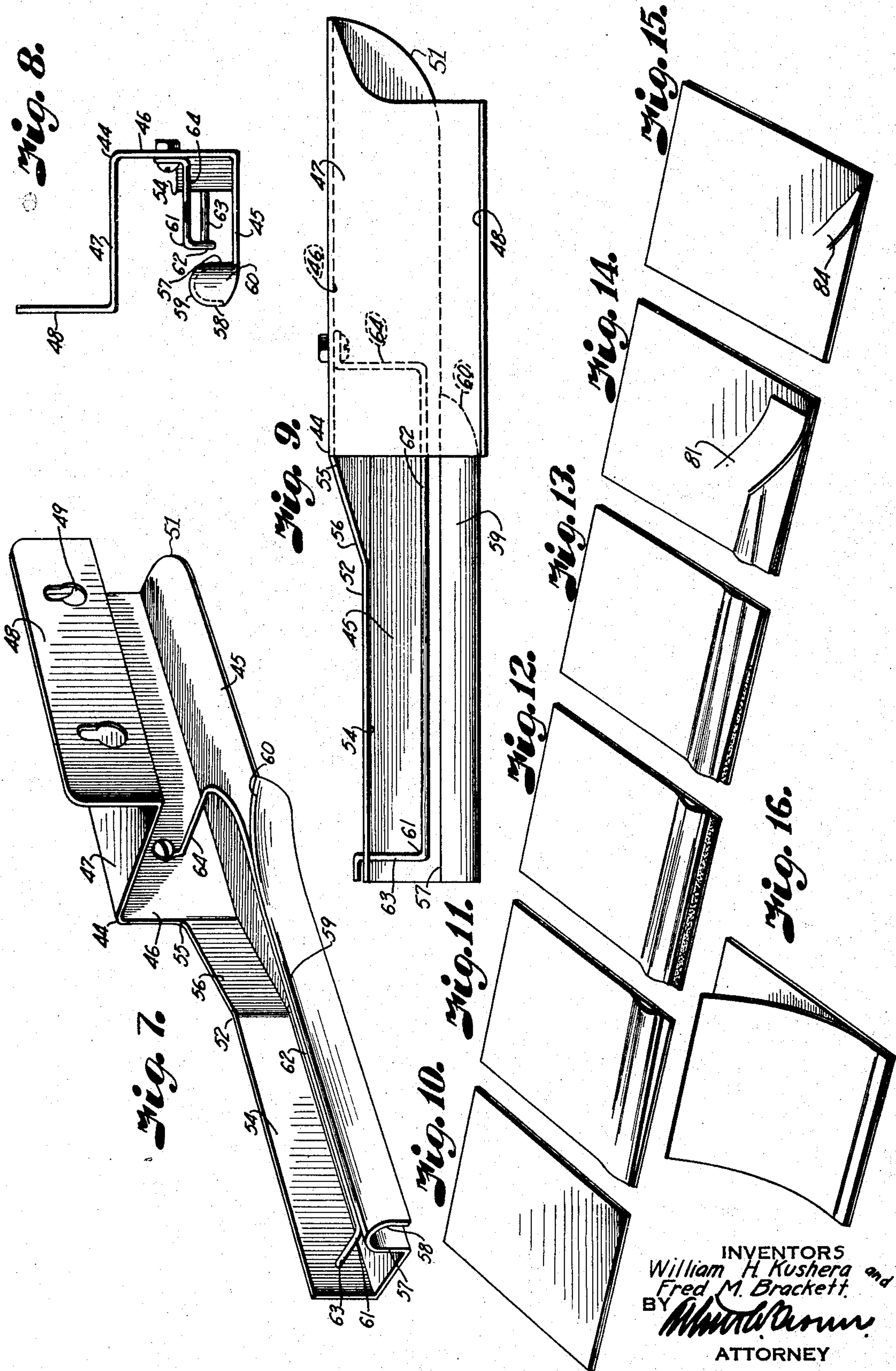
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3 Sheets-Sheet 3



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2,024,932

APPARATUS FOR TIP GLUING PAPER
SHEETS AND THE LIKE

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Application May 18, 1934, Serial No. 726,320

8 Claims. (Cl. 154—42)

This invention relates to a method of and apparatus for tip gluing paper sheets and the like and has for its principal objects to provide a simple continuous method of tipping sheets, to facilitate application of the glue to the sheets being tipped, to prevent mis-alignment of the sheets while the glue is being applied, and to provide for pressing the sheets together while they are retained in their properly aligned position relatively to each other.

In accomplishing these and other objects of the invention, we have provided improved details of structure for carrying out the method illustrated in the accompanying drawings, wherein:

Fig. 1 is a perspective view of a tipping machine embodying the features of the present invention.

Fig. 2 is a plan view of the machine.

Fig. 3 is an enlarged detail perspective view of a portion of the machine, a part of which is in section to better illustrate the construction and relative relation of the glue applying mechanism to the means for lifting the edge of an upper sheet while glue is applied to a lower sheet.

Fig. 4 is a cross sectional view through the apparatus shown in Fig. 3.

Fig. 5 is an enlarged detail cross section through the conveyor belts, particularly illustrating the support for one of the pressing members.

Fig. 6 is a detail perspective view of a pair of pressing members for pressing the edge of one of the sheets into contact with the glue applied to the other sheet.

Fig. 7 is a detail perspective view of the shoe for lifting the edge of the upper sheet, while glue is being applied to the lower sheet.

Fig. 8 is an end view of the shoe.

Fig. 9 is a plan view of the shoe.

Figs. 10 to 16, inclusive, are diagrammatic views illustrating the steps in the operation of tipping a pair of sheets.

Referring more in detail to the drawings:

1 designates a machine for tip gluing adjacent edges of superimposed sheets of paper or like material as in the binding of books, insertion of plates in books, preparation of circulars, and like articles.

The machine 1 includes a table portion 2 that is carried at its ends by pairs of legs 3, 4 and 5, 6 which are braced to longitudinal side flanges 7 of the table by diagonals 8. Carried at one end of the table is a work supporting

shelf 9 including a plurality of slats 10 extending in the longitudinal direction of the table and which are adapted to be interposed relatively to each other for locating a guide strip 11 on one of the slats in alignment with a tipping mechanism carried on the table portion of the machine, later described.

The work supporting shelf is preferably supported in horizontal alignment by braces 12 connecting the shelf with the legs 3 and 4. Carried by the sides of the shelf are work supporting wings 13 and 14 which are adapted to carry stacks of material which are to be run through the machine.

The tipping mechanism includes a feeding head comprising upper and lower conveyor belts 15 and 16 arranged in the same vertical plane and having upper and lower runs 17 and 18 moving in contact with each other whereby the sheets to be tipped are moved through the machine and held in correct relation while the tipping mechanism is operating thereon to secure the sheets together. The lower conveyor belt has its upper run 17 operating in a longitudinal slot 19 extending the length of the table top 2 and is supported with its upper face in the plane thereon on a series of rollers 21 that are mounted on pins 22 having their ends supported in longitudinal flanges 23 and 24 depending from the sides of the slot 19, as best shown in Figs. 4 and 5.

The lower run 18 of the upper belt is retained in yielding contact with the upper run of the lower belt by a series of rollers 26 carried by spaced longitudinal bars 27 and 28 which are suspended over the table by means of goose neck brackets 29 and 30. The intermediate rollers 26 are rotatably mounted on shafts 31 having their ends movably mounted in slots 32 of the longitudinal bars 27 and 28 and are yieldingly urged against the belts by spring pressed plungers 33 and 34 slidably mounted in bores 35 and 36 in the bars and having ends engaging in sockets 37 of the ends of the shafts.

The springs 38 are loosely supported in the bars and have one end engaging the tops of the plunger and their opposite ends engaging plugs 39 that are threaded in the open upper ends of the bores 35 and 36.

The bars 27 and 28 are spaced apart to accommodate the width of the belt and rollers by means of U-shaped brackets 40 in which are rotatably mounted vertically positioned screw threaded shafts 41 that are threadedly supported in the horizontal arms 42 of the brackets

29 and 30 and which carry hand wheels 43 by which the shafts may be rotated to raise and lower the bars for varying the pressure between the belts, as best suited to the thickness of the sheets that are passed through the machine. The forward ends of the conveyor belts extend into close relation to the work supporting shelf so that the sheets to be tipped, when placed in their proper superimposed relation on the shelf, are supported in position to be engaged by the belts. The belts not only serve as means to feed the sheets through the machine, but they also clamp the sheets in position for tipping so that they will not become disarranged when the sheets are acted upon by the tipping mechanism.

Owing to the fact that the sheets are positioned on the shelf, so that the edge of one overlies the place on the other to which it is to be secured, it is necessary to provide means for raising the edges of the upper sheet while glue or other suitable adhesive is applied to the lower sheet. This is accomplished by a shoe 44, the detail construction of which is best illustrated in Figs. 7, 8 and 9. The shoe is preferably formed of flat sheet metal and includes a horizontal flange portion 45 that is supported above the table top a sufficient distance to permit passage of the lower sheet thereunder as it is being advanced by the conveyor belts while the upper sheet is moved over the upper face thereof as later described.

Extending along the outer edge of the flange portion is a vertical portion 46 terminating at its upper edge in a laterally extending wing 47 terminating adjacent the side bar 27 in an attaching flange 48, the attaching flange 48 being provided with key-hole slots 49 to engage headed studs 50 projecting from the side face of the side bar as best shown in Fig. 1.

The end 51 of the flange portion 45 adjacent the work supporting shelf is preferably rounded and is so located that the respective sheets may be inserted under and above the flange prior to engagement of the feeding belts therewith so as to assure that the lower sheet moves under the flange while the upper sheet moves on top of the flange. The opposite end of the flange 45 extends beyond the vertical portion 46 of the shoe and the side thereof adjacent the outer edges of the sheets is cut away as at 52 to accommodate a glue applicator 53 later described, so that the glue applicator can operate directly on the lower sheet which is advanced under the flange 45.

The extending portion of the flange is provided with a vertical guard rail 54 extending along the side of the applicator and having its end connected with the vertical portion 46 of the shoe as at 55 to provide an inclined vertical guide 56 whereby the edge of the upper sheet is guided therealong and prevented from striking against the applicator.

In order to compensate for the projecting edge of the upper sheet which normally would extend beyond the confines of the guard 54, the opposite edge of the flange 45 is flanged upwardly from a point adjacent the end of the vertical portion 46 to the terminal end thereof as at 57 and the upper end of the flange terminates in an outwardly curved and downwardly extending rolled portion 58 to form a rounded ledge 59 over which the edge of the upper sheet is drawn in curved form so that the outer edge of the sheet is retained from engagement with the guard 54. The advance end 60 of the ridge is curved up-

wardly from the plane of the flange 45 so that the edge of the sheet is lifted thereby.

In order to assure that the edge of the sheet is drawn or draped in rounded form over the ledge 59, we provide a retaining guard 61 including a horizontal bar 62 extending in parallel relation with the vertical flange portion 57 and having its ends bent laterally as at 63 and 64 to connect with the vertical flange portions 54 and 46, respectively.

The forward end of the guard is preferably curved upwardly to provide free entrance of the upper sheet thereunder to assist the curved nose 60 of the ledge in guiding the edge of the sheet.

The glue applicator includes a knurled wheel 65 which is adapted to move in rolling contact with the upper face of the lower sheet alongside the vertical flange portion 54 of the shoe and which has its upper periphery operating through a slot 66 in a glue pot 67 wherefrom glue is carried by the wheel and deposited on the edge of the lower sheet, the glue pot being adjustably supported on a rod 68 carried in a bracket 69 fixed to the side rail 7 of the table top.

The wheel 65 is mounted on a shaft 70 having one end rotatably mounted in depending lugs 71 and 72 on the glue pot and its opposite end rotatably mounted in a bearing 73 on the bracket 69, the shaft 70 being positively driven by a pulley fixed on the outer end thereof and which is actuated through a belt 74 operating thereover and over an aligning pulley 75 on the shaft 76 that is connected in driving relation with one of the pulleys of the upper conveyor belt, as shown in Fig. 1.

Projecting laterally from the side bar 27 are horizontally spaced studs 77 and 78 carrying eccentrically mounted hubs 79 and 80 which support flexible pressing plates 81 and 82. The plates 81 and 82 are preferably constructed of flat spring material and have one end located in pressing contact with the work advanced through the machine and their opposite ends fixed to the hub 80 in peripheral contact therewith so that when the hubs are rotated on their respective studs and secured by set screws 83, the pressure of the plates is varied to suit the nature of the work. For example, when the attached ends of the plates are caused to reach about the periphery of the hubs greater tension is established in the plates to provide greater pressure on the work. Similar pressing plates 84 are located at the delivery end of the bar 27.

In order to assure smoothing out of the upper sheet over the glued portion of the lower sheet, the first wiper plate is preferably the width of the portion of the sheets projecting outwardly from the sides of the conveyor belts as shown in Fig. 5.

The following wiper plate 82 is of narrower width to contact only at the outer edges of the sheets or over the portion carrying the glue so that after the upper sheet has been spread flatly over the lower sheet, greater pressure is applied directly over the glue to assure positive adhesion of the upper sheet.

In operating a machine constructed as described, a stack of lower sheets is supported in convenient relation to the operator on the shelf 14 and a stack of upper sheets is placed on the other shelf 13 or on an unused portion of the shelf 9, the guide strip 11 having been positioned relatively to the feeder belts so that when one edge of the sheets are engaged thereby, the

opposite edge will be in tipping relation to the tipping mechanism.

After the machine has been started, a lower sheet is placed upon the shelf with one edge thereof in abutting relation with the guide 11 and the forward edge under the rounded horizontal flange portion 51 of the shoe.

An upper sheet is then placed on the lower sheet with corresponding edges abutting against the guide 11 and its forward edge supported above the rounded flat portion of the shoe. The superimposed sheets are then advanced by hand until they are engaged by the conveyor belts which retain them in aligned position while the sheets are being advanced along the table with the edge of one in underlying relation with the flange portion 45 of the shoe and the other in overlying relation therewith.

When the upper sheet engages and rides over the forward curved nose 60 of the forming ridge an engages under the curved end of the rail 61, it is moved downwardly thereby in rounded overlapping relation with the rail so that the outer edge thereof is shortened sufficiently to permit its ready passage by the vertical guard portion 54 of the shoe.

As the underlying sheet passes the cut away portion of the flange 45, it is exposed to the action of the glue applying roller so that continued advancement of the sheets effects application of a strip of glue along the lower sheet.

When the sheets are driven off the end of the shoe the upper sheet follows into contact with the lower sheet as illustrated in Fig. 12 and the curvature formed therein will gradually settle out until the edge lies in contact with the strip of adhesive. The sheets then are engaged by the first pressing plate which smooths out any of the curvature that may remain in the upper sheet, as shown in Fig. 14. The sheets are then engaged by the second pressing plate which presses the edge of the upper sheet in positive sealing contact with the strip of glue on the lower sheet to complete the tipping operation whereby the upper and lower sheets are securely attached along their upper side edges as shown in Fig. 16.

In order to positively deliver the completed work pieces from the machine, the end of the table opposite the shelf 9 is provided with an off-take conveyor 85 that is supported on a frame 86 carried by the legs 5 and 6 and supplementary legs 87 and 88 respectively, the conveyor 85 preferably includes a plurality of spaced belts operating over rollers 89 and 90 carried at the respective ends of the frame 86.

From the foregoing, it is apparent that we have provided a machine which is of simple construction and which provides for the continuous tipping of superimposed sheets which have been preliminarily positioned in proper relation by the hands of the operator and that the preliminarily positioned sheets when moving through the machine are retained in position by the belts so that the adhesive is applied in the proper place on the lower sheet while the upper sheet is being supported therefrom out of contact with the adhesive applicator and that the sheets are retained in their desired alignment while the edge of the upper sheet is being restored to normal position on the lower sheet and pressed into sealing contact with the adhesive.

What we claim and desire to secure by Letters Patent is:

1. In a machine of the character described, the combination of means for conveying a pair of superimposed sheets with the edge of one sheet in registry with the edge of the other sheet, means for separating the registered edges of the sheets, means for lifting the upper sheet including means for forming a curved ridge adjacent the edge of the sheet to expose an underlying edge of the other sheet, and means for applying glue to said exposed edge for securing said lifted edge when the lifted edge is disengaged from said lifting means.

2. In a machine of the character described, the combination of upper and lower conveyor belts for conveying a pair of sheets, supporting means for the belts, a ledge member having a rounded upper face, means supporting the ledge member on the supporting means for the upper belt in the path of said sheets to roundly drape an edge of one of the sheets over said rounded face to expose an underlying edge of the other sheet, means for applying glue to said exposed edge, and means carried by said upper belt supporting means for pressing said lifted edge into sealing contact with the glue.

3. In a machine of the character described, the combination of means for conveying a pair of sheets, a separating member carried in the path of edges of the sheets and having a cut away portion, a ledge member extending in parallel relation with said cut away portion for lifting the edge of one of the sheets, a guard extending along the cut away portion, means for draping the sheet over said ledge member to prevent engagement of the sheet with the guard, and a glue applicator supported in said cut away portion to apply glue to the other sheet.

4. In a machine of the character described, the combination of means for conveying a pair of sheets, a separating member carried in the path of edges of the sheets and having a cut away portion, a ledge member extending in parallel relation with said cut away portion for lifting the edge of one of the sheets, a guard extending along the cut away portion, means extending along the ledge member for draping the sheet over said ledge member to prevent engagement of the sheet with the guard, a glue applicator supported in said cut away portion to apply glue to the other sheet, and pressing members for smoothing the lifted sheet over the glued portion of the other sheet.

5. In a machine of the character described, a support, a conveyor belt carried by the support, a pair of spaced bars adjustably carried by the support, a second conveyor carried by said bars and cooperating with the first conveyor for conveying a pair of sheets, a separating member carried by one of the bars in the path of edges of the sheets and having a cut away portion, a ledge on said separating member and extending in parallel relation with said cut away portion for lifting the edge of one of the sheets, a guard on the separating member and extending along the cut away portion, means carried by the guard for draping the sheet over said ledge to prevent engagement of the sheet with the guard, and a glue applicator supported in said cut away portion to apply glue to the other sheet.

6. In a machine of the character described, a support, a conveyor belt carried by the support, a pair of spaced bars adjustably carried by the support, a second conveyor carried by said bars and cooperating with the first conveyor for con-

veying a pair of sheets, a separating member carried by one of the bars in the path of edges of the sheets and having a cut away portion, a ledge on said separating member and extending in parallel relation with said cut away portion for lifting the edge of one of the sheets, a guard on the separating member and extending along the cut away portion, means carried by the guard for draping the sheet over said ledge to prevent engagement of the sheet with the guard, a glue applicator supported in said cut away portion to apply glue to the other sheet, and pressing members on said bar for smoothing the lifted sheet over the glued portion of the other sheet.

7. In a machine of the character described, a sheet separating member for engaging edges of superimposed sheets and having a cut away portion, a ledge extending in parallel relation with said cutaway portion for lifting the edge of one of the sheets, a guard extending along the cut away portion, means for draping the

lifted sheet over said ledge to prevent engagement of the sheet with the guard, and a glue applicator supported in said cut away portion to apply glue to the other sheet.

8. In a machine of the character described, a sheet separating member for engaging between the registered edges of superimposed sheets including a plate having a cut-out portion, a guard wall extending along said cut-out portion, a ledge spaced from and extending in parallel relation with said cut-out portion and having a rounded upper face for lifting the edge of the upper sheet, a guide rail extending in parallel relation along said ledge for draping the edge of the sheet over said rounded face and having laterally extending ends fixed to the guard wall to support said guide portion, and a glue applicator supported in said cut-out portion to apply glue to the other sheet.

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