

Jan. 9, 1923.

J. MURRAY.

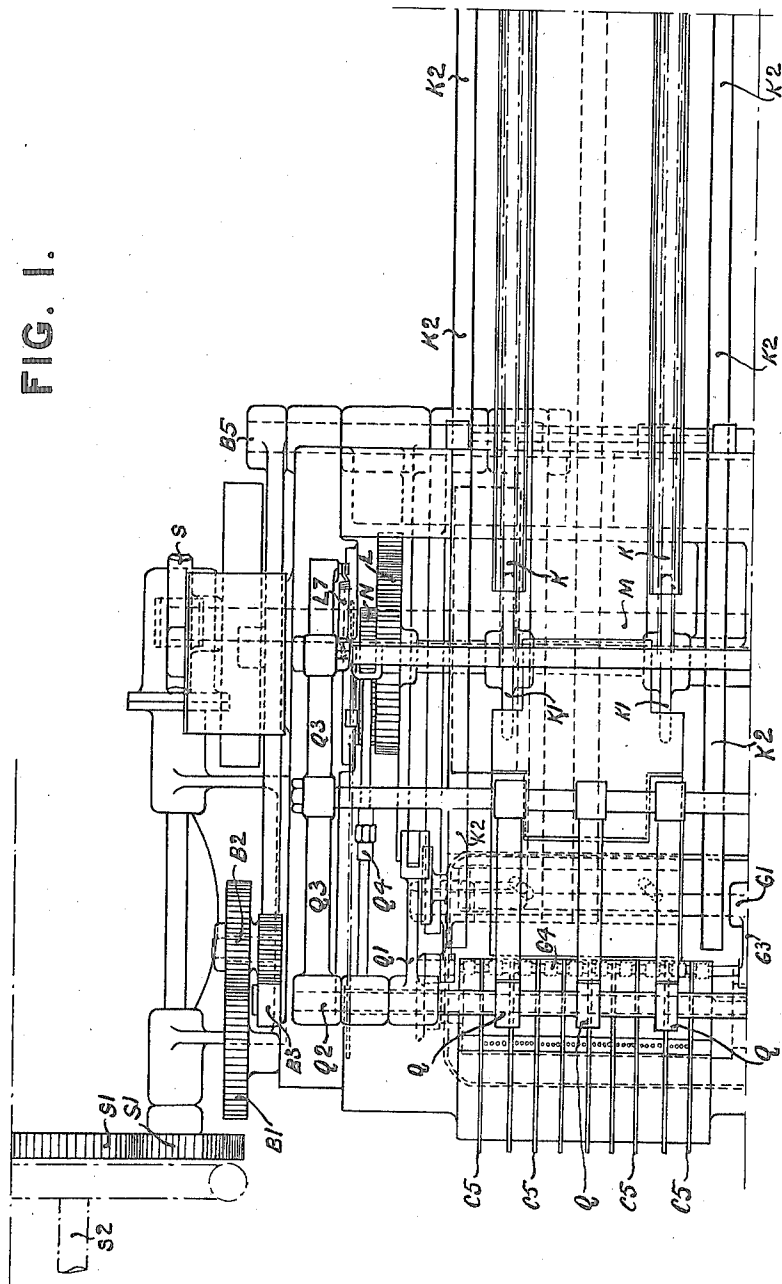
1,441,997.

AUTOMATIC FEEDING MECHANISM FOR BOOK SEWING MACHINES.

FILED DEC. 27, 1920.

7 SHEETS—SHEET 1.

FIG. 1.



INVENTOR

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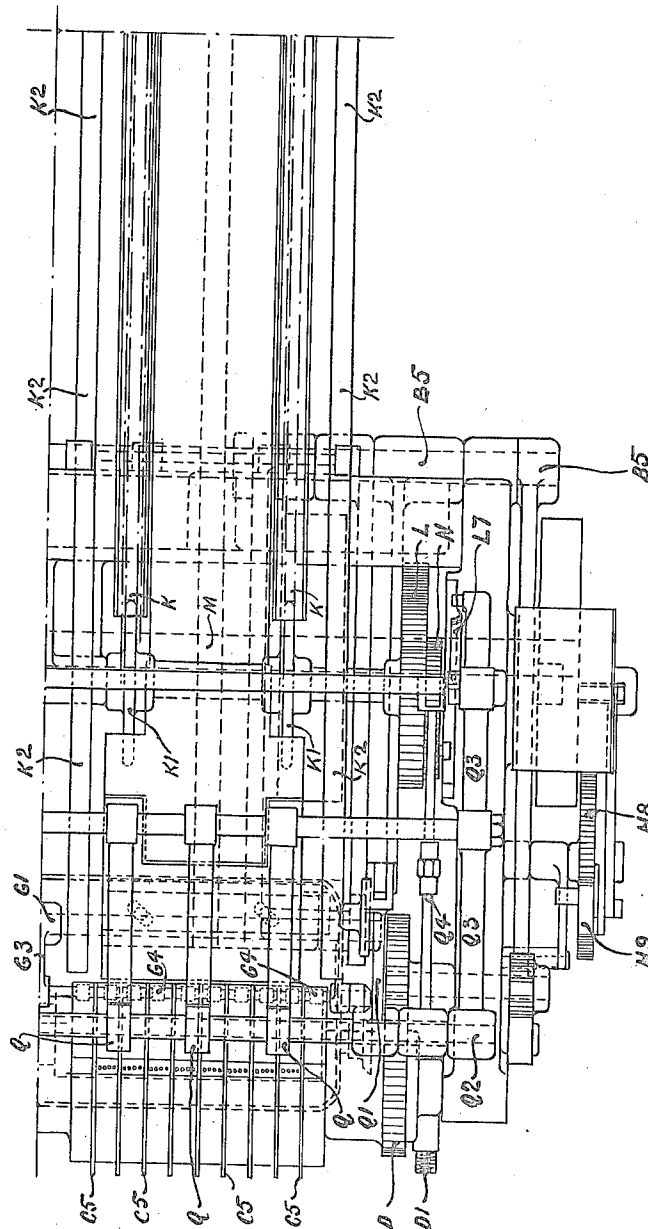
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7 SHEETS—SHEET 2.

FIG. 1A.



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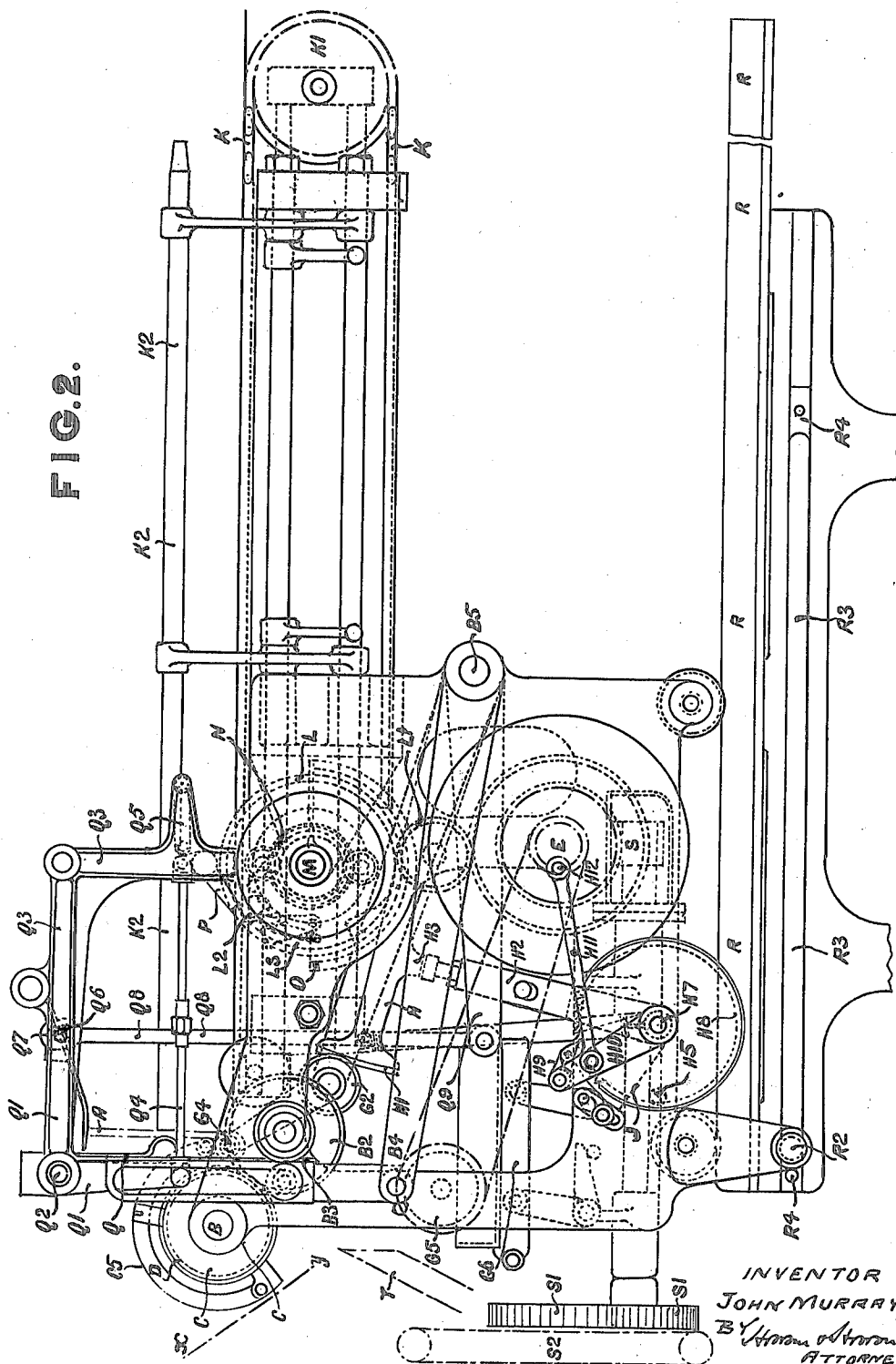
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7 SHEETS—SHEET 3.



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7 SHEETS—SHEET 4.

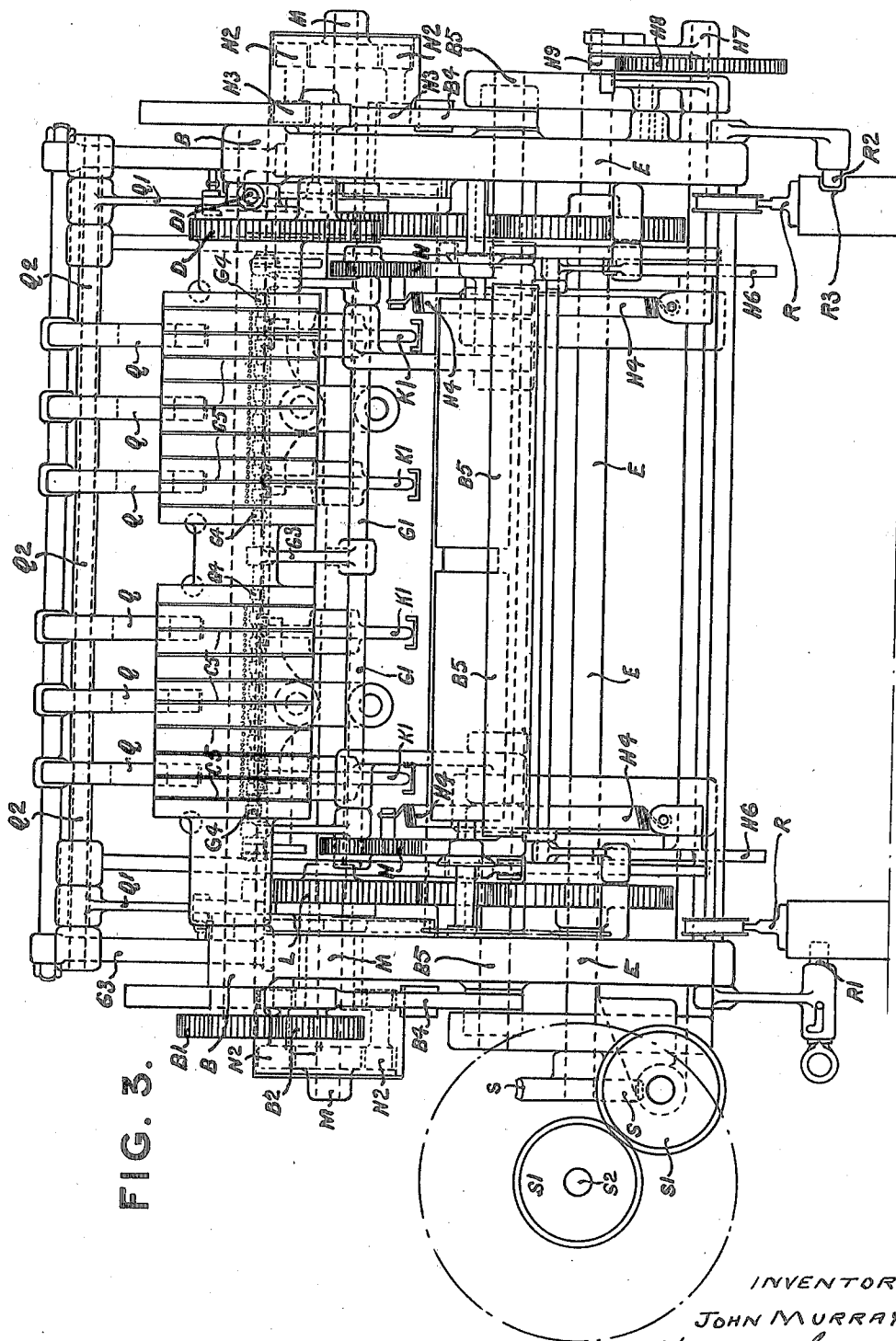


FIG. 3.

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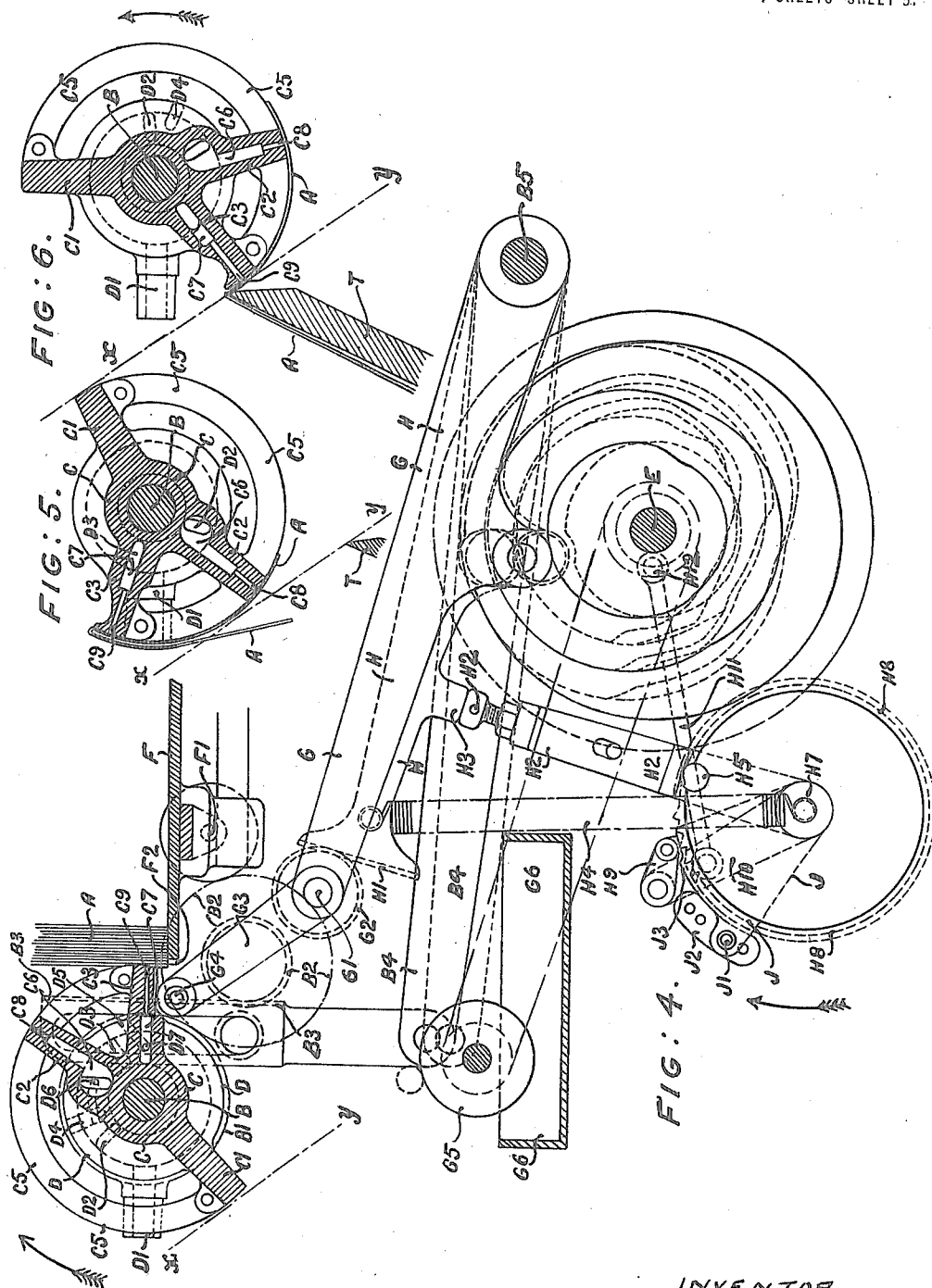
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7 SHEETS—SHEET 5.



Jan. 9, 1923.

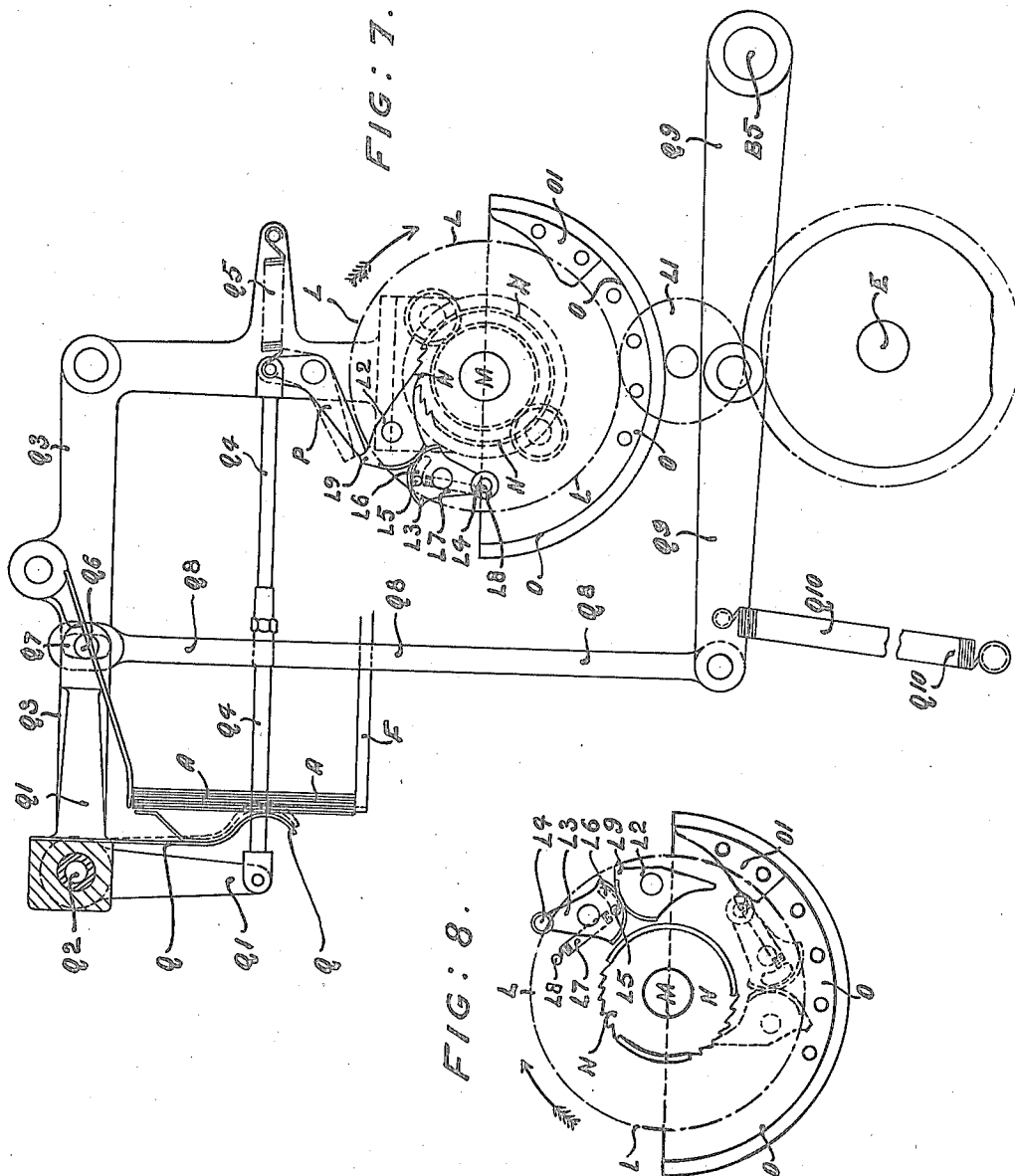
J. MURRAY.

1,441,997

AUTOMATIC FEEDING MECHANISM FOR BOOK SEWING MACHINES.  
FILED DEC 27 1922

FILED DEC. 27, 1920.

7 SHEETS—SHEET 6.



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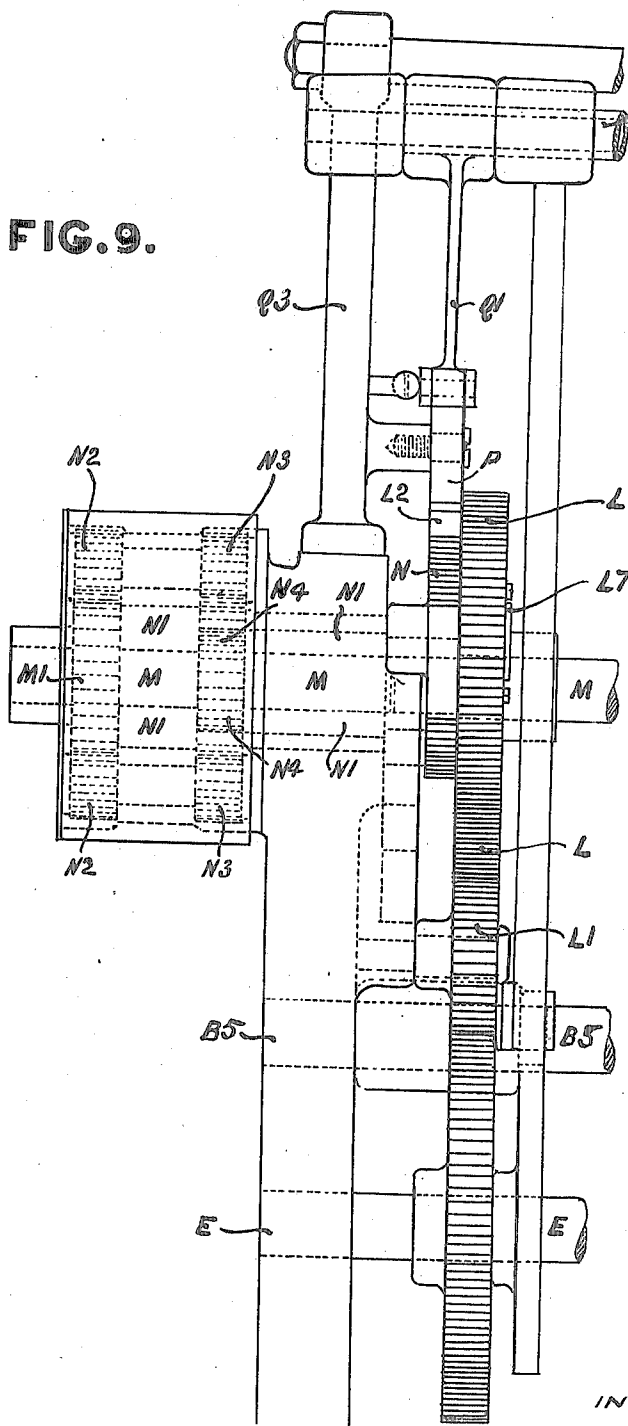
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AUTOMATIC FEEDING MECHANISM FOR BOOK SEWING MACHINES.

FILED DEC. 27, 1920.

7 SHEETS--SHEET 1.

FIG. 9.



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Patented Jan. 9, 1923.

1,441,997

# UNITED STATES PATENT OFFICE.

JOHN MURRAY, OF LONDON, ENGLAND.

AUTOMATIC FEEDING MECHANISM FOR BOOK-SEWING MACHINES.

Application filed December 27, 1920. Serial No. 433,524.

*To all whom it may concern:*

Be it known that I, JOHN MURRAY, a subject of the King of Great Britain and Ireland, and a resident of Hatton Garden, E. C., London, England, have invented certain new and useful Improvements in Automatic Feeding Mechanism for Book-Sewing Machines, of which the following is the specification.

The invention relates to book-sewing machines of the kind for securing together by a series of stitchings across their backs series of assembled signatures to form books; and has for its object to provide mechanism for automatically feeding successive signatures and for presenting them to the sewing device and also for applying adhesive to their back edges.

In the type of sewing machines to which the invention relates, each successive signature is laid over a bar or frame entered at its centre, the two portions hanging down one on either side of the bar. The bar is then moved to the sewing device and the signature is presented back uppermost to the needle.

Hitherto successive signatures have been placed on the presenting bar by hand. According to the invention means are provided for withdrawing them one by one from a supply presented to this device by mechanism hereinafter described, and for positioning them upon the bar ready for presentation to the needle, or to the equivalent mechanism in other types of sewing or equivalent machines. These means consist of a cylinder (or segment thereof) on an axis transverse to the signatures and against which the signature to be removed is held with its back downwards. This cylinder is provided with valve-controlled suction devices of the type common in rotary printing machines for manipulating sheets, which devices are adapted to engage top and bottom edges of the signature. Means are provided for firstly rotating the cylinder so as to withdraw the adjacent signature from the supply and so as to move it beyond the presenting bar which is arranged parallel with the axis of the cylinder and so that at the lowest point of its travel from the needle the bar is adjacent to the cylinder. When the cylinder reached this point its motion is reversed, causing the outer half of the signature to fly outwards and beyond the presenting bar. The re-

verse motion is continued until the signature lies upon the bar, the valves of the suction devices are then closed and the signature is left upon the bar. The cylinder may then continue to rotate reversely to the position to engage another signature, or may complete its rotation in the original direction for the same purpose.

According to the invention adhesive is applied to the back edges of the successive signatures before they are taken by the cylinder by which they are fed to the presenting bar. While by this means much neater work and more perfect adhesion of the signatures to one another is assured than heretofore, it is essential that the outer back edges of the first and last signature of each set should not receive adhesive—else adjacent books will adhere to one another.

The adhesive is applied to the back edge of the signature, immediately before it is seized by the cylinder, by a roller the axis of which is parallel with the axis of the cylinder and which reciprocates between that cylinder and a doctor roller supplying adhesive. The adhesive-applying roller is reciprocated by any convenient mechanism operating in such consonance with the cylinder that it applies the adhesive to the signature immediately before the latter is seized by the cylinder, and in the train of gearing operating this mechanism (and in which there is preferably provided change wheels or equivalents for varying numbers of signatures forming a book) is a trip mechanism or hit-and-miss device operated by a cam or equivalent and adapted to arrest the adhesive roller when the first and last signatures are being handled.

The signatures are presented to the pneumatically-controlled cylinder with their back edges downwards by a device consisting of a conveyor band or the like upon which they are stacked by hand and along which they are fed between register-preserving devices. It is essential that the signatures should not be presented to the cylinder either too loosely or with too great pressure, and means are provided for automatically correcting the rate of feed and so for maintaining correct pressure of presentation.

According to the invention the conveyor is driven through any convenient gearing at a normal speed less than what is actually necessary, but capable of attaining a speed

in excess of normal. Clutch, ratchet, or equivalent mechanism in this gearing is controlled either directly or through a mechanical relay by a spring controlled finger having a portion of small area bearing upon the foremost signature. If the signatures be too loose, then this finger being of small area sinks somewhat into the surface and retains disengaging mechanism out of contact with the clutch, ratchet, or like mechanism. When a certain pressure is attained, however, the finger no longer sinks into the surface of the signature but is moved, and in moving rethrows the disengaging mechanism and reduces the speed at which the conveyors are driven to normal.

An example illustrative of one method of carrying out the invention as applicable in connection with a machine for what is known as "French sewing" (the apparatus being however readily adaptable to other types of sewing or equivalent machines) is shown on seven accompanying sheets of explanatory drawings. Of these Figure 1, Sheet 1, Figure 1<sup>A</sup>, Sheet 2, Figure 2, Sheet 3, and Figure 3, Sheet 4, are general views of the machine as a whole in plan, side elevation and end elevation respectively; Figures 4, 5, and 6, Sheet 5 are side elevations on an enlarged scale showing in detail the suction withdrawing device and gluing apparatus; Figures 7 and 8, Sheet 6, are side elevations on an enlarged scale of the automatic feeding mechanism; and Figure 9, Sheet 7, is an end elevation corresponding to Figure 7, Sheet 6.

In this example the signatures A to be treated are fed forward in two horizontal piles with their backs downward by automatic means hereinafter described. Adjacent to the ends of the piles and mounted on a transverse shaft B is a cylindrical sleeve C provided with radial arms C<sup>1</sup>, C<sup>2</sup>, C<sup>3</sup>, the latter being in duplicate with each set extending in width between the head and tail dimension of each pile of signatures. For the sake of clearness the operation of the mechanism is described with reference to one only of the two piles of signatures. Secured between the arms C<sup>1</sup> and C<sup>3</sup> is a series of arcuate webs C<sup>5</sup> forming a skeleton periphery against which each signature is held on withdrawal from the pile. Longitudinal channels C<sup>6</sup> and C<sup>7</sup> are formed in the arms C<sup>2</sup> and C<sup>3</sup> respectively, and communicating between these channels and the peripheries of the arms is a series of holes C<sup>8</sup>, C<sup>9</sup>. A disc valve D abutting a portion of enlarged diameter at one end of the sleeve C and maintained in air tight contact therewith by springs, controls the admission or air and vacuum to the channels C<sup>6</sup>, C<sup>7</sup>. The vacuum supply is connected to the casing of the valve D by a projecting socket D<sup>1</sup>, and has access to the valve face by ports D<sup>2</sup>, D<sup>3</sup>. The atmosphere is in communication with the face

of the valve by way of ports D<sup>4</sup>, D<sup>5</sup> drilled from the periphery of the valve to meet apertures D<sup>6</sup>, D<sup>7</sup> in the valve face. The shaft B carries a spur wheel B<sup>1</sup> in mesh with a stud wheel B<sup>2</sup> which is in turn engaged by a rack B<sup>3</sup> which transmits a reciprocating motion to the sleeve C and arms C<sup>1</sup>, C<sup>2</sup>, C<sup>3</sup>. The rack B<sup>3</sup> is actuated by a lever B<sup>4</sup> fulcrumed at B<sup>5</sup> and carrying a tappet roller engaged by a cam on the main cam shaft E of the machine. The valve D is reciprocated by similar gearing located at the other end of the machine. The modus operandi of the suction device is as follows:—In the position shown in Figure 4 both suction arms C<sup>2</sup> and C<sup>3</sup> are open to the atmosphere via the ports C<sup>6</sup>, C<sup>8</sup>, D<sup>4</sup>, D<sup>6</sup> and C<sup>7</sup>, C<sup>9</sup>, D<sup>5</sup>, D<sup>7</sup>, respectively. The reciprocating drive for the suction arms and for the control valve is such that a certain amount of lag and lead is provided between the action of the valve and that of the arms at different stages in their motion. Starting from the position shown in Figure 4, the valve first moves relatively to the arms in the direction indicated by the arrow, at the same time cutting off communication between the atmosphere and the arm C<sup>2</sup> and making connection between the latter and the vacuum supply by way of the port D<sup>2</sup>. The signature adjacent to the arm C<sup>3</sup> will now be seized thereby and simultaneously the arms and valve will rotate as a whole withdrawing the signature from the pile. This movement will continue until the arm C<sup>2</sup> makes contact with the pile, that is, until it reaches the position formerly occupied by the arm C<sup>3</sup>, when the valve will rotate relatively to the arms first closing the arm C<sup>2</sup> to atmosphere and then making connection with the vacuum through the port D<sup>2</sup>. The port D<sup>2</sup> is sufficiently long to permit of this relative movement bringing the suction on to the arm C<sup>2</sup> while the vacuum is still maintained on the arm C<sup>3</sup>. The arms and valve will now rotate as a whole without further relative movement until the signature is completely withdrawn and the position shown in Figure 5 is reached. The direction of motion is now reversed and arms and valve rotate backwards, initially as one, but after a short traverse the valve again leads and closes communication firstly between the vacuum and arm C<sup>2</sup> and finally between vacuum and both arms C<sup>2</sup>, C<sup>3</sup>. This relative movement continues until the position shown in Figure 6 is reached, when both arms C<sup>2</sup>, C<sup>3</sup> are again opened to atmosphere and the signature is released. Simultaneously with the release the presenting bar T which conveys the signatures one at a time to the sewing machine and there deposits them, has arrived at the position shown in Figure 6 so that the bar T receives the signature as it is released by the suction arms. The path of the bar T lies approximately along the line

X, Y, (Figures 4, 5 and 6). After the release of the signature the valve and arms continue to rotate without relative movement between them until they assume their initial position, when the same sequence of operations is carried out upon the next succeeding signature in the pile. The signatures as they leave the conveyor device (hereinafter described) are carried on a plate F located in guides and adjustable longitudinally by means of a screw F<sup>1</sup> to vary the opening F<sup>2</sup> through which each signature is withdrawn by the suction arms.

According to this example adhesive is applied to the back edges of the signatures one at a time before removal from the pile by the suction arms. The gluing apparatus comprises levers G and H mounted on the fulcrum B<sup>5</sup> and bearing tappet rollers cam-operated from the main shaft E of the machine. Journalled in the ends of the levers G remote from the fulcrum is a shaft G<sup>1</sup> carrying spur wheels G<sup>2</sup> in mesh with toothed segments H<sup>1</sup> formed in the ends of the levers H. Rigidly fixed on the shaft G<sup>1</sup> are links G<sup>3</sup> the outer ends of which carry a roller G<sup>4</sup> which acts as the glue-applying roll of the mechanism. The latter is adapted to receive its supply of adhesive from a "doctor" roll G<sup>5</sup> dipping into a glue-container G<sup>6</sup> and continuously chain-driven from the cam shaft E. The cams on the shaft E operating the levers G, H, are so designed that the compound motion transmitted to the links G<sup>3</sup> transfers the glue roll G<sup>4</sup> from the position in which it receives its supply from the doctor roll to that in which it applies it to the back edges of the signatures. The function of the levers H in toothed engagement with the shaft G<sup>1</sup> is to effect the actual swing of the links G<sup>3</sup> necessary to bring the glue roll into and out of contact with the signatures and with the doctor roll. The levers G, H, are operated in such consonance with the suction device that adhesive is applied to a signature immediately before the latter is seized by the suction arms. In order to ensure that the glue roll G<sup>4</sup> will rotate when brought into contact with the doctor roll G<sup>5</sup> and become coated over the whole of its periphery, any suitable known means are provided for driving the roll G<sup>4</sup> other than by frictional contact with the roll G<sup>5</sup>.

It is essential that the first and last signatures forming a book should not receive a coating of adhesive, otherwise adjacent books would adhere to one another. It will be seen that the actual advance of the glue roll into contact with the signatures is performed by the downward movement of the levers H after the levers G are at the top of their stroke. In order to prevent the operation of the glue roll while the first and last signatures are being handled, there is provided a trip mechanism adapted to in-

terrupt this downward movement of the levers H when the signatures in question are in the normal "gluing" position. This trip mechanism comprises two stops H<sup>2</sup> located substantially at right angles to the levers H and so supported and guided as to permit of their movement within small limits in a direct line towards or away from projections H<sup>3</sup> formed on the underside of the levers H. Normally the travel of the levers H, which are downwardly constrained by springs H<sup>4</sup> in tension, is in no way interfered with by the stops H<sup>2</sup>, but the latter are adapted to be raised into such a position that they abut the projections H<sup>3</sup> on the levers and prevent the downward movement of the latter necessary to swing the glue roll into contact with the signatures. The means for raising the stops H<sup>2</sup> consists of a roller H<sup>5</sup> carried on a disc H<sup>6</sup> mounted on a shaft H<sup>7</sup> to which is rigidly fixed a ratchet wheel H<sup>8</sup>. The ratchet H<sup>8</sup> is intermittently rotated by means of a pawl H<sup>9</sup> pivoted on the outer end of an arm H<sup>10</sup> loosely mounted on the shaft H<sup>7</sup> and reciprocated by a connecting rod H<sup>11</sup> and crank H<sup>12</sup> from the main cam shaft E. The lower ends of the stops H<sup>2</sup> lie in the circular path of the roller H<sup>5</sup>, and the rate of feed of the ratchet is so arranged that the roller H<sup>5</sup> intercepts the stops H<sup>2</sup> and forces the latter upwards, maintaining them thus during the period in which the levers H would normally descend to bring the glue roll into contact with the signatures in the pile. By way of illustration of the operation of this device, suppose the book being constructed to consist of ten signatures, then with a ratchet wheel having say sixty teeth, the pawl H<sup>9</sup> would take six teeth per revolution of the cam shaft E, the shaft H<sup>7</sup> rotating one tenth of a revolution for each signature withdrawn from the pile. The rate of feed may be adjusted within small limits by means of a mask J loosely mounted on the shaft H<sup>7</sup> and angularly adjustable by a set pin J<sup>1</sup> passing through the mask and entered in a fixed bar J<sup>2</sup> having a number of apertures opposite any of which the mask may be positioned. The effect of advancing the mask J in the direction indicated by the arrow in Figure 4 is to bring the knee J<sup>3</sup> thereon into the path of the pawl H<sup>9</sup> thereby limiting to any desired extent—within the range allowed by the bar J<sup>2</sup>—the actual amount of rotation of the ratchet caused by each stroke of the pawl. A greater variation in the feed to cope with books containing more varying numbers of signatures may be obtained by substituting a ratchet wheel having a greater or fewer number of teeth, or by actuating the crank H<sup>12</sup> through a series of change gears from the cam shaft E.

The signatures to be presented to the suction apparatus are arranged by hand with

their back edges downwards in two parallel horizontal piles upon two sets of conveyor chains K carried on sprockets K<sup>1</sup>. The signatures are fed forward by the chains, and their transverse register is ensured by horizontal guide rails K<sup>2</sup> transversely adjustable to accommodate different sizes of signatures. In the machine illustrated, automatic feeding means are associated with each set of conveyor chains; to avoid confusion therefore the mechanism will be described with reference to one only of the two piles of signatures. The drive for the conveyor chains is obtained from a spur wheel L loosely mounted upon a shaft M and continuously driven through an intermediate toothed wheel L<sup>1</sup> from the cam shaft E. Mounted on the wheel L is a pawl L<sup>2</sup> adapted to be thrown into and out of engagement with a ratchet wheel N automatically in accordance with the amount of feed required. The ratchet wheel N is interconnected with the shaft M carrying the chain sprockets K<sup>1</sup> through an epicyclic train of usual form. The train consists of a sleeved extension N<sup>1</sup> on the ratchet carrying a spider in which are located bearings for the planetary wheels N<sup>2</sup>, N<sup>3</sup>. The wheels N<sup>3</sup> mesh with a stationary pinion N<sup>4</sup>, while the wheels N<sup>2</sup> engage a pinion M<sup>1</sup> fast on the final motion or slow speed shaft M driving the conveyor chains. The pawl L<sup>2</sup> is provided with a toothed arc in mesh with a toothed quadrant L<sup>3</sup> forming a lever centrally fulcrumed on the wheel L and bearing a small roller L<sup>4</sup> at its end remote from the quadrant teeth. The quadrant L<sup>3</sup> is limited in travel by a pin L<sup>5</sup> attached to the quadrant and passing through an arcuate slot L<sup>6</sup> in the wheel L. The quadrant and pawl are maintained stable in both the "on" and the "off" position by a spring L<sup>7</sup> in tension between a fixed point L<sup>8</sup> on the wheel L and one end of the pin L<sup>5</sup>. It will be seen that the spring acts on opposite sides of the fulcrum according as the pawl is in, or out of, engagement with the ratchet. Adjustably secured to a fixed frame O is a ramp O<sup>1</sup> located in the circular path of the roller L<sup>4</sup> when the pawl is out of engagement, but clear of the roller when the ratchet is engaged. Pivoted on the framing is a bell crank lever P one arm of which is located in the path of a projecting finger L<sup>9</sup> on the pawl L<sup>2</sup> when the latter is in engagement with the ratchet, but clear of the finger when the ratchet is disengaged. The wheel L rotating continuously in the direction indicated by the arrow heads in Figures 7 and 8 carries the roller L<sup>4</sup> against the stationary ramp O<sup>1</sup> which throws the feed pawl into engagement with the teeth of the ratchet; this position being shown in Figure 8. The ratchet wheel is then driven forward and with it the conveyor chains until the finger L<sup>9</sup> is intercepted by the lever P and the pawl again thrown out of engagement, causing an interruption in the feed until the ramp is again reached. Thus the conveyor chains are being advanced only while the wheel L is describing that portion of its revolution located between the ramp O<sup>1</sup> and the lever P. The position of the ramp on the frame O is adjustable in a circular arc to vary the duration of engagement of the pawl. The feed transmitted to the conveyor chains by this period of engagement is such that for each revolution of the cam shaft E the chains are advanced through a distance slightly less than the thickness of a single signature. Trip mechanism is introduced to increase the normal feed of the chains automatically in accordance with the requirements called for by the rate at which the suction withdrawing device operates. The trip mechanism comprises means for withdrawing the lever P out of the path of the pawl finger L<sup>9</sup> which then continues to make engagement with the ratchet and consequently drives forward the conveyor chains until such time as the automatic means rethrows the lever P into the position in which it interrupts the feed. The signatures as they are fed forward by the chains on to the plate F are pressed against spring fingers Q the lower portions of which making contact with the foremost signature in the pile, being of comparatively small area. The fingers Q are secured at or near the fulcrum of a bell crank lever Q<sup>1</sup> pivoted on a transverse axis Q<sup>2</sup> in brackets Q<sup>3</sup> in the machine frame. A horizontal connecting rod Q<sup>4</sup> makes operative connection between the depending arm of the lever Q<sup>1</sup> and the vertical arm of the trip lever P. On the opposite side of the lever P from the connecting rod, and colinear with the latter, is a spring Q<sup>5</sup> in tension between the vertical arm of the lever P and a point some distance to the right thereof. To the outer end of the horizontal arm of the bell crank lever Q<sup>1</sup> is secured a pin Q<sup>6</sup> located in a vertical slot Q<sup>7</sup> in the upper end of a vertical rod Q<sup>8</sup> the lower end of which is operatively connected to a cam lever Q<sup>9</sup>. The lever Q<sup>9</sup> is fulcrumed at B<sup>5</sup> and carries a tappet roller engaging a cam on the main cam shaft E, contact between roller and cam being maintained by a spring Q<sup>10</sup> in tension. The mode of operation of the automatic feed control is as follows:—When the suction arms are about to extract the foremost signature in the pile, the lever Q<sup>9</sup> is lowered by its cam and the bell crank lever Q<sup>1</sup> thus operated to remove the pressure regulating fingers Q from contact with the pile. On complete withdrawal of the signature, the fingers Q are again brought into contact with the pile by the succeeding upward movement of the rod Q<sup>8</sup> caused by the continual rotation of the cam. It will be seen that as the movement of the fingers is away from the pile, the

consequent movement of the connecting rod  $Q^4$  is in the same direction and does not remove the trip lever  $P$  from the path of the pawl finger  $L^3$ . As already explained, the normal feed of the chains corresponding to each revolution of the cam shaft  $E$ , that is, to each cycle of the machine, is less than the thickness of each signature. As the latter are withdrawn therefore, the pressure transmitted by the pile to the fingers  $Q$  will gradually diminish until the spring  $Q^5$  acting on the rod  $Q^4$  will be able to pull the fingers  $Q$  into the face of the pile, and the consequent movement of the rod  $Q^4$  will be sufficient to withdraw the trip lever  $P$  from the path of the pawl fingers. The ratchet wheel and consequently the conveyor chains will be driven without interruption until the pressure on the fingers  $Q$  has increased sufficiently to reposition the lever  $P$  in the path of the feed pawl when the feed will again be reduced to normal. In this way the feed is automatically adjusted in accordance with the rate at which the signatures are withdrawn, thus maintaining at all times a correct pressure on the pile and reducing the liability of fouling to a minimum.

The feeding machine as a whole—that is, the pile conveyors, pressure regulating device, suction withdrawing apparatus and gluing group—is mounted on horizontal rails  $R$  along which it is movable to withdraw it from the sewing machine to which it feeds. The feeder is maintained in the correct relative position to the sewing machine by a spring controlled pin  $R^1$  carried from the frame of the feeder and entered in a hole in one of the base members supporting the rails. When the feeder is to be moved, the pin  $R^1$  is withdrawn and the machine moved along the rails, being guided in its motion by a fixed pin  $R^2$  carried from the feeder and located in a horizontal channel  $R^3$  in the base member. The traverse of the feeder along the rails is limited by stops  $R^4$ , one at each end of the channel  $R^3$ . The main cam shaft  $E$  of the feeder is driven by worm gearings and spur wheels  $S^1$  from the operating shaft  $S^2$  of the sewing machine.

What I claim is:—

1. In book-sewing machines of the type referred to in which the signatures forming the book are presented to the sewing device upon a signature support, a signature support, automatic means for withdrawing successive signatures from a pile and for positioning them upon the support, said means comprising, a cylindrical member rotatable on an axis transverse to the pile, and against which the signatures are fed with the backs downwards, valve controlled suction devices in the cylinder adapted to engage top and bottom edges of each signature, and means for reciprocating the suc-

tion cylinder and controlling valve means in such relation thereto, and in such consonance with the movement of the signature support, that a signature is withdrawn from the pile on rotation in one direction, and when the motion is reversed, is deposited upon the signature support, substantially as described.

2. In the book-sewing machine specified in claim 1, a suction withdrawing device comprising a cylindrical member mounted on a transverse axis and provided with radial arms adapted to engage top and bottom edges of the signature adjacent to the device, arcuate webs secured to the arms and forming a skeleton periphery against which each signature is held on withdrawal from the pile, ports in the radial arms communicating with a valve facing at one end of the cylindrical sleeve, a disc valve abutting this facing and controlling admission of air and vacuum to the ports in the arms, and means for reciprocating the sleeve and the valve in the manner and for the purposes set forth.

3. In the book-sewing machine specified in claim 1, means for applying adhesive to the back edge of each signature immediately before withdrawal from the pile, comprising a doctor roll for supplying adhesive, a roller mounted on an axis parallel with that of the suction cylinder and adapted to be reciprocated between the latter and said doctor roll, means for operating the roller in consonance with the suction cylinder, and a trip mechanism adapted to arrest the roller when the first and last signatures of a book are being handled, as and for the purposes set forth.

4. In a book-sewing machine, a cylindrical suction member for transferring signatures to the signature support, an adhesive applying roller, a transverse shaft parallel to the axis of the roller, and links rigid with said transverse shaft for carrying said roller, levers at one end supporting said transverse shaft, and at the other end fulcrumed, a shaft transmitting motion to the suction cylinder, cams thereon operatively connected to said levers at a point intermediate their ends, together with toothed wheels secured to the transverse shaft, levers fulcrumed at one end and terminating at the other end in toothed quadrants engaging said toothed wheels on the transverse shaft, and cam means engaging said levers at points intermediate their ends to impart motion thereto.

5. In a book-sewing machine, a signature support, a cylindrical suction member for transferring signatures to the signature support, an oscillating adhesive applying roller, and trip mechanism for arresting the adhesive applying roller when the first and last signatures of a book are being handled, comprising stop means movable into position

to halt the movement of the adhesive roller into contact with the signatures, and means, variable in accordance with the number of signatures forming a book, for effecting this arresting movement of the stops, as set forth.

6. In a book-sewing machine of the construction specified in claim 5, a stop control device comprising a ratchet wheel intermittently rotated by a pawl operated from the cam shaft of the machine, a roller moving with the ratchet and so positioned that it engages in its travel the ends of the movable stops and advances the latter to arrest the oscillation of the adhesive applying roller when the first and last signatures are about to be withdrawn, and a mask adjustable in position to vary the rate of feed of the pawl in accordance with the number of signatures forming a book, as set forth.

7. In a book-sewing machine, a suction transfer device, means for feeding the signatures to the suction transfer device, comprising a conveyor adapted to advance the signatures back downwards in a horizontal pile towards the suction device, means for ensuring the transverse register of the pile, means for driving the conveyor, and a regulator of small area bearing upon the foremost signature in the pile and adapted to regulate the advance by the conveyor in accordance with the pressure exerted by the pile on the finger, as and for the purposes set forth.

8. In a book-sewing machine, a suction transfer device, means for feeding the signatures to the suction transfer device, comprising a conveyor adapted to advance the signatures back downwards in a horizontal pile towards the suction device, means for ensuring the transverse register of the pile, means for intermittently advancing the conveyor upon the successive withdrawal of signatures, but to an extent less than the thickness of the signature, and means, controlled by the regulator, for rendering the advance of the conveyor temporarily continuous when the pressure on the pile falls below a predetermined value, as set forth.

9. In a book-sewing machine, a suction transfer device, means for feeding the signatures to the suction transfer device, comprising a conveyor adapted to advance the signatures back downwards in a horizontal pile towards the suction device, means for ensuring the transverse register of the pile, means for driving the conveyor, said drive comprising a driving wheel continuously ro-

tated, a ratchet wheel operatively interconnected through reduction gearing with the conveyor, a feed pawl carried by the driving wheel and adapted to be thrown into and out of engagement with the ratchet wheel, a toothed quadrant pivotally mounted on the driving wheel and in mesh with a toothed arc on the feed pawl, a stationary ramp adapted by engagement with the quadrant to throw the pawl into gear with the ratchet, a trip finger adapted by engagement with the feed pawl to throw the latter out of gear with the ratchet, means for stabilizing the pawl in both "engaged" and "disengaged" positions, and means, controlled by the finger, for withdrawing the trip finger from the path of the feed pawl, as and for the purposes set forth.

10. In the combination forming the subject-matter of claim 9 hereof, a depending lever mounted on a transverse axis and carrying the regulating finger bearing on the pile, a connecting rod between the lower end of the depending lever and one arm of a bell crank lever, mounted on a fixed fulcrum and having its other arm normally located in the path of the feed pawl, and a spring in tension between the end of the connecting rod attached to the bell-crank lever and a fixed point in line with the rod but on the opposite side of the lever, as and for the purposes set forth.

11. In a book-sewing machine, a suction transfer device, means for feeding the signatures to the suction transfer device, comprising a conveyor adapted to advance the signatures back downwards in a horizontal pile towards the suction device, means for ensuring the transverse register of the pile, means for intermittently advancing the conveyor upon the successive withdrawal of signatures, but to an extent less than the thickness of the signature, a regulator device, and means, controlled by the regulator device, for rendering the advance of the conveyor temporarily continuous when the pressure on the pile falls below a predetermined value, together with means for releasing the pressure of the regulator device on the pile when the foremost signature therein is about to be withdrawn, said means comprising an arm carried by the regulator device, and a cam operated lever operably connected thereto through a lost motion connection.

In testimony whereof I have signed my name to this specification.

JOHN MURRAY.