No. 774,726. PATENTED NOV. 8, 1904.

W. I. LEWIS.

MACHINE FOR APPLYING FLY LEAVES OR THE LIKE TO SIGNATURES OF BOOKS.

NO MODEL. APPLICATION FILED MAY 3, 1902. 6 SHEETS—SHEET 1.

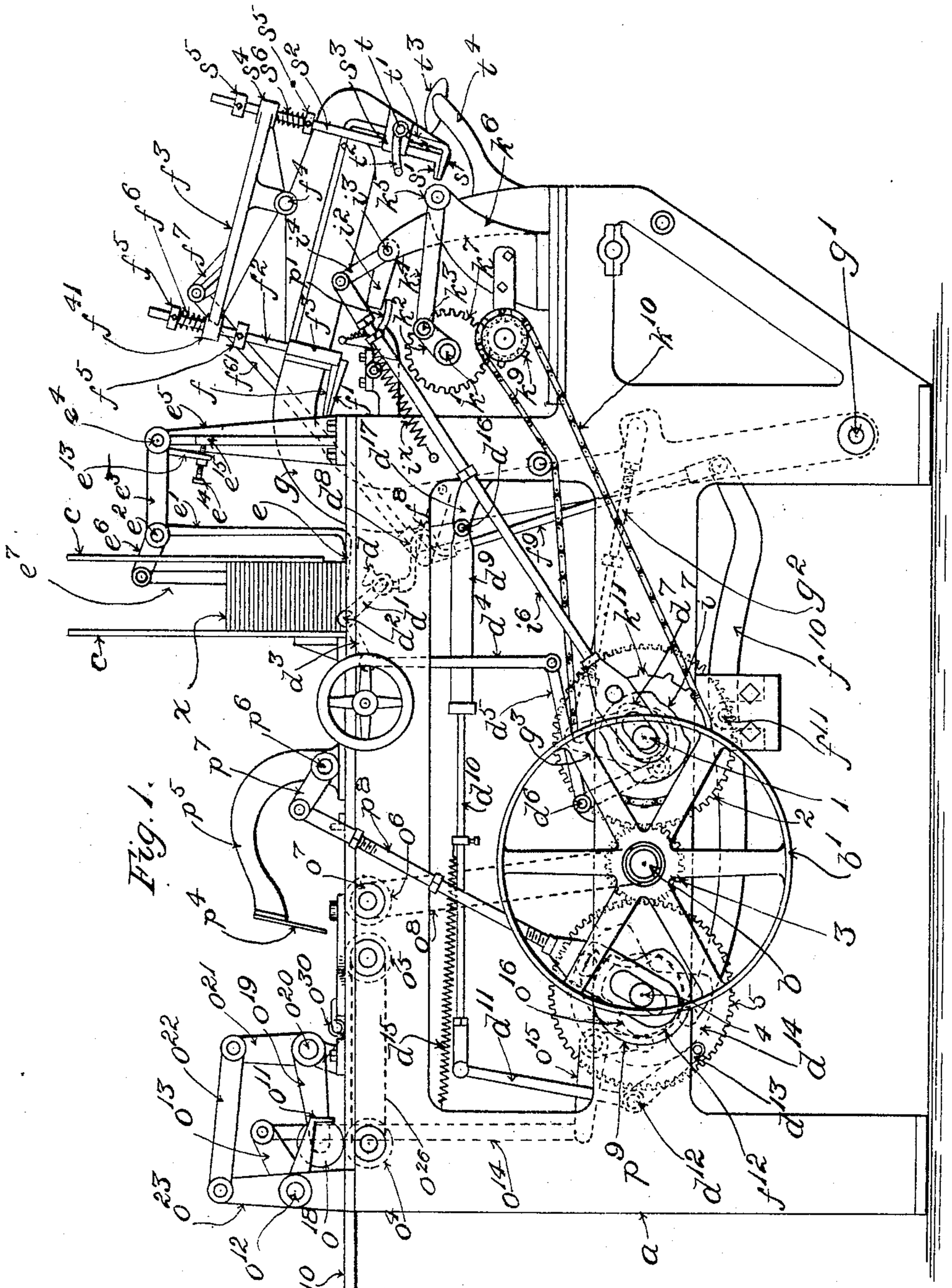

Fig. 1.

Witnesses:
Oscar F. Hill
Arthur F. Randall

Inventor:
Willard I. Lewis
by MacLeod Calver & Randall
Attorneys.

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NO MODEL. 6 SHEETS—SHEET 2.

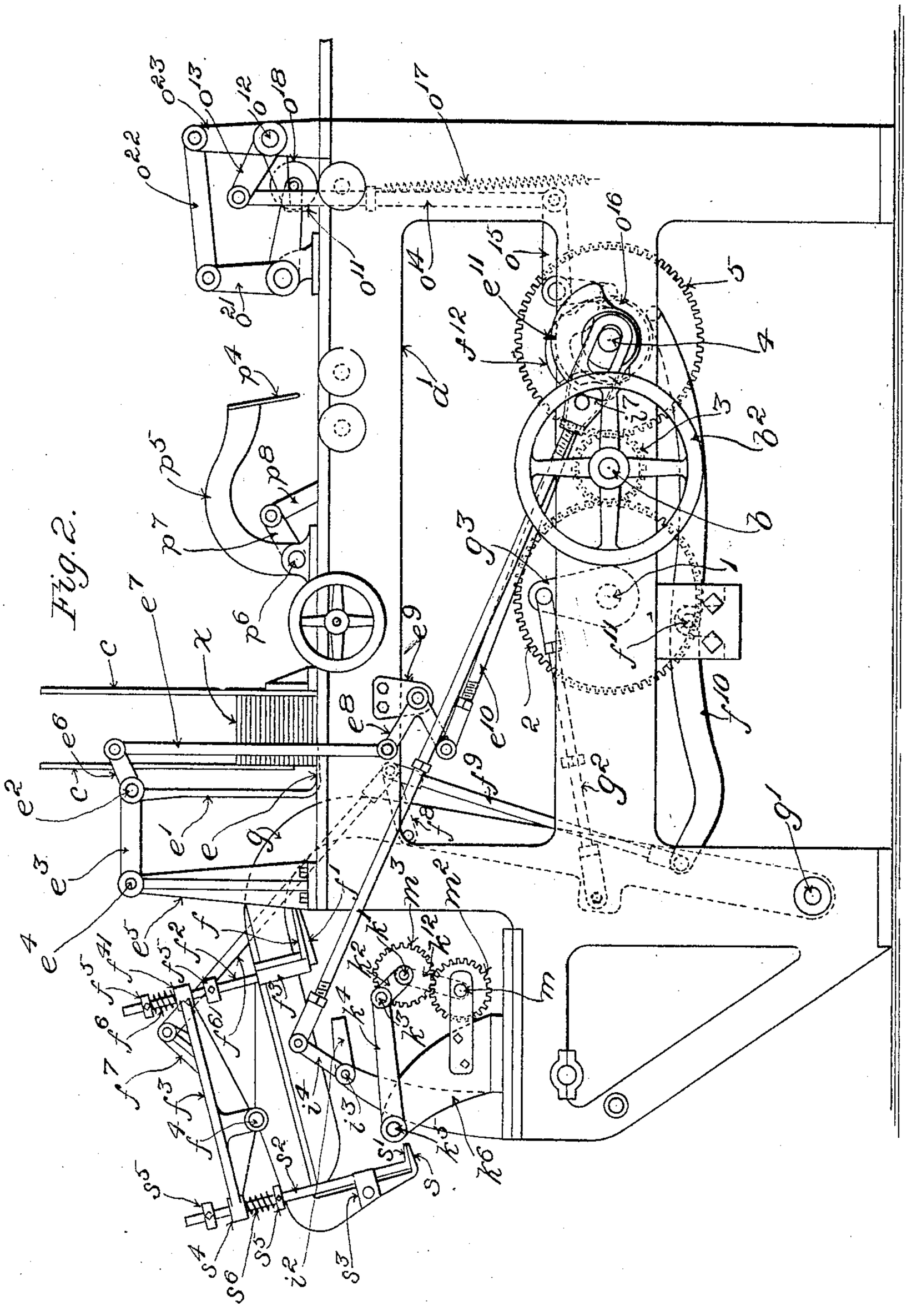

Fig. 2.

Witnesses:
Oscar F. Hill
Arthur F. Randall

Inventor:
Willard I. Lewis
by Macleod Calver & Randall
Attorneys.

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NO MODEL. 6 SHEETS—SHEET 3.

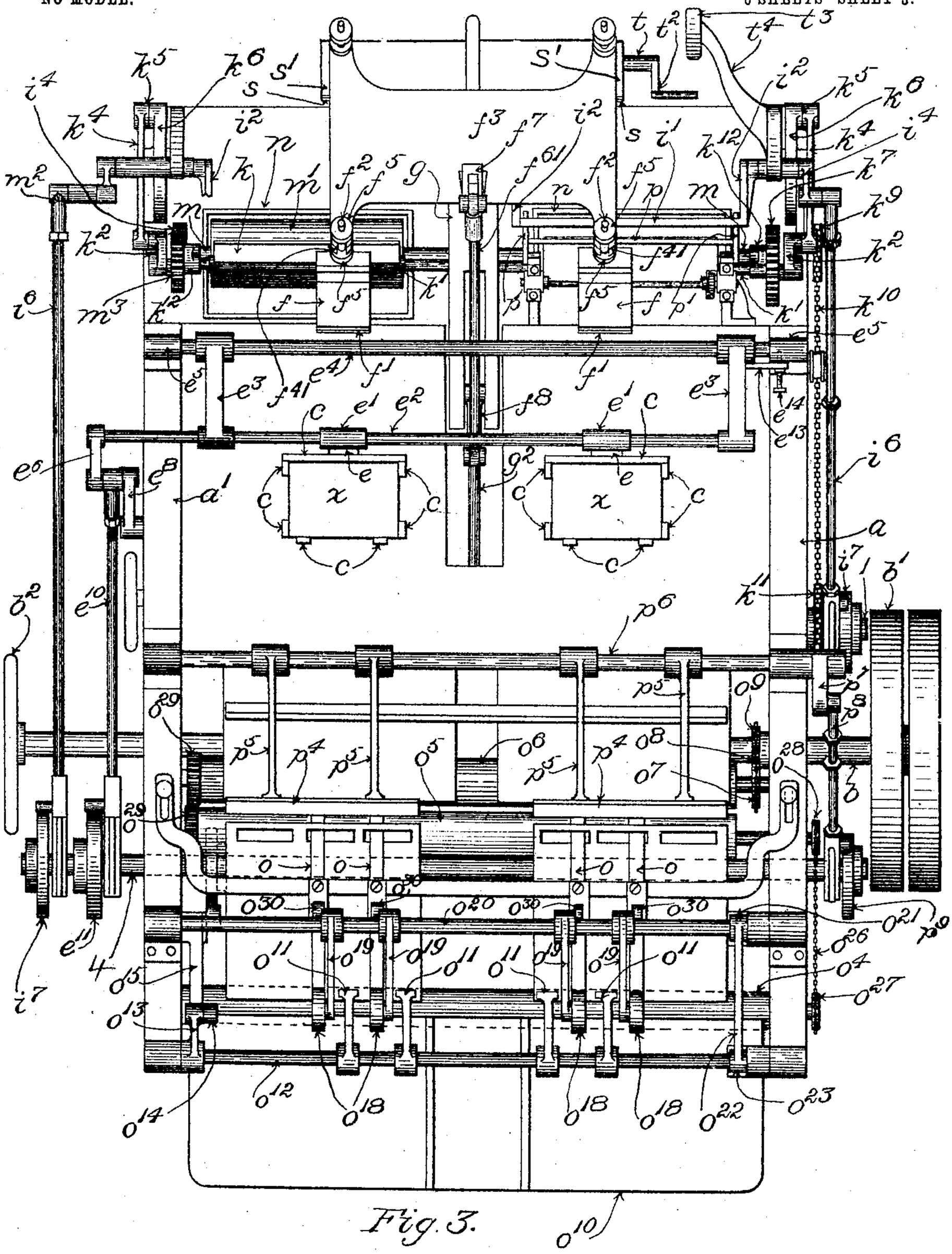

Fig. 3.

Witnesses:
Oscar F. Hill
Arthur J. Randall

Inventor:
Willard I. Lewis
by Macleod Calver & Randall
Attorneys.

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NO MODEL. 6 SHEETS—SHEET 4.

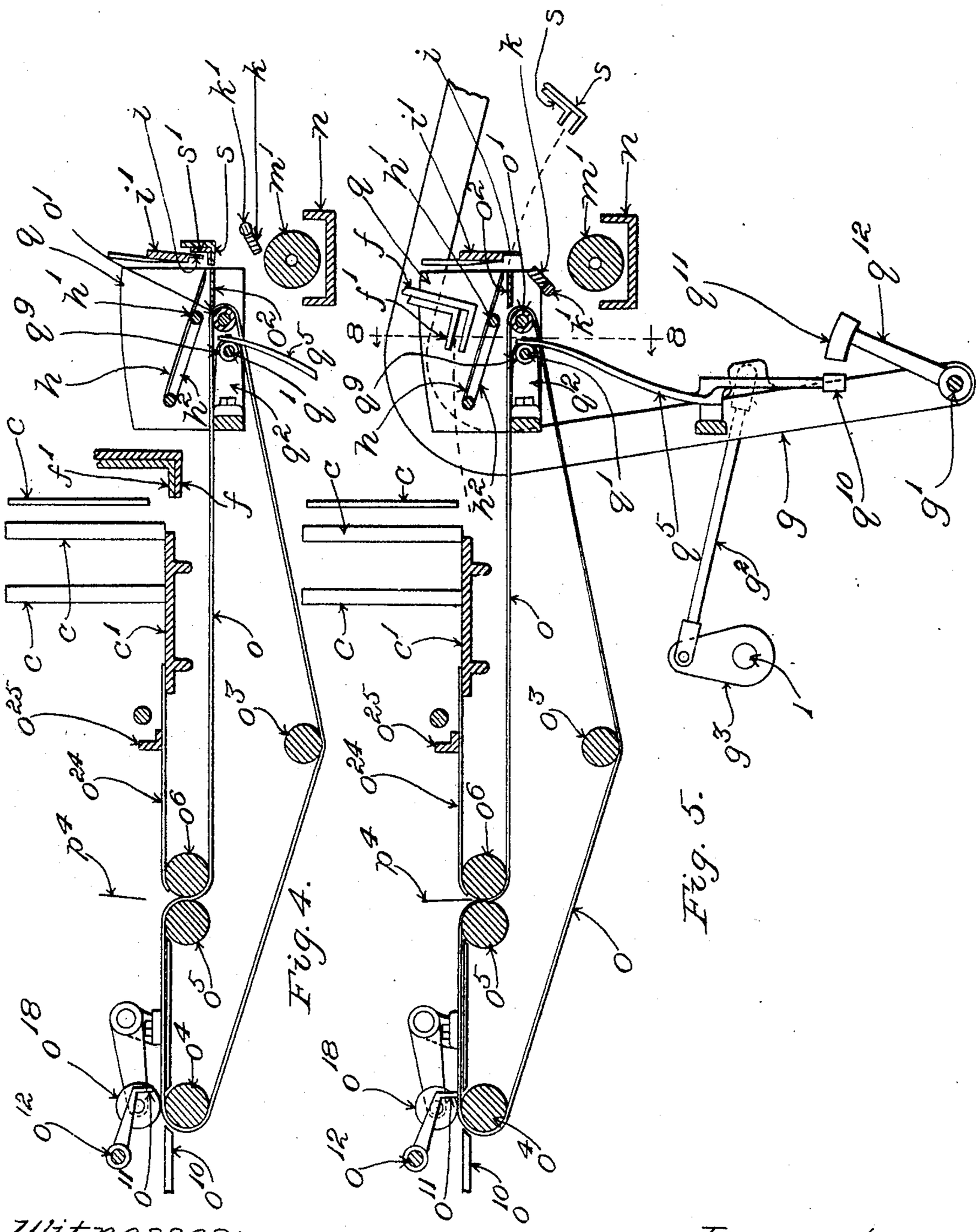

Fig. 4.

Fig. 5.

Witnesses:
Oscar F. Hill
Edith J. Anderson.

Inventor:
Holland I. Lewis
by Macleod Calver & Randall
Attorneys.

No. 774,726. PATENTED NOV. 8, 1904.

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NO MODEL. APPLICATION FILED MAY 3, 1902.

6 SHEETS—SHEET 5.

Fig. 6a

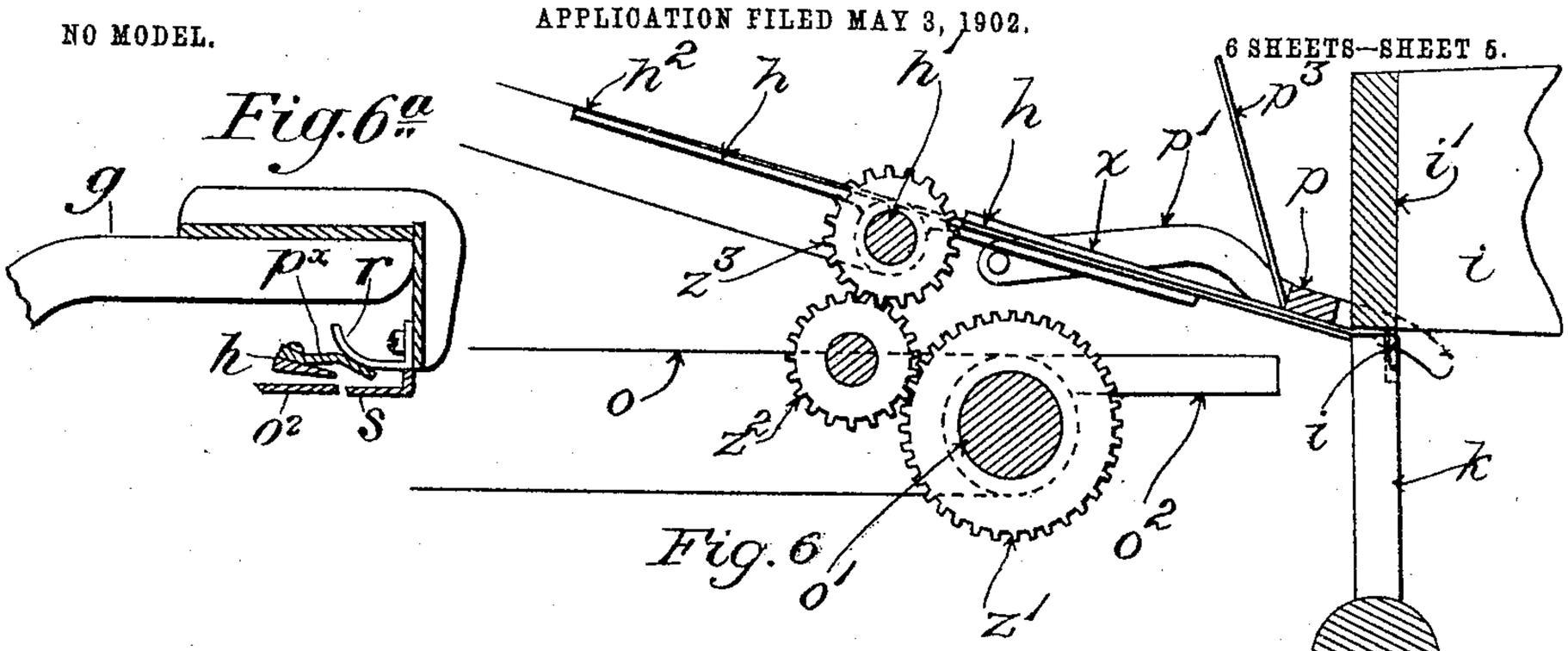

Fig. 6

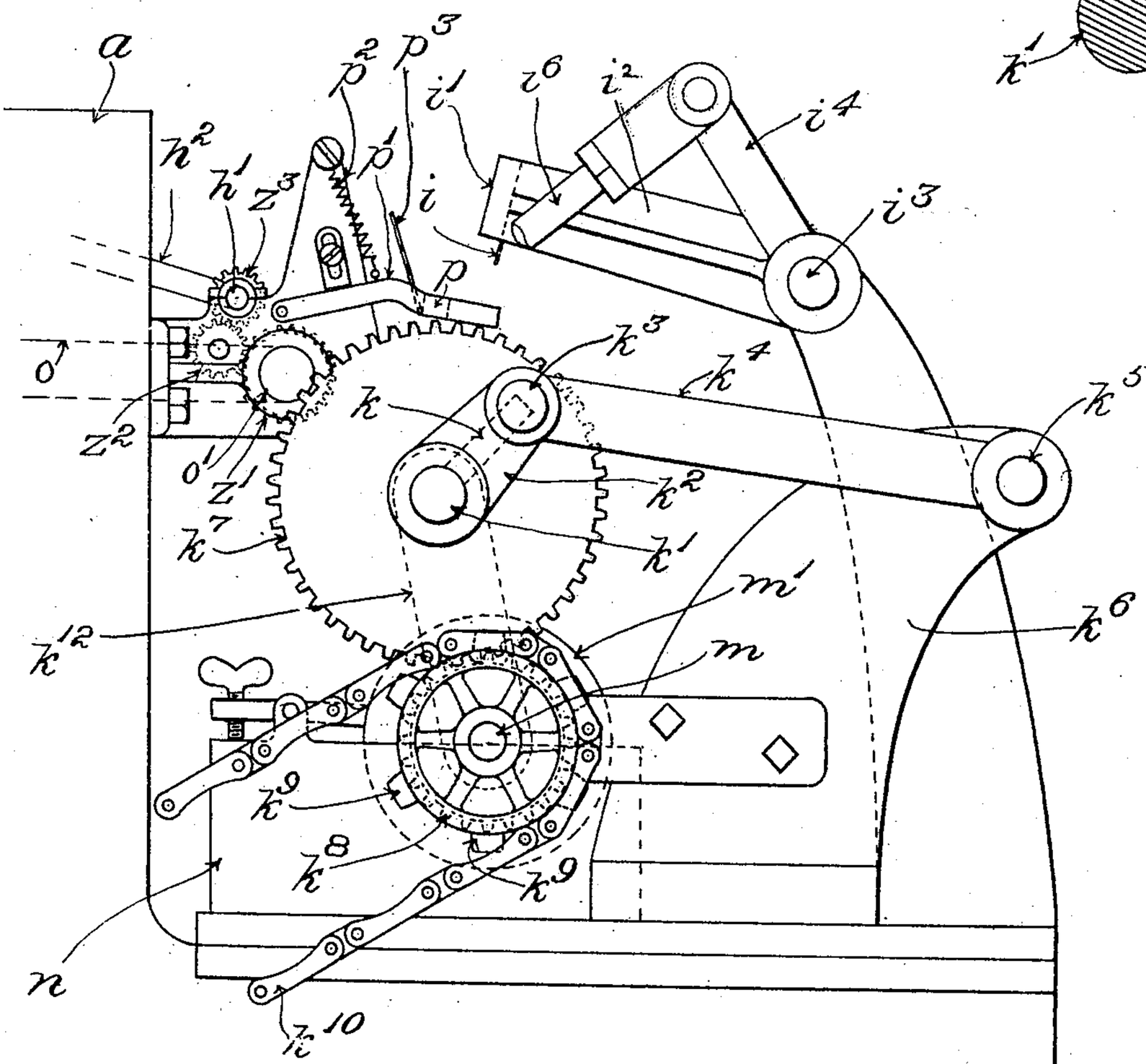

Fig. 7.

Witnesses:
Oscar F. Hill
Arthur J. Randall

Inventor:
Willard I. Lewis
By Macleod Baker & Randall
Attorneys.

No. 774,726. PATENTED NOV. 8, 1904.

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APPLICATION FILED MAY 3, 1902.

NO MODEL. 6 SHEETS—SHEET 6.

Fig. 9.

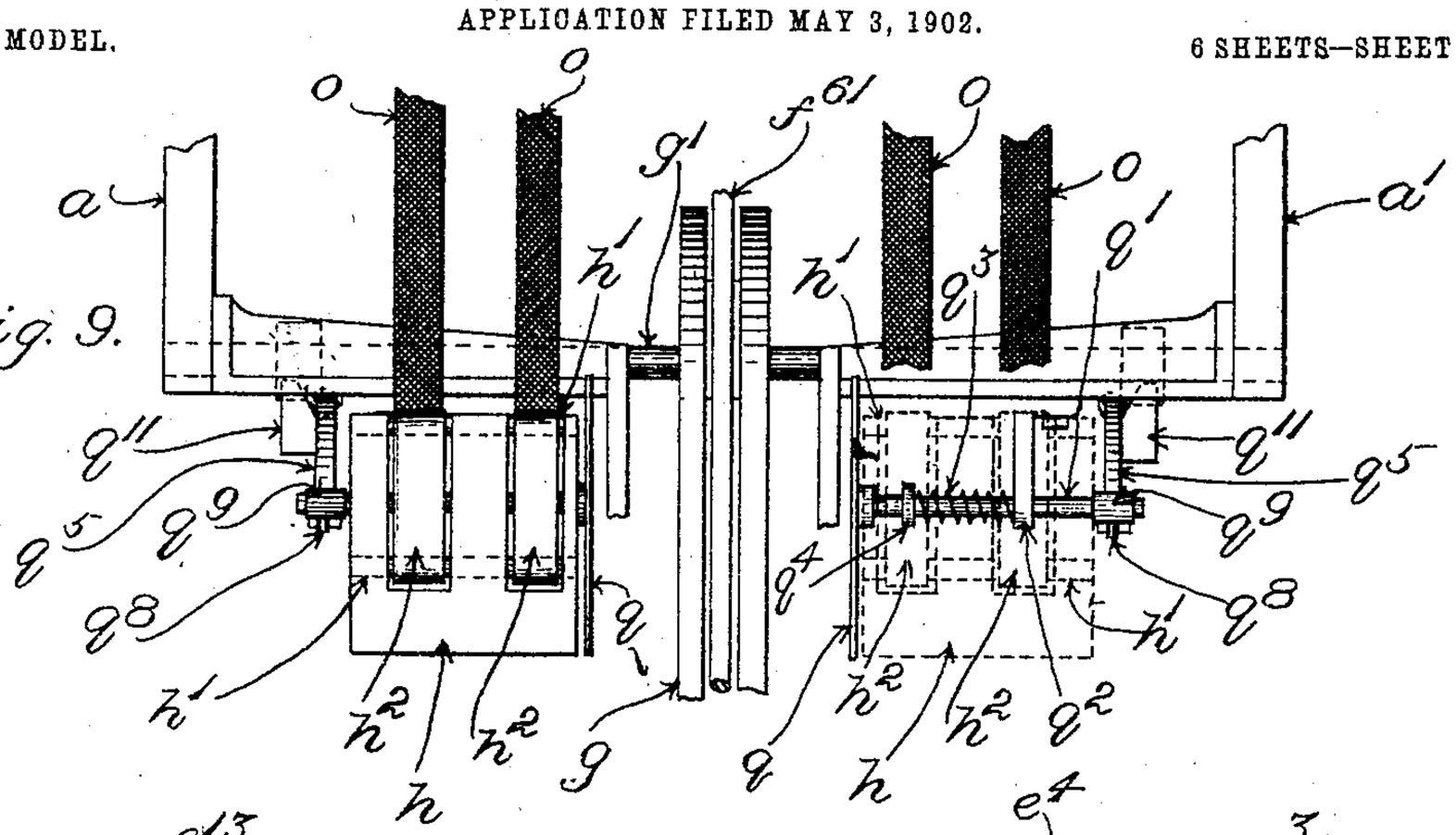
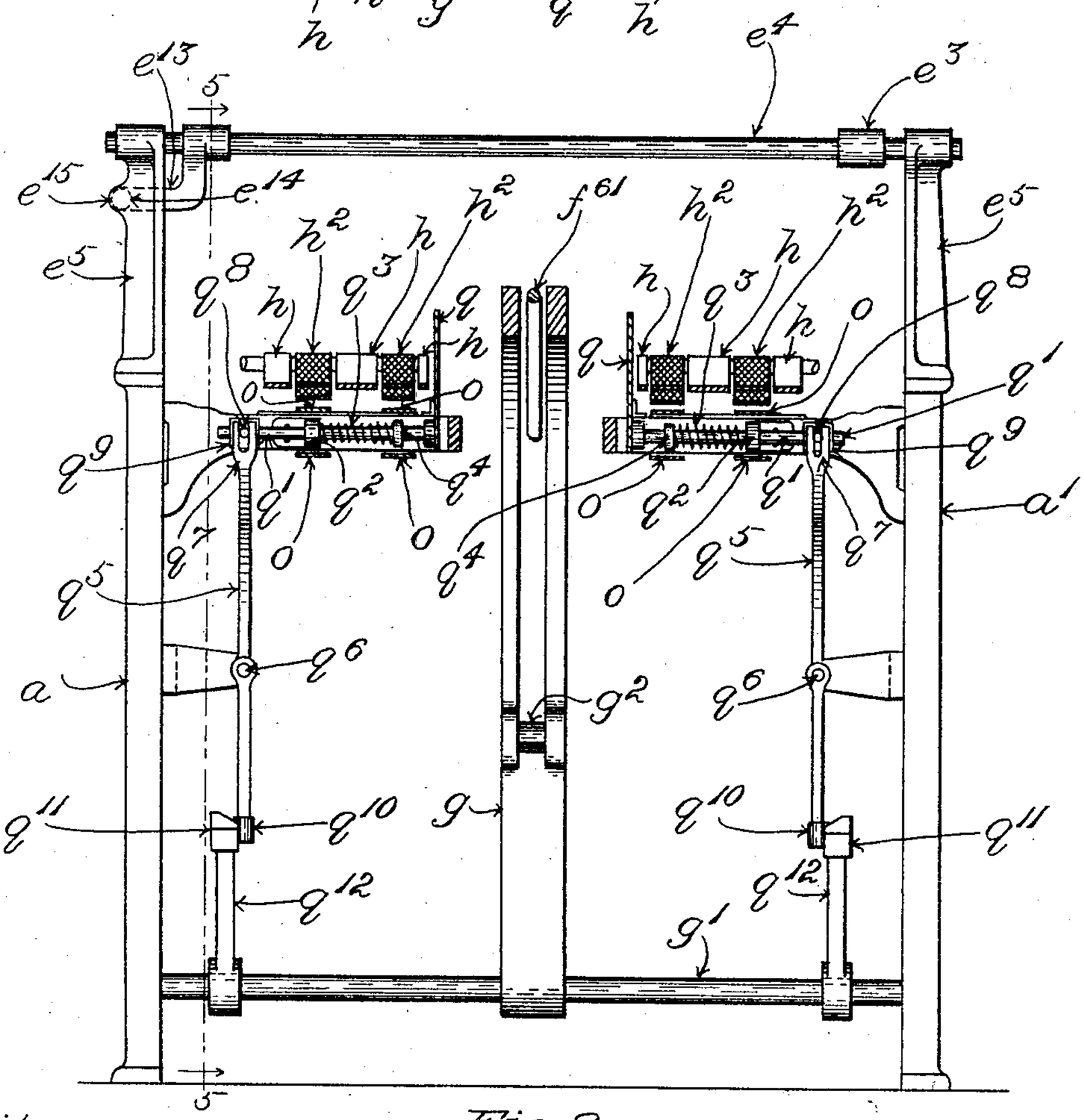


Fig. 8.



Witnesses:
Oscar F. Hill
Edith J. Anderson.

Inventor:
Willard I. Lewis
By Macleod Calver & Randall
Attorneys.

No. 774,726. Patented November 8, 1904.

UNITED STATES PATENT OFFICE.

WILLARD I. LEWIS, OF WALPOLE, MASSACHUSETTS.

MACHINE FOR APPLYING FLY-LEAVES OR THE LIKE TO SIGNATURES OF BOOKS.

SPECIFICATION forming part of Letters Patent No. 774,726, dated November 8, 1904.

Application filed May 3, 1902. Serial No. 105,851. (No model.)

To all whom it may concern:

Be it known that I, WILLARD I. LEWIS, a citizen of the United States, residing at Walpole, in the county of Norfolk, State of Massachusetts, have invented a certain new and useful Improvement in Machines for Applying Fly-Leaves and the Like to Signatures of Books, of which the following is a specification, reference being had therein to the accompanying drawings.

In the art of bookbinding one of the operations preliminary to assembling and securing together the signatures, &c., constituting the body of a book is to attach with the aid of cementitious material, such as glue or paste, certain additional sheets to a portion of the said signatures. In some instances a single or unfolded sheet constituting a fly-leaf is united by one margin thereof to one face of each of the end signatures of a book, adjacent the inner or folded edge of the corresponding signature. Cuts and the like are united similarly to the appropriate signatures. In other instances a sheet which is folded upon itself at its middle is attached or united adjacent the fold thereof to the exterior of an end signature. Such a folded sheet is variously termed a "fly-sheet" or an "end" paper. In subsequently completing the binding operations one half of the said fly-sheet or end paper is pasted to the inner surface of the adjacent side of the cover to constitute a lining therefor, while the other half constitutes one of the fly-leaves of the book. In the case of the first signature of a book the fly-leaf or fly-sheet or end paper is applied to the front of such signature. In the case of the last signature of a book the fly-leaf or fly-sheet or end paper is applied to the back of the same. In practice a cut or the like sometimes is attached to the front of a signature and sometimes to the back of a signature. Heretofore, so far as I am aware, the operation of attaching fly-leaves and the like to the end signatures and the like of books has been performed manually.

My invention has for its general object to provide an automatic machine of novel character by means of which single fly-leaves, folded or double fly-sheets or end papers, and cuts, as well as other like parts of books, all of which for convenience of designation will be comprehended generically under the term "fly-leaves" in the following description, may be attached to signatures of books or the like.

The invention consists in a machine for the said purpose, which I believe to be the first of its kind.

I will proceed to describe the invention with the aid of the accompanying drawings, in which latter I have illustrated the best form in which I have thus far embodied the same.

In the drawings, Figure 1 shows in side elevation a machine embodying the invention. Fig. 2 is an elevation of the side of the machine which is opposite to that shown in Fig. 1. Fig. 3 shows the machine in plan, certain of the parts at the delivering end of the machine on the left-hand side in the said figure being omitted in order to show parts which otherwise would be hidden. Figs. 4 and 5 are sectional views on the order of diagrams, being intended more particularly to show the working relations of certain of the parts of the machine, many of the details being omitted, the plane of section being substantially as indicated by the dotted line 5 5, Fig. 8. Fig. 6 is a sectional detail showing chiefly the means of supporting the signatures and fly-leaves when being united, the device for applying adhesive material to one edge of the signature, the backing-bar and its stop-pins, and the clamping-bar. Fig. 6ª is a sectional detail view designed chiefly to show the means of depressing the forward edge of the signature to place the glue-covered marginal portion of the same in contact with the fly-leaf. Fig. 7 is a view in side elevation, showing the same parts as Fig. 6 and certain other features adjacent the same. Fig. 8 is a view of a portion of the machine at the delivery end of the latter, partly in section on the vertical transverse plane indicated by the dotted line 8 8 in Fig. 5, showing chiefly the head-end-registering devices, which are termed hereinafter the "side-jog" devices. Fig. 9 is a view showing in plan the parts which are illustrated by Fig. 8, together with certain immediately-adjoining parts, certain portions of

the latter being broken away in order to show features which otherwise would be hidden.

In my machine the signature and fly-leaf or other sheet which are to be united to each other are fed into predetermined position in proper relation to each other. A line of glue or other suitable cementitious material is applied to the proper edge of one of the said parts, and the two parts having been properly presented with relation to each other they are subjected to compression to unite them and insure their adhesion to each other and then are discharged. The presentation of the signatures and leaves or sheets which are to be united thereto to the working parts by means of which the union is accomplished may be effected manually in some embodiments of the invention; but preferably I employ automatic feeding mechanism when convenient. When folded fly-sheets are to be attached to the signatures, the said fly-sheets may be supplied to the machine in folded condition; but I prefer to provide the machine with automatic devices for folding the fly-sheets and conveying them to the place where they are attached to the signatures, and I have shown the machine provided with such folding and conveying devices.

Having reference to the drawings, the opposite side frames of the machine are designated a and a', respectively. A driving-shaft is shown at b, it having suitable fast and loose band-pulleys b', Figs. 1 and 3. b^2, Figs. 2 and 3, is a suitable hand-wheel or fly-wheel on said driving-shaft. From the driving-shaft b the various moving parts of the machine are actuated through suitable trains of motion-transmitting devices and connections.

The particular motion-transmitting devices and connections which are described hereinafter with reference to the drawings may be employed or not, as preferred. Specifically considered they do not constitute features of the invention.

The machine shown in the drawings is constructed to act to apply fly-leaves or the like to two signatures simultaneously, and accordingly some of the working parts are duplicated. In practice the machine may be built or arranged to operate upon one or more signatures at a time, as may be preferred.

I provide a suitable magazine or hopper for the reception of each stack or series of the signatures which are to have fly-leaves or the like applied thereto. At c c, &c., Figs. 1 to 5, are upright bars constituting the sides of each of the said magazines or hoppers, and into the inclosure constituted by each group of the said upright bars c c a stack or pile of the signatures x, Figs. 1, 2, and 3, is placed, c', Figs 4 and 5, being the table on which the bottom signature rests.

The automatic mechanism for feeding the signatures x from each magazine to the point in the machine at which the assembling of the signatures and fly-leaves is effected, when such mechanism is employed, may be of any suitable preferred construction in practice.

I have shown a convenient construction of feeding mechanism, which I will briefly describe as follows: For the purpose of separating the bottom signature from the pile of signatures above the same in each magazine in order that a pair of nippers pertaining to the feeding mechanism may properly engage with the said bottom signature preliminary to making the required transfer of the signature to the place at which it is to be united with the corresponding fly-leaf the said feeding mechanism is provided with a suction-cup d, (shown only in Fig. 1,) mounted at the free extremity of an arm d' of a rock-shaft d^2, the latter having another arm, d^3, which is connected, by means of a rod d^4, to a lever d^5, which is pivoted at d^6 and actuated by means of a cam d^7, Fig. 1, on an auxiliary shaft 1, which is driven from driving-shaft b by means of a gear 2, fast on shaft 1 and meshing with a pinion 3, fast on shaft b. By means of the cam d^7 and described connections the cup is raised so as to press the same against the under surface of the bottom signature in the corresponding magazine and then is lowered, drawing down with it a short distance the forward (folded) edge of the said signature. For the purpose of exhausting the air from the suction-cup d in order to cause the bottom signature to adhere thereto I have shown in Fig. 1 the interior of the said cup connected by flexible tubing d^8 with the cylinder d^9 of a suction-pump, the piston-rod d^{10} of the said pump being connected with a lever d^{11}, the latter being mounted on a rock-shaft d^{12}, having an arm d^{13}, which is actuated in one direction to operate the piston of the said pump by means of a cam d^{14} on a second auxiliary shaft 4, which is driven from the driving-shaft b by means of a gear 5, fast on shaft 4 and meshing with the pinion 3 on the shaft b, the piston-rod and piston being acted upon in the opposite direction by a spring d^{15}. The cam d^{14} occasions the inward movement of the piston, while the spring is operative to occasion the outward movement thereof, by which the suction is occasioned. The rock-shaft d^{12} operates the piston-rod of the suction-pump (not shown) pertaining to the magazine at the other side of the machine by a similar arrangement of parts. To accommodate the swinging movement of the piston-rod d^{10} as it oscillates in unison with the curvilinear movements of the rocking arm d^{11}, the pump-cylinder is pivoted, as at d^{16}, to a suitable bracket d^{17}, attached to the machine-frame, this arrangement permitting it to swing in a vertical plane in unison with the piston-rod. The bottom signature having been depressed below the level of the next succeeding one in the stack of signatures contained in the magazine or hopper, a separating-blade is interposed between the said

bottom signature and the one next above. The separating-blades pertaining to the two magazines are shown in Figs. 1 and 2 at e. Each thereof is mounted at the lower end of a depending arm e'. The two arms e' e' are fast upon a rock-shaft e^2, which latter is journaled in the free extremities of arms e^3 e^3, that are attached to a rock-shaft e^4, journaled in suitable bearings which are provided at the tops of standards e^5 e^5, located at opposite sides of the machine-frame. The rock-shaft e^2 aforesaid, carrying the arms e' e', is provided with operating connections comprising another arm, as e^6, a connecting-rod e^7 joining the same arm e^6 with one arm of a bell-crank e^8, Figs. 2 and 3, which is mounted pivotally upon a bracket, as e^9, attached to the side frame a', the said bell-crank having also connected therewith a rod e^{10}, which is in engagement with a cam e^{11} on auxiliary shaft 4. Movement transmitted from the said cam e^{11} through the connections described and acting with a tendency to swing the arm e^6 upwardly will first turn the rock-shaft e^2 so as to swing each separator-blade e in between the bottom signature, which has been separated and depressed, as aforesaid, and the signature next above the same. The swinging movement will continue until arrested by contact of the lower end of the arm e' with the front guide-bar of the hopper or magazine. Thereafter the continued action of the cam e^{11} will operate to lift the assemblage e^6, e^3, e^2, e', and e, causing the same to move around the axis of the rock-shaft at e^4. The upward movement of the separator-blades e e' thereby produced acts to lift the stacks of signatures x, so as to relieve the bottom signature of each of the weight and pressure of those above the same, thereby facilitating the withdrawal of the bottom signature from beneath the stack in each magazine by the action of the signature-feeding nippers.

For the purpose of determining the position in which the separator-blades e shall stop after being withdrawn from beneath the stacks of signatures x in the hoppers or magazines the rock-shaft e^4 is furnished with a projecting arm e^{13}, Figs. 1 and 3, having applied thereto a set-screw e^{14}, that is adapted to engage with a suitable stop—as, for example, a portion e^{15} of the adjacent standard e^5, Fig. 1.

A pair of signature-feeding nipppers is provided for each magazine. Each pair comprises a fixed upper nipper-blade f and the movable lower nipper-blade f'. The two pairs of nippers are carried by a movable carrier or frame g, to which latter movement to and fro, rearward and forward, is communicated for the purpose of carrying the nippers rearward into position to engage with the bottom signatures, which have been separated in the manner aforesaid from the signatures in the stacks above them, and of then carrying the nippers, with the signatures held thereby, forward to the place at which the said signatures are to be delivered up to be combined with the fly-leaves. For the purpose of actuating the said frame g and communicating thereto its forward and rearward movements I have herein shown the same mounted pivotally in the lower portion of the machine-frame, as upon a rock-shaft at g', Figs. 1 and 2, and connected by a rod, as g^2, with a rotating crank, as g^3, on the shaft 1. For the purpose of moving the movable nipper-blade f' of each pair of nippers toward and from the corresponding fixed nipper-blade f the said movable nipper-blade f' is mounted upon the lower end of the upright rod or pin f^2, the latter being mounted in a guide, as f^3, on the frame g, in which guide it is capable of moving longitudinally. For the purpose of actuating the rods f^2 f^2 of both pairs of nippers simultaneously I employ an operating-rocker f^3, Figs. 1, 2, and 3, which is hung pivotally at f^4, Figs. 1 and 2, upon the movable frame g. One extremity of the said rocker f^3 has a fork or eye f^{41} for each rod f^2, encircling the said rod between two collars or the like f^5 f^5 upon the said rod, a spring, as f^6, being interposed between the upper side of the fork or eye f^{41} and the upper collar f^5. When the rocker f^3 is swung in a direction to carry its rear end downwardly, the fork or eye f^{41} by engaging with the lower collar f^5 will move the lower nipper-blade f' away from the upper nipper-blade f, so as to open the nippers. When the rocker f^3 is swung in the reverse direction, it acts with a tendency to compress the spring f^6, and the said spring acting against the upper collar f^5 transmits a yielding force to the rod f^2, whereby the lower nipper-blade f' is borne toward the upper nipper-blade f, thereby compressing the signature with yielding force between the two nipper-blades. The rocker f^3 is actuated by means of a rod f^{61}, which at one extremity thereof is connected to a projection f^7 of the rocker and at the other extremity thereof is joined to a radius-arm f^8, Figs. 1 and 2, a second rod f^9 extending from the said radius-arm to a lever f^{10}, which last is pivoted at f^{11} and actuated by means of a cam f^{12}, Fig. 2, on the auxiliary shaft 4.

In the working of the machine the frame g moves rearwardly to carry the nippers f f' into their rearward position, the said nippers having been opened. The nippers are then permitted to close upon the lowermost signature in each magazine, the front edge of the latter having been separated from the piles above by the action of the separator-blades, as aforesaid. The frame g then moves forwardly, the respective pairs of nippers carrying along with them the said signatures. Having been carried to their foremost position, the said nippers are opened, as in Fig. 5, so as to release the signatures, each of which falls from the nippers upon the upper

surface of an inclined table *h*, Figs. 4, 5, 6, 8, and 9. The incline of this table may in practice be such as to cause the signature to move by gravity down the same until the folded edge of the signature brings up against the stop-pins *i i* upon the bar *i'*. I usually prefer, however, to facilitate and insure the movement of the signature into position against the stop-pins *i* by the employment of suitable means for advancing the signature after it has reached the table *h*. A variety of means may be employed for the purpose. Herein I have shown a rotatable roll *h'* and endless feeding-tapes h^2, the said roll *h'* being driven by suitable gearing hereinafter described. The signatures having been positioned against the stop-pins *i i*, a line of glue or other cementitious material is now applied to the lower face of each of the same closely adjacent the folded edge of the signature. The construction and mode of operation of the glue-applying device or paster may vary in practice. I have herein shown a construction which is of my own invention and which for many reasons I prefer to employ. It consists of a dabbing-strip *k* for each magazine. The two dabbing-strips *k k* are mounted upon a shaft *k'*, the said shaft extending across the machine and being provided at its opposite ends with crank-arms k^2, Figs. 1, 2, 3, and 7, each crank-arm having a crank-pin k^3. The centers of the said crank-pins coincide with the acting edge of the dabbing-strips *k k* in distance radially from the axis of the shaft *k'*. (See more especially Fig. 7.) The said crank-pins k^3 are fitted in eyes at the free extremities of radius-arms k^4 k^4, which last are hung upon pivots at k^5 k^5, carried by brackets k^6 k^6, fast to the machine-framing. Upon the shaft *k'* is made fast a gear k^7, Figs. 1, 3, and 7, meshing with a pinion k^8, which is loosely mounted upon the shaft *m* of the glue-roll *m'*, the said pinion k^8 having fast therewith the sprocket-wheel k^9, which is engaged by the sprocket-chain k^{10}, the latter also passing around an actuating sprocket-gear k^{11} on the auxiliary shaft 1. The ratio between the sprocket-gear k^{11} and the sprocket-pinion k^9 is the inverse of the ratio between the pinion k^8 and the gear k^7. By means of links k^{12} k^{12}, Figs. 2, 3, and 7, extending from the shaft *k'* to the shaft *m*, the gear k^7 and the pinion k^8 are held at all times in mesh, but with capacity on the part of the gear k^7 and shaft *k'* to oscillate forwardly and rearwardly in an arc about the axis of the shaft *m*. The radius-arms k^4 k^4 by their engagement with the crank-pins k^3 confine the said crank-pins to substantially vertical movement in an arm described about the axes of the pivots k^5 k^5 as a center. The result in practice is that when the shaft *k'* is rotated by means of the pinion k^8 and gear k^7 the acting faces of the glue-applying strips *k k* are caused to make a nearly-vertical slightly-rolling contact with the surfaces of the glue-rolls *m' m'*. The glue-applying strips then turn over, and as they do so the acting faces thereof ascend, moving in a vertical arc concentric with the pivots k^5 k^5, until in ascending the said acting faces come uppermost and make a nearly-vertical slightly-rolling contact with the signatures adjacent the folded edges of the latter, after which the glue-applying strips *k k* descend, turning over in their descent until they make similar contact again with the surfaces of the glue-rolls, after which they rise once more toward the next succeeding signature. The glue-rolls are mounted upon the shaft *m*, which latter is rotated by means of a gear m^2 thereon, Figs. 2 and 3, meshing with a gear m^3 of equal diameter therewith on the shaft *k'* of the glue-applying devices. The glue-troughs beneath the glue-rolls *m' m'* are shown at *n n*.

For the purpose of furnishing a backing or support for the folded edge of the signature at the time at which the acting edge of the glue-applying device *k* is thrust against the signature in applying glue thereto the bar *i''* is depressed from the intermediate position which it occupies when the signature is first delivered against the stop-pins *i i* into the position in which it is shown in Fig. 5. Hence by the rise of the glue-applying device the folded edge of the signature becomes compressed between the said device and the edge of the bar *i''*, as in Fig. 6. There is a bar *i''* for each side of the machine, each of the said bars being carried by swinging arms i^2 i^2. One of the said arms i^2 has connected with the axis i^3 thereof another arm, i^4, to which is joined a rod or bar i^6, that is in operative connection with a cam i^7, the cam for one side of the machine being on the auxiliary-shaft 1, while that for the other side of the machine is on the auxiliary shaft 4.

For the purpose of preventing the signature to which glue has been applied by the ascent of the glue-applying device *k* from adhering to the said device and being drawn down thereby in its descent means is provided for stripping the signature from the acting face of the glue-applying device. Thus a clamping-bar *p* is arranged above the table *h*. (See Figs. 3, 6, and 7.) This bar is mounted on swinging arms *p' p'* and normally is held lifted by a tension-spring p^2, Fig. 7. When the bar *i''* is depressed, it makes contact with one of the arms *p' p'*, and thereby forces bar *p* down, so as to hold the signature clamped between the bar *p* and the table *h*, the signature being held clamped in this manner until the glue-applying strip *k* has completed a part of its descent and separated from the signature. In order to prevent a signature in being advanced toward the stop-pins *i i* from accidentally passing above the clamping-bar *p*, the latter bar is furnished with upwardly-inclined guides p^3, Figs. 6 and 7, which act to

deflect the forward edge of the signature beneath the said bar p. Glue having been applied to the signature resting against the stop-pins i i, the said signature is in readiness to have the fly-leaf joined thereto. A shelf or table o^2 is located a slight distance below the forward edge of the table h. This shelf or table o^2 serves to support the fly-leaf when the latter is advanced upon the same after the glue-applying strip k has been moved away from the signature. Prior to the said advance of the fly-leaf the bar i' is raised a short distance. This relieves the pressure of the bar p, by which the signature is clamped against the table h and by which also the forward edge of the table is held depressed slightly below its normal position. As the bar i' rises, therefore, the clamping-bar p becomes elevated by the action of its spring p^2, and the front edge of the table h rises also, lifting the glued portion of the signature slightly, so as to afford clearance for the front edge of the fly-leaf as it passes forward upon the shelf or table o^2. Thereby contact of the front edge of the fly-leaf with the glue on the signature is avoided and the fly-leaf is not hindered from moving forward into proper position against the stop-pins i i. Feed-tapes o o serve in the machine shown in the drawings to advance the fly-leaf into position beneath the table h and over the table o^2, with its front edge in contact with the stop-pins i i. The said feed-tapes o o pass around a supporting and guide roll o', which is located adjacent the table o^2, and also around other supporting and guide rolls o^3, o^4, o^5, and o^6 in the rear part of the machine. For the purpose of driving the roll o^6 and actuating the tapes o o the roll o^6 is provided with a sprocket-wheel o^7, and a sprocket-chain o^8 passes around the said sprocket-wheel and around a sprocket-wheel o^9 on the driving-shaft b. The fly-leaves which are to be fed by the tapes o o are placed upon a table o^{10} at the rear of the machine and pass thence onto the horizontal relatively elevated rear portion of the feed-tapes. For the purpose of timing the feed of the successive fly-leaves feed-gages o^{11} are employed. The said feed-gages being in their normal depressed position upon or adjacent the upper surface of the feed-tapes o o, a fly-leaf is advanced by hand or otherwise until its front edge rests against the said feed-gages, which latter hold the fly-leaf back until the feed-gages are lifted. The lifting of the feed-gages to permit of the forward movement of the fly-leaf with the feed-tapes o o is effected periodically by suitable devices which are provided for the purpose. Herein the feed-gages are carried by swinging arms which are attached to a rock-shaft o^{12}, the latter having an arm o^{13}, which is connected, by means of a rod o^{14}, with one arm of a bell-crank o^{15}, which is acted upon by a cam o^{16} on the auxiliary shaft 4. The said cam o^{16} operates to cause the lifting of the feed-gages o^{11}, and a spring o^{17}, which is connected with the rod o^{14}, acts to depress the same. Presser-rolls o^{18} are provided at the rear of the feed-gages o^{11}. These rolls are mounted on arms o^{19}, attached to a shaft o^{20}, located above the feed-tapes o o. The said shaft o^{20} has an upwardly-extending arm o^{21}, which is connected by a rod o^{22} with an upwardly-extending arm o^{23}, fast on the shaft o^{12} of the feed-gages. Normally the presser-rolls o^{18} occupy a position in which they are raised slightly above the upper surface of the feed-tapes o o. When, however, the feed-gages are raised so as to release the fly-leaf, the presser-rolls are lowered so as to press the fly-leaf against the feed-tapes, thereby insuring that the fly-leaf shall be fed forward by the said feed-tapes. The guide and supporting rolls o^4 o^5 elevate the rear portions of the feed-tapes o o slightly above the forward portions of the same, and the said feed-tapes pass down between the rolls o^5 and o^6. As the fly-leaf, which is gripped between the presser-rolls o^{18} and the feed-tapes o o, is advanced its forward edge passes on horizontally beyond the rolls o^5 and o^6 onto a table o^{24} until it brings up against a stop-gage o^{25}. For the purpose of folding or doubling the fly-leaf transversely upon itself automatically a folding-blade p^4 is provided at each side of the machine. The two folding-blades p^4 p^4 are carried by arms p^5, which are attached to a transversely-extending shaft p^6, and the said shaft is operated by means of an arm p^3, with which it is provided, the said arm p^7 having connected therewith a rod or bar p^8, which is in operative engagement with a cam p^9 on the auxiliary shaft 4. By means of the cam and connections described the folding-blades are depressed at the proper time upon the fly-leaves below the same, so as to press the middle of each fly-leaf into the bight of the rolls o^5 o^6, whereby the fly-leaves are fed forward and folded upon themselves in well-known manner. To assist in driving the rolls o^4 and o^5, a sprocket-chain o^{26} is passed around sprocket-wheels o^{27} and o^{28} upon the said rolls, and the rolls o^5 and o^6 are geared together, as at o^{29} o^{29}. Auxiliary presser-rolls o^{30} o^{30} are provided in front of the presser-rolls o^{18} to hold the fly-leaf in contact with the feed-tapes o o. A fly-leaf having been advanced upon the table o^2 beneath the signature which rests upon the table h and the front edges of both the signature and the fly-leaf being in contact with the stop-pins i i, the head ends of the same are brought into proper correspondence by means of the head-end-registering device, which I will now describe and which I have termed the "side jog." The details of the head-end-registering or side-jog mechanism are shown in Figs. 4, 5, 8, and 9. The said details are mostly concealed from view in the elevations and are omitted from the other views to avoid complication. They are duplicated in the ma-

chine to correspond with the number of signatures being operated upon at one time. Having reference to Figs. 4, 5, 8, and 9, q designates a gage or plate for making contact with the head ends of the signature and fly-leaf. This gage is mounted to move transversely within the machine and has attached thereto a rod q'. The said rod passes through a hole in a bracket q^2 and is encircled by an expanding spiral spring q^3, which is compressed between the said bracket and a collar q^4, that is secured to the rod. For the purpose of moving the rod q' and gage q laterally of the machine in a direction to compress the spring q^3 a lever q^5 is provided, it being pivoted at q^6 and having the upper arm thereof forked, as at q^7, to engage with a pin q^8, carried by a collar q^9, which is secured to the shaft. The other arm of the said lever q^5 carries a roller q^{10}, which is acted against by the cam-face q^{11} of an arm q^{12}, extending upward from the rock-shaft q', on which the frame or carrier g for the nippers is mounted. When, therefore, the nipper-carrying frame g is moved rearwardly in the machine, the cam-face q^{11} acts against the lever q^5 to move the rod q' and gage q in a direction to compress the spring q^3. When the nipper-carrying frame returns to its forward position, the spring is permitted to act, and it moves the gage q in the opposite direction. The contact of the said gage in its movement with the head ends of the signature and of the fly-leaf below the same occasion a shift of these latter lengthwise in a direction extending transversely of the machine, bringing the said head ends into proper position with relation to each other. The signature and fly-leaf having been adjusted into proper position, as just described, the forward edge of the signature is depressed slightly, so as to place the glue-covered marginal portion of the face of the same in contact with the corresponding marginal portion of the opposing or proximate face of the fly-leaf. For the purpose of effecting this depression the clamping-bar p is caused to be forced downwardly upon the top of the signature again, so as to effect the required lowering of the same and of the front portion of the table h. To this end the nipper-carrying frame g is provided at one side of the path of the signature and fly-leaf with a cam r, which, in the movement of the said frame rearward for the purpose of enabling the nippers $f\,f'$ to engage with the bottom signatures in the magazines, acts against the cam-shaped portions $p^\times$, Fig. 6[a], of one of the arms p' of said bar p. The pressure of the said bar p against the upper surface of the signature lying upon the table h bears the forward portion of the table h down bodily. Thereby the signature is carried into contact with the fly-leaf below the same without displacement of the forward edges of the two relative to each other in consequence of the operation of bringing them together.

For the purpose of causing the signature and fly-leaf to unite perfectly along the line on which the glue is applied to the signature the forward edges of the two are compressed tightly together. In the present instance I employ a pair of nippers $s\,s'$ at each side of the machine for the purpose of effecting this compression. These nippers are carried by the frame or carrier g and are operated by the rocker f^3 in manner substantially the same as the nippers $f\,f'$, which transfer the signatures from the magazines to the tables h. The nipper-blade s is the fixed blade, while the nipper-blade s' is the movable one, the latter having connected therewith the upright rod s^2, moving through a guide on the frame g at s^3, and the upper portion of the said rod having fitted thereto the fork or eye s^4 of the rocker f^3. Collars s^5 s^5 are secured to the said rod at opposite sides of the fork or eye s^4, and a spiral spring s^6 encircles the rod between the fork or eye s^4 and the lower collar s^5, so as to cause the movable blade s' to be moved with yielding force toward the nipper-blade s. The nippers $s\,s'$ are carried by the rearward movement of frame or carrier g into position to engage with the signature and fly-leaf which have been brought together in manner aforesaid, and the said nippers having been closed upon the signature and fly-leaf, so as to effect the compression, the ensuing forward movement of the nipper-carrying frame causes the signature and fly-leaf together to be drawn forward from the tables h and o^2. Just before the nippers s and s' commence the discharge movement the blade i', carrying the stop-pins i, is caused to rise by the cam i^7, so that the paper may pass out under the pins $i\,i$. (See Fig. 4.)

For the purpose of discharging the signature and attached fly-leaf from the nippers $s\,s'$ as the latter complete their forward movement a small rock-shaft t is mounted upon the nipper-carrying frame, it being provided with a series of downwardly-extending arms or wires t' and also being provided at one end of the same with an arm t^2 to coact with a cam t^3, which is affixed to a bracket t^4 on the forward part of the machine-framing. When in the advancing movement of the frame g the arm t^2 encounters the cam t^3, the rock-shaft t is turned so that the arms or wires t' thereof push the signature rearwardly from between the nippers $s\,s'$.

The roll h' is driven from the roll o' by means of the gears z' z^2 z^3, Figs. 6 and 7.

In order that the bar i may yield to accommodate the thickness of the signature when the glue-applying strip k in its rise compresses the signature against the edge of the said bar, the cam i^7, which actuates the said bar, is arranged to act to raise the bar, while

the depression of the bar is effected by means of spring $i^{\times}$, connected with the rod or bar i^{6}, which engages with said cam. Thereby the bar i is held to its work with yielding force.

In its working the dabbing-strip k as it descends from the position which it is represented as occupying in Fig. 6 turns over for the purpose of making contact with the glue-roll m, and as it ascends again for the purpose of applying glue to the next succeeding signature it approximates a vertical position before it makes contact with the edge of the latter signature. Fig. 5 shows the dabbing-strip after it has nearly turned over in its rise into position to contact with the signature. It will be apparent that the working edge of the dabbing-strip moves in a path which enables the forward edge of the support o^{2} for the fly-leaf to be extended into close proximity with the forward edge of the signature to which the fly-wheel is about to be attached. In other words, the path of the dabbing-strip is such as to enable the front edge of the supporting-table o^{2} for the fly-leaf to be located in position to sustain the fly-leaf closely adjacent to its front edge. This insures against displacement of the free forward edge of the fly-leaf and enables the same to be properly applied to the signature.

While in the case of the illustrated embodiment of the invention I have explained the parts as operating to cause the glue or cementitious material to be applied to the signature preliminary to causing the fly-leaf or the like to become attached thereto, this is not necessary in all cases, and I also contemplate applying the glue or cementitious material directly to the fly-leaf or the like.

The duplication of the working parts of the machine shown in the drawings enables me advantageously to utilize one set of the said parts for the attachment of fly-leaves to the fronts of those signatures with which such attachment is necessary and the other set thereof for the attachment of fly-leaves to the backs of those signatures with which the latter attachment is required. The simultaneous operation of the two sets of working parts enables the work of attaching fly-leaves to the fronts of one set of signatures to be performed concurrently with that of attaching fly-leaves to the backs of a second set of signatures. To these ends I simply place the two head-end-registering gages or side jogs q q in opposite relations with respect to the supports at the opposite sides of the machine against which the signatures and fly-leaves rest while in process of being united to each other. This causes the gaging devices to operate in reverse relations with respect to the duplicate attaching or combining devices. In the illustrated machine the said head-end registering-gages or side jogs are located adjacent the middle of the width of the machine, one thereof being in position to act outwardly against the inwardly-directed head ends of a signature and fly-leaf resting upon the supports therefor at the one side of the supporting-arm g for the nippers (see Figs. 3, 5, 8, and 9) and the other thereof being in position to act outwardly in the opposite direction against the inwardly-directed head ends of the signature and fly-leaf resting upon the supports therefor at the opposite side of the machine. It will be obvious that in the case of the signature at the left-hand side of Figs. 8 and 9, it having its back edge presented to the pins i and its head end toward the middle of the width of the machine, the front face of the same will be turned down in position to have the fly-leaf attached to such face, while in the case of the signature at the right-hand side of the machine, it having its back edge similarly presented to the pins i and its head end toward the middle of the width of the machine, the back face of the same will be presented downward to have the fly-leaf attached thereto.

What I claim is—

1. In a machine for uniting fly-leaves, and the like, to signatures of books and the like, in combination, devices for assembling a signature and fly-leaf from different sources of supply, and devices for attaching one marginal portion of one face of the fly-leaf to the corresponding marginal portion of one face of the signature.

2. In a machine for uniting fly-leaves, and the like, to signatures of books and the like, in combination, devices to assemble a signature and fly-leaf from different sources of supply, means to render the marginal portions of the faces of the said parts adhesive to enable one marginal portion of one face of the fly-leaf to be united to the marginal portion of one face of the signature, and means to press the parts together and deliver them with the fly-leaf mounted upon the said face of the signature.

3. In a machine for combining fly-leaves and the like, with the signatures of books, in combination, means to feed a signature from a stack or pile, means to feed a fly-leaf, means to render the marginal portions of the faces of the said parts adhesive to enable one marginal portion of one face of the fly-leaf to be united to the marginal portion of one face of the signature, registering means to cause the said signature and fly-leaf to register with each other in readiness for being united, and means to press the parts together and deliver them with the fly-leaf mounted upon the said face of the signature.

4. In a machine for combining fly-leaves and the like with the signatures of books, in combination, means to feed a signature from a stack or pile, means to feed a fly-leaf, means to render the signature adhesive along the marginal portion of one face thereof adjacent the folded-back edge of the same, registering means to cause the signature and fly-leaf to register in readiness for being united to each other along

corresponding marginal portions of proximate faces thereof, and means to press the signature and fly-leaf together and deliver them with the fly-leaf united to the said face of the signature.

5. In a machine for uniting fly-leaves and the like to signatures of books, in combination, devices to feed a signature and a fly-leaf which are to be united, a device to render adhesive the marginal portion of one face of one of said parts, registering means to cause the edges of the fly-leaf and signature adjacent the line of union to register with each other, and means to press the proximate faces of the signature and fly-leaf together to complete the union of the marginal portions thereof.

6. In a machine for uniting fly-leaves and the like to signatures of books, in combination, devices for feeding the signatures and fly-leaves, and presenting one face of the fly-leaf to one face of the signature, means for rendering adhesive the marginal portions of the faces of the said parts along the intended line of union, and clamping-jaws whereby a signature and the corresponding fly-leaf are pressed together to complete the attachment of the fly-leaf to one face of the signature along corresponding marginal portions of the parts.

7. In a machine for uniting fly-leaves and the like to signatures of books, in combination, devices for feeding the signatures and fly-leaves, and presenting one face of the fly-leaf to one face of the signature, means for rendering adhesive the marginal portions of the said faces of said parts adjacent corresponding edges of the latter, registering means to cause the edges of a signature and the corresponding fly-leaf to register with each other, and clamping-jaws whereby the signature and fly-leaf are pressed together to complete the attachment of the fly-leaf to one face of the signature along corresponding marginal portions of the parts adjacent the edges of the latter.

8. In a machine for uniting fly-leaves and the like to signatures of books, in combination, feeding devices for the signature and fly-leaf which are to be joined, operating to present one face of the fly-leaf to one face of the signature, a paster, operating means for the said paster whereby it is moved into position to apply paste to the marginal portion of one face of one of the said parts or elements to be joined, and then is retracted, and means to press the faces of the signature and fly-leaf together to complete the attachment of the fly-leaf to one face of the signature along corresponding marginal portions of the proximate faces of the parts adjacent the edges of the latter.

9. In a machine for uniting fly-leaves and the like to signatures of books, the combination with a paster to render adhesive the marginal portions of the proximate faces of a signature and fly-leaf which are to be joined together, and means to press the said faces of the signature and fly-leaf together to complete the attachment of the fly-leaf to the face of the signature along corresponding marginal portions of the proximate faces of the parts adjacent the edges of the latter, of devices to feed the signature and fly-leaf to the action of the said paster and pressing means and to cause the head ends of the same to register.

10. In a machine for uniting fly-leaves and the like to signatures of books, the combination with a paster to render adhesive the marginal portions of a signature and fly-leaf which are to be joined together, and means to press the said portions together to complete the union of the same, of devices to feed the signature and fly-leaf to the action of the said paster and pressing means, and a jogging device to occasion jogging of the signature and fly-leaf lengthwise prior to being united to cause the heads of the same to register properly with each other.

11. In a machine for uniting fly-leaves and the like to signatures of books, in combination, feeding devices for the signature and fly-leaf which are to be combined, a pasting device, a carrier-clamp to press together the said parts to unite the same, and means to move the said carrier-clamp bodily to transport and deliver the united signature and fly-leaf.

12. In a machine for uniting fly-leaves and the like to signatures of books, in combination, means to support a signature and fly-leaf in readiness to be joined together, a paster, a carrier-clamp to press together the said parts, to unite the same, and means to move the said carrier-clamp bodily to transport and deliver the united signature and fly-leaf.

13. In a machine for uniting fly-leaves and the like to signatures of books, in combination, supports adjacent each other for supporting, respectively, in proximate positions a signature and the fly-leaf which is to be secured thereto, a device to render adhesive the marginal portions of the signature and fly-leaf, and means to press the said portions together to unite the signature and fly-leaf while the parts are still sustained respectively by the said supports.

14. In a machine for uniting fly-leaves and the like to the signatures of books, in combination, supports adjacent each other for supporting, respectively, in proximate positions a signature and the fly-leaf which is to be secured thereto, a device to render adhesive the marginal portions of the signature and fly-leaf, a registering device to cause the edges of such parts to register with each other, and means to press the said marginal portions together to unite the signature and fly-leaf while the parts are still sustained respectively by the said supports.

15. In a machine for uniting fly-leaves and

the like to signatures of books, in combination, supports adjacent each other for respectively sustaining in proximate position a signature and a fly-leaf which are to be secured together, a device to render adhesive the marginal portion of one of the said parts, registering means to cause the marginal portions which are to be joined together to register with each other in readiness for being united, and means to press the signature and fly-leaf together to complete the union thereof while the parts are still sustained respectively by the said supports.

16. In a machine for uniting fly-leaves and the like to signatures of books, in combination, a receiver for a signature, a gage to position the edge of said signature, means to support a fly-leaf in engagement with said gage, a paster and devices to press the fly-leaf and signature together to complete the union.

17. In a machine for uniting fly-leaves and the like to signatures of books, in combination, a receiver for a signature, a gage to position the edge of said signature, means to support a fly-leaf in engagement with said gage, a paster and gripping devices whereby the fly-leaf and signature are pressed together to complete the union and then are delivered.

18. In a machine for uniting fly-leaves and the like to signatures of books, in combination, a device to render adhesive the marginal portion of the face of one of the said parts, means to cause the said parts to register with each other at corresponding ends thereof, means to cause the marginal portions which are to be joined together to register with each other in readiness for being united, and means to press the corresponding marginal portions of the faces of the signature and fly-leaf together to complete the attachment of the fly-leaf to one face of the signature.

19. In a machine for uniting fly-leaves and the like to signatures of books, in combination, means to position the edges which are to be joined together, means to render the margin of one of the parts adhesive, a device to cause the head ends of the fly-leaf and signature to register with each other, and devices to press the two together to complete the union.

20. In a machine for uniting fly-leaves and the like to signatures of books, in combination, a receiver for a signature, a gage to position the edge of said signature at which the fly-leaf is to be attached, means to render the marginal portion adjacent the said edge adhesive, a jog device to cause the head ends of the fly-leaf and signature to register with each other, and devices to press the two together to complete the union.

21. In a machine for uniting fly-leaves and the like to signatures of books, in combination, means to feed a signature, means to feed a fly-leaf, a jog device to cause the head ends of the parts to register with each other, and devices to unite the fly-leaf and signature along one edge of the signature.

22. In a machine for uniting fly-leaves and the like to signatures of books, in combination, means to feed a signature, means to feed a fly-leaf, a jog device to cause the head ends of the parts to register with each other, means to render the line of union adhesive, and means to press the fly-leaf and signature together to complete the union.

23. A machine for attaching fly-leaves and the like to signatures of books and the like, comprising, essentially, devices for feeding a fly-leaf and signature and acting against ends of the said parts or elements to cause the said ends to register with each other, means to apply paste to the marginal portion of one face of one of said parts or elements, means to cause the said marginal portion and the corresponding portion of the other of the said parts or elements to register with each other, and devices to press the fly-leaf and signature together to cause them to unite.

24. A machine for attaching fly-leaves and the like to signatures of books and the like, comprising, essentially, supports to receive a fly-leaf and a signature, respectively, means to render one of such parts adhesive along one marginal portion thereof, edge-registering means for the fly-leaf and signature, means acting against ends of the fly-leaf and signature to cause the said ends to register with each other, and devices to press the fly-leaf and signature together to cause them to unite.

25. In a machine for uniting fly-leaves and the like to signatures of books, in combination, a receiver for a signature, a gage to position the edge of said signature to which the fly-leaf is to be attached, means to apply adhesive material adjacent the said edge, devices to fold a fly-leaf upon itself and present the same with the folded edge thereof in proper register with said edge of the signature, and devices to apply pressure to effect the uniting of the fly-leaf and signature.

26. In a machine for uniting fly-leaves and the like to signatures of books, in combination, a table to receive a signature, an adhesive-applying device moving toward and from the signature to apply adhesive material to the marginal portion thereof, means to prevent the signature from adhering to the said device as the latter withdraws, and means to present a fly-leaf and unite the same to the signature.

27. In a machine for uniting fly-leaves and the like to signatures of books, in combination, a receiver for a signature, means to present a fly-leaf in position adjacent one face of the signature, a device to apply adhesive material to the marginal portion of the face of one of the said parts, and means to move into contact with each other the corresponding

marginal portions of the proximate faces of the signature and the fly-leaf.

28. In a machine for uniting fly-leaves and the like to signatures of books, in combination, a receiver for a signature, means to support a fly-leaf in position adjacent the signature, a device to apply adhesive material to the marginal portion of the face of one of the said parts, means to move into contact with each other the corresponding marginal portions of the proximate faces of the signature and the fly-leaf, and devices to apply pressure to complete the union of the fly-leaf to the face of the signature and deliver the parts in united condition.

29. In a machine for uniting fly-leaves and the like to signatures of books, in combination, a receiver, as *h*, a stop or stops, as *i*, to position one edge of a signature or the like fed to the said receiver, the bar *i'* carrying the said stop or stops, the dabbing-strip *k* and means to move the same to apply adhesive material to the marginal portion of the part thus fed, and means to unite a fly-leaf or the like to the said part.

30. In a machine for uniting fly-leaves and the like to signatures of books, in combination, a receiver, as *h*, a stop or stops, as *i*, to position one edge of a signature or the like fed to the said receiver, the bar *i'* carrying the said stop or stops, the dabbing-strip *k* and means to move the same to apply adhesive material to the marginal portion of the part thus fed, means to present a fly-leaf or the like adjacent the said part, and means to press the same against the said part.

31. In a machine for uniting fly-leaves and the like to the signatures of books, in combination, a receiver, as *h*, a stop or stops, as *i*, and a backing-bar, as *i'*, means for operating the said stop or stops and backing-bar, the dabbing-strip and means to operate the same to apply adhesive material to the marginal portion of a signature in connection with said receiver, means to fold a fly-leaf upon itself, and means to feed the folded fly-leaf to and secure the same to the said signature.

32. In a machine for uniting fly-leaves and the like to signatures of books, in combination, a receiver, as *h*, means to feed a signature thereto, a stop or stops, as *i*, and a backing-bar, as *i'*, means for operating the said stop or stops and backing-bar, the dabbing-strip and means for operating the same to apply adhesive material to the marginal portion of a signature in connection with said receiver, means to fold a fly-leaf upon itself, and means to feed the folded fly-leaf to and secure the same to the said signature.

33. In a machine for uniting fly-leaves and the like to signatures of books, in combination, a receiver, as *h*, means to feed a signature thereto, means to position said signature which has been fed to the receiver, means to apply adhesive material to the marginal portion of the said signature, devices to fold a fly-leaf upon itself and feed it into position adjacent the said signature, the nippers whereby the fly-leaf and signature are pressed together to complete the uniting thereof along one edge of the signature and are then delivered, and means to operate the said nippers.

34. In a machine for uniting fly-leaves and the like to signatures of books, in combination, the inclined table *h*, the positioning stop or stops and backing-bar, means for operating said stop or stops and backing-bar, the device for applying adhesive material to the marginal portion of a signature on said table, the feeding-tapes to deliver a fly-leaf beneath said table, and devices to press the fly-leaf and signature together and to deliver the same united together.

35. In a machine for uniting fly-leaves and the like to signatures of books, in combination, the inclined table, the positioning stop or stops and backing-bar, means to operate the said stop or stops and backing-bar, the device for applying adhesive material to the marginal portion of a signature on said table, means to fold a fly-leaf upon itself, the feeding-tapes to deliver a fly-leaf beneath said table, and devices to press the fly-leaf and signature together and to deliver the same united together.

36. In a machine for uniting fly-leaves and the like to signatures of books, in combination, the inclined table, the positioning stop or stops and backing-bar, means to operate the said stop or stops and backing-bar, the adhesive-applying devices moving toward and from the signature on said table, the clamping-bar acting in connection with said signature, means to feed a fly-leaf into position beneath said table, means to operate said clamping-bar to hold the signature from displacement during withdrawal of said adhesive-applying device and also to press the signature against the fly-leaf, and means to press the signature and fly-leaf together and thereby complete the union of the same.

37. The adhesive-applying device *k*, means to rotate the same, a crank or cranks rotating in unison therewith, and the radius arm or arms *k'* connected with said crank or cranks and with a relatively fixed pivotal point or points.

38. The adhesive-applying device *k*, a driving-wheel therefor, a driven wheel connected with said device, a support for said device movable transversely with the latter in an arc concentric with the axis of said driving-wheel, a crank or cranks rotating in unison with said device, and the radius arm or arms connected with the said crank or cranks and also with a relatively fixed pivotal point or points.

39. The adhesive-applying device *k*, means to rotate the same, a crank or cranks connected with said device and having a center or centers coinciding in position, radially, with

the acting surface of the said device, and the radius arm or arms connected with said crank or cranks and with a relatively fixed pivotal point or points.

40. In combination, a support, as *h*, for a signature, a backing-bar, as *i'*, adjacent the same, an adhesive-applying device, as *k*, and means to rotate said device and cause the same to make nearly vertical, slightly-rolling contact with a signature which is sustained by the said backing-bar against the pressure of said device.

41. In combination, the signature-feeding nippers *f*, *f'*, means to apply adhesive to the signature fed thereby and means to apply a fly-leaf to said signature, the pressing and delivering nippers *s*, *s'*, means to operate the two sets of nippers, and a device to discharge the signature and attached fly-leaf from the nippers *s*, *s'*.

42. In combination, the signature-feeding nippers *f*, *f'*, means to apply adhesive to the signature fed thereby and means to apply a fly-leaf to said signature, the pressing and delivering nippers *s*, *s'*, means to operate the two sets of nippers, a discharging device traveling in unison with the said nippers *s*, *s'*, and a fixed cam by which the said discharging device is operated.

43. In combination, the signature-feeding nippers, means to apply adhesive to the signature fed thereby and apply a fly-leaf to said signature, the nippers *s*, *s'*, the frame carrying both sets of said nippers, means to operate said frame, and means to operate the nippers.

44. In combination, the signature-feeding nippers, means to unite a fly-leaf with the signature fed by the said nippers, the nippers *s*, *s'*, the carrier for both sets of nippers, the nipper-actuator mounted on said carrier, means to operate said carrier and said nipper-actuator, the rod *t* mounted on said carrier, the discharging wire or wires carried by the said rod, and the fixed cam by which the said rod is actuated as the carrier is moved.

45. In a machine for uniting fly-leaves and the like to the signatures of books, the combination with a pasting device to apply paste to a marginal portion of a signature, means acting against the edges of a signature and a fly-leaf to cause the said marginal portion and the corresponding portion of a fly-leaf to register in readiness for being united, means to press the said portions together, and means to automatically feed the signature and fly-leaf to be acted upon as aforesaid.

46. A machine for attaching fly-leaves and the like to signatures of books and the like, comprising, essentially, means to render one of the parts or elements which are to be joined together adhesive along one marginal portion thereof, means to cause the said marginal portion and the corresponding portion of the other part or element to register with each other, and means to press the fly-leaf and signature together to cause the two to unite.

47. A machine for attaching fly-leaves and the like to signatures of books and the like, comprising, essentially, supports for signatures and fly-leaves, paste-applying devices, pressing devices, and registering devices for the signatures and fly-leaves to act in opposite directions, respectively, upon the said signatures and fly-leaves.

48. A machine for attaching fly-leaves and the like to signatures of books and the like, comprising, essentially, duplicate sets of supports for signatures and fly-leaves, paste-applying devices, edge-registering devices acting in opposite relations in connection with the respective sets of supports, and pressing devices, whereby the machine is adapted to attach fly-leaves and the like to the faces and backs, respectively, of signatures and the like.

49. A machine for attaching fly-leaves and the like to signatures of books and the like, comprising, essentially, supports in duplicate for signatures and fly-leaves, devices for feeding the said signatures and fly-leaves, paste-applying devices, edge-registering devices acting in opposite relations in connection with the said supports, and pressing devices, whereby the machine is adapted to attach fly-leaves and the like to the faces and backs, respectively, of signatures and the like.

50. A machine for attaching fly-leaves and the like to signatures of books and the like, comprising, essentially, supports in duplicate for signatures and fly-leaves, paste-applying devices, edge-registering devices for the signature and fly-leaf which are to be united to each other, head-end-registering devices, and pressing devices.

51. A machine for attaching fly-leaves and the like to signatures of books and the like, comprising, essentially, supports in duplicate for signatures and fly-leaves, paste-applying devices, edge-registering devices for the signature and fly-leaf which are to be united to each other, head-end-registering devices acting in opposite relations with respect to the signatures and fly-leaves upon the respective supports, and pressing devices, whereby the machine is adapted to attach fly-leaves and the like to the faces and backs, respectively, of signatures and the like.

52. A machine for attaching fly-leaves and the like to signatures of books and the like, comprising, essentially, opposite sets of pasters and edge-registering devices, duplicate end-registering devices oppositely related to the respective sets aforesaid, and devices to press the fly-leaves and signatures together to cause them to unite.

53. A machine for attaching fly-leaves and the like to signatures of books and the like, comprising, essentially, duplicate mechanisms,

respectively right and left, whereby fly-leaves and the like are attached to the faces and backs, respectively, of signatures.

54. A machine for attaching fly-leaves and the like to signatures of books and the like, comprising, essentially, duplicate attaching or combining devices, and gaging devices reversely related to the respective attaching or combining devices to act in opposite directions, respectively.

55. In a machine for uniting fly-leaves and the like to signatures of books and the like, in combination, means to fold a fly-leaf or fly-sheet upon itself, and means to attach the marginal portion of one face of the said fly-leaf or fly-sheet adjacent the line of fold thereof to the marginal portion of one face of the signature.

In testimony whereof I affix my signature in presence of two witnesses.

WILLARD I. LEWIS.

Witnesses:
CHAS. F. RANDALL,
WILLIAM A. COPELAND.