(No Model.)

5 Sheets—Sheet 1.

J. W. LOW.

PAPER BOX MACHINE.

No. 603,471. Patented May 3, 1898.

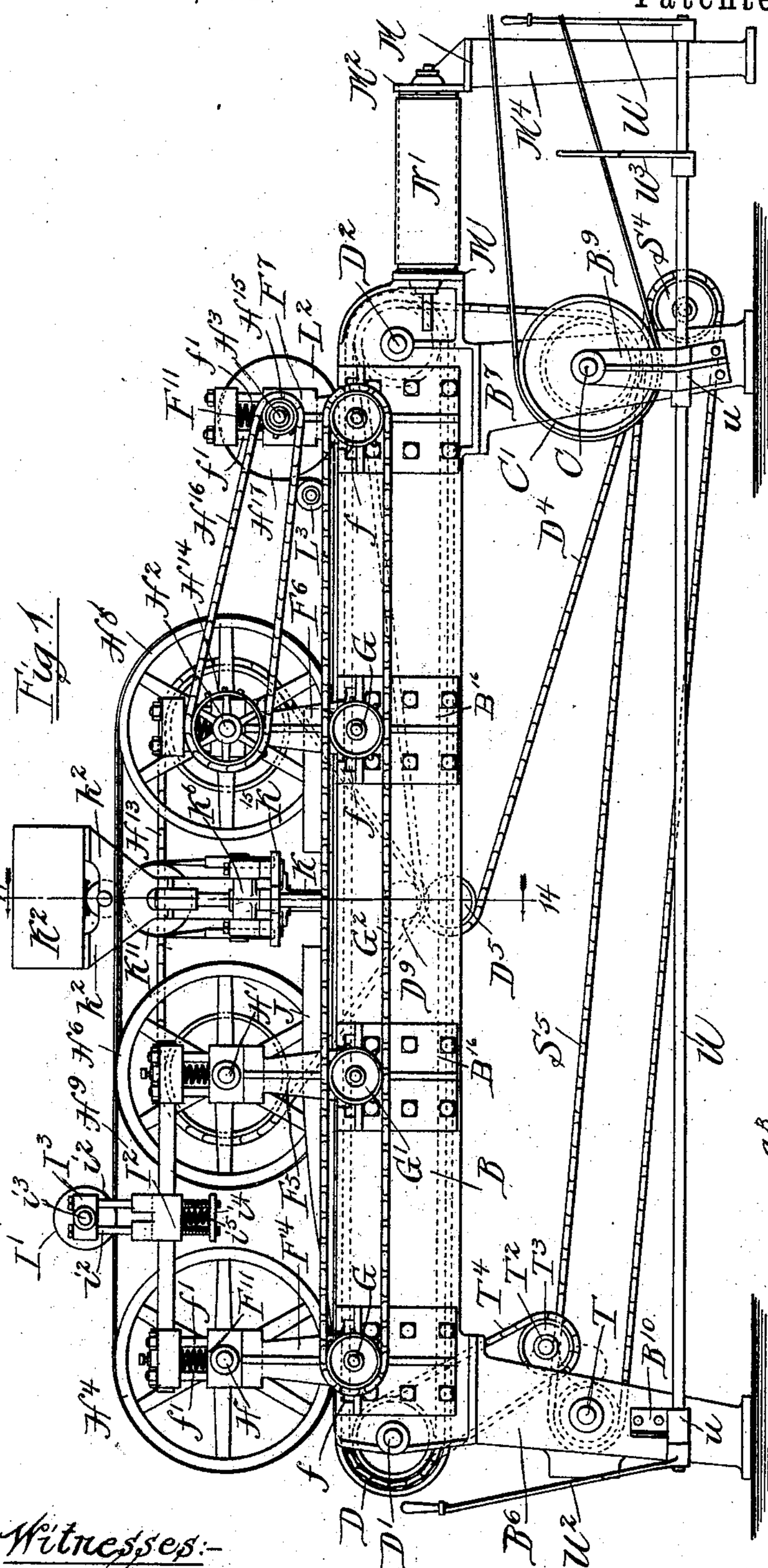

Fig. 1.

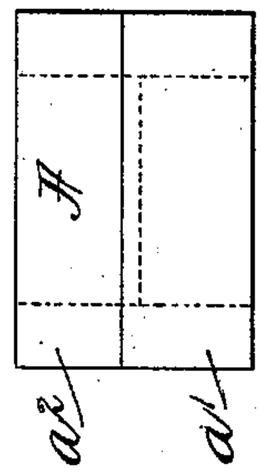

Fig. 19.

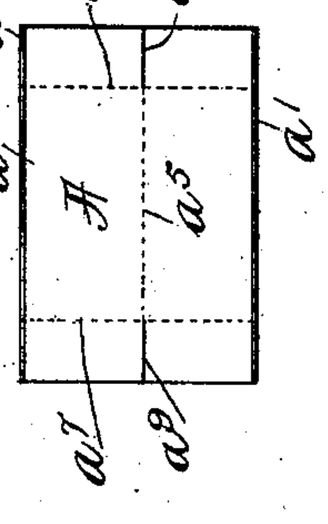

Fig. 18'.

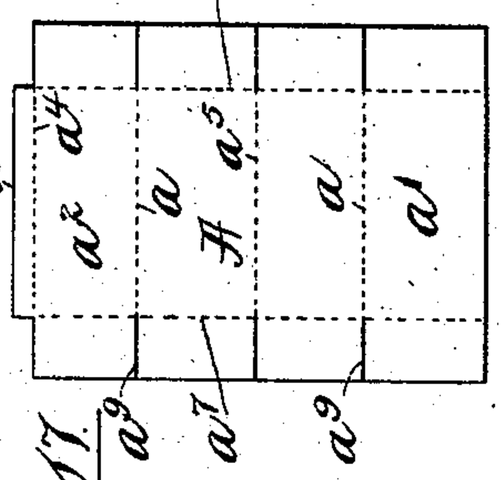

Fig. 17.

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(No Model.) 5 Sheets—Sheet 2.

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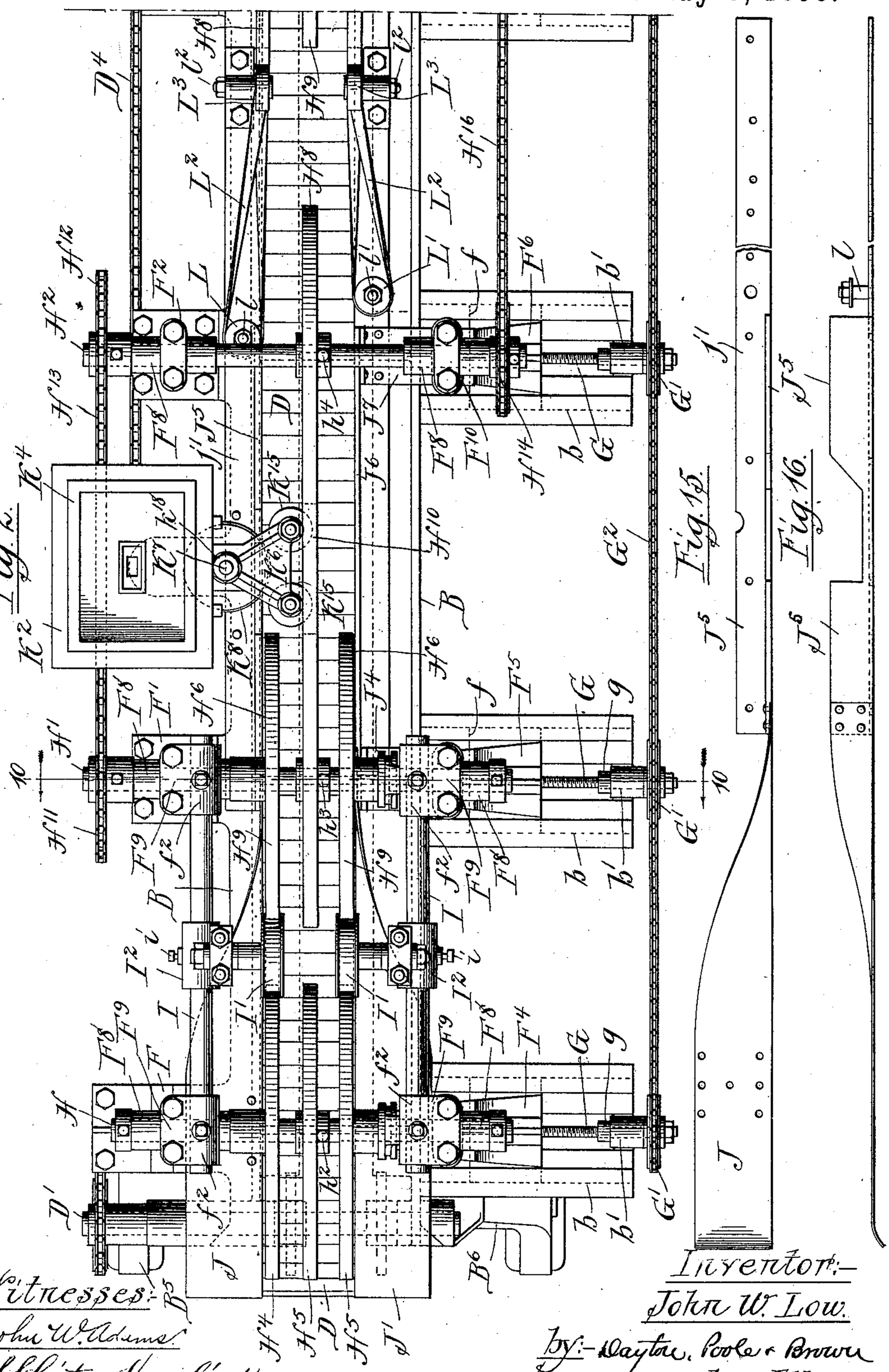

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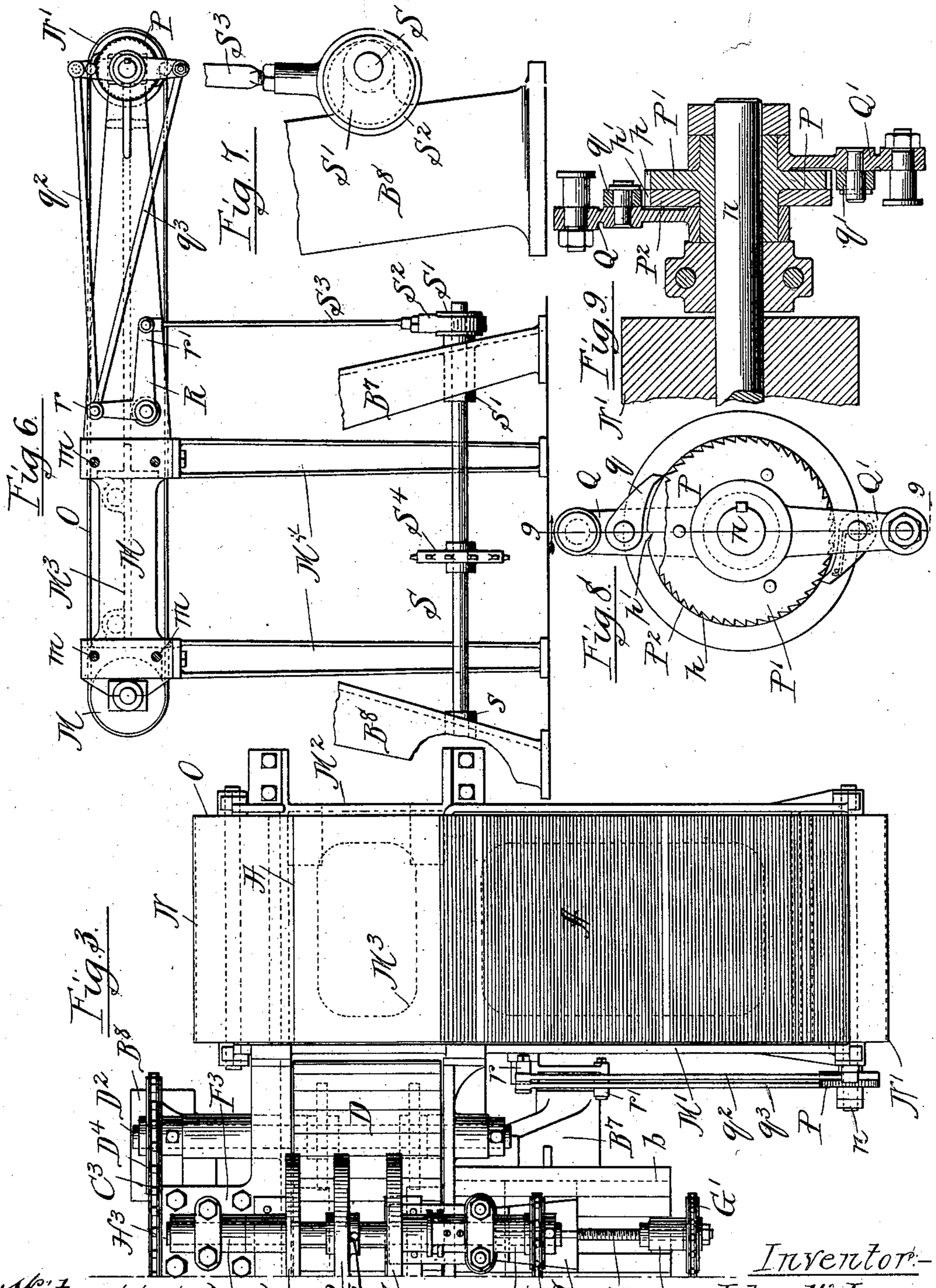
J. W. LOW.

PAPER BOX MACHINE.

No. 603,471. Patented May 3, 1898.



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(No Model.) 5 Sheets—Sheet 4.

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PAPER BOX MACHINE.

No. 603,471. Patented May 3, 1898.

Fig. 5.

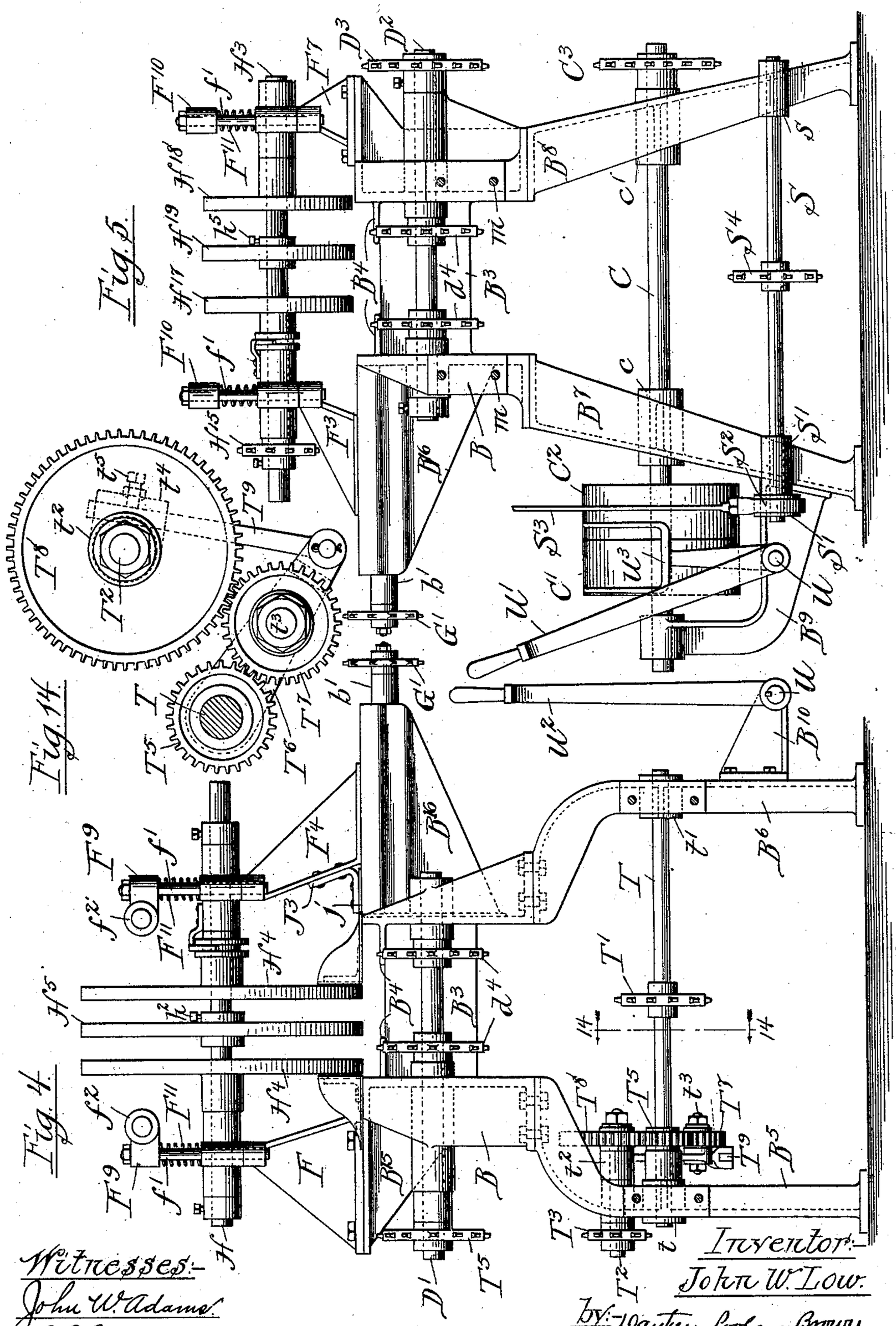

Fig. 14.

Fig. 4.

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(No Model.)

5 Sheets—Sheet 5.

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PAPER BOX MACHINE.

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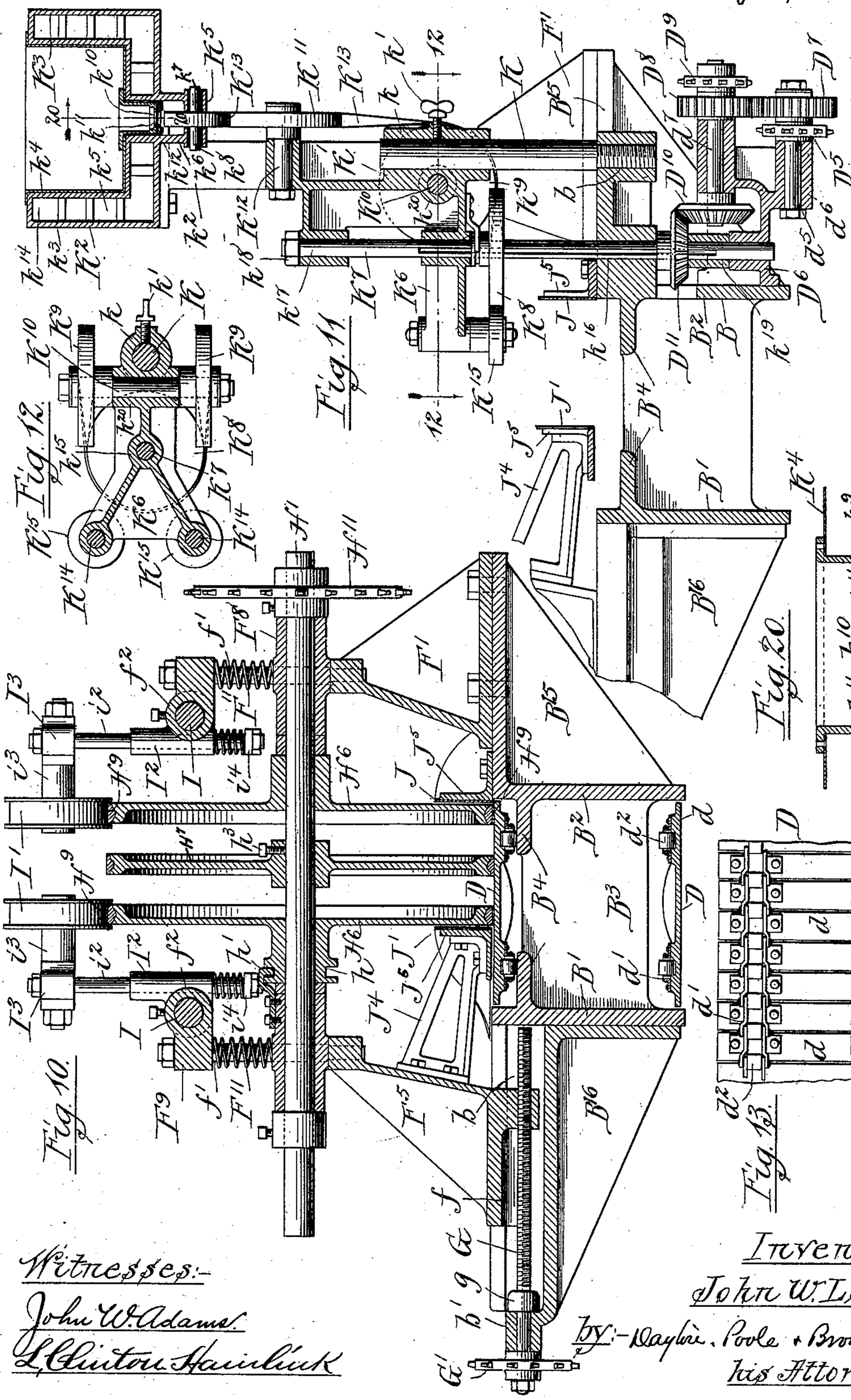

Fig. 11.

Fig. 12.

Fig. 10.

Fig. 20.

Fig. 13.

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UNITED STATES PATENT OFFICE.

JOHN W. LOW, OF CHICAGO, ILLINOIS.

PAPER-BOX MACHINE.

SPECIFICATION forming part of Letters Patent No. 603,471, dated May 3, 1898.

Application filed March 19, 1896. Serial No. 583,899. (No model.)

To all whom it may concern:

Be it known that I, JOHN W. LOW, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Paper-Box Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in box folding and pasting machines, and pertains more specifically to a machine adapted to fold and paste blanks which have been previously scored or creased, so that they may be readily folded on the desired lines.

The machine herein shown is provided in addition to its main parts with a counting mechanism by which a record is made of the number of blanks handled by the machine.

The invention consists in the matters hereinafter set forth, and more particularly pointed out in the appended claims, and it will be more readily understood by reference to the accompanying drawings, in which—

Figure 1 is a side elevation of a machine embodying my invention. Figs. 2 and 3 taken together represent the same in top plan view. Fig. 4 is a front end elevation of the machine. Fig. 5 is a rear end elevation with the counting mechanism removed. Fig. 6 is an end elevation of said counting mechanism. Fig. 7 is a detail of the eccentric, by means of which the counting mechanism is actuated. Fig. 8 is a face view of the ratchet feed mechanism of a counting device. Fig. 9 is an axial section of the same, taken on line 9 9 of Fig. 8. Fig. 10 is a transverse vertical sectional view taken on line 10 10 of Fig. 2 and looking in the direction of the arrows. Fig. 11 is a vertical sectional view of the pasting mechanism, taken on line 11 11 of Fig. 1. Fig. 12 is a horizontal sectional view taken on line 12 12 of Fig. 11 and looking downwardly. Fig. 13 is a fragmentary detail of the carrier-belt. Fig. 14 is a detail of the change-speed gears. Figs. 15 and 16 are top plan and edge views, respectively, of one of the forming-plates. Fig. 17 is a plan view of a blank as scored preparatory to being folded and pasted by the machine. Fig. 18 is a plan view of the same, showing its form at the time the paste is applied. Fig. 19 is a plan view showing the blank as it leaves the machine. Fig. 20 is a detail section on line 20 20 of Fig. 11.

A machine embodying my present invention is adapted to fold a blank such as is indicated by A, Fig. 17, which has been previously scored or provided with at least two parallel longitudinal creases, as indicated in dotted lines at a a, and the operation of the machine is to bend the side portions a' a^2 upwardly along said scores a a to apply paste to the outer side of the flap a^3 or that portion exterior to the dotted line a^4, and to thereafter fold the side a^2, carrying the flap, against the central part of the blank, and the part a' also against the central part of the blank, with its side margin into contact with the pasted flap, and thereby forming a tubular box-body or blank.

The machine herein shown performs only the above-described steps and the additional step, hereinafter described, of automatically separating the blanks into lots, each containing a predetermined number, so that the scoring of the blank in the manner hereinbefore referred to is therefore all that is directly concerned in the operation of the machine; but in order that the collapsed tube may be expanded out into rectangular form and the ends of the same thereafter folded in to form a rectangular package in a well-understood manner the blank will usually be provided with one additional longitudinal score a^5, transverse end scores a^7 a^8, and suitable cuts or slits, as a^9 a^9.

A machine embodying my invention comprises the following general groups of mechanisms, to wit: feed mechanism for engaging the blank and carrying it through the machine, (the various folding and pasting operations being performed upon the blank during its transit,) mechanism for folding or bending the side portions of the blank into position at right angles to the central portion thereof, mechanism for applying the paste or other adhesive substance to the flap of the blank, mechanism for folding down the side portions, mechanism for pressing the margin of the uppermost side portion into contact with the paste-coated portion of the underlying one, and a receiving mechanism which

operates to automatically separate the completed blanks or tubular box-bodies into lots, each containing a determined number. The present machine is also made adjustable for blanks of different sizes and for blanks scored at different distances apart, so as to form packages having relatively wider or narrower sides. The machine, therefore, also includes as a subordinate or auxiliary improvement mechanism whereby the adjustment of all the operative parts is accomplished simultaneously and accurately into correct operative positions.

Referring now to the drawings, B designates as a whole the main frame of the machine, the same consisting of a main body or bed generally of oblong rectangular form and comprising parallel vertical side webs or plates B′ B², united at suitable intervals by means of integral transverse vertical webs B³ and inwardly-extending horizontal flanges B⁴ B⁴, located a short distance below the top surface of the said bed and extending the full length of the latter. At each end the bed is provided with suitable supporting legs or standards B⁵ B⁶ and B⁷ B⁸, bolted thereto in such manner as to insure rigid support to the main frame, as indicated clearly in end views, Figs. 4 and 5.

C designates the main driving-shaft mounted to extend transversely of the machine and resting in journal-bearings *c c′*, formed in the supporting-legs B⁷ B⁸, said shaft being shown as extended at one end some distance outside of the journal-bearing *c* and supported at its extremity by means of a bracket B⁹, secured to the lower part of the leg B⁷. Between the bracket and the adjacent leg B⁷ the shaft is provided with fast and loose pulleys C′ C², through which motion is communicated to the shaft by means of a belt driven from any suitable source of power. The opposite end of the shaft C is provided with a sprocket-wheel C³.

D designates an endless carrier-belt mounted to travel longitudinally of the bed B between the vertical side plates thereof and resting on tracks or ways, in this instance formed by the inwardly-extending flanges B⁴ B⁴ of the frame. Said belt, as shown more clearly in the detail view, Fig. 13, is composed of transversely-arranged supporting-plates or slats *d*, preferably made of metal and united by means of links *d′ d′*. The slats are provided adjacent to their ends with rollers *d²*, which rest and travel upon the said horizontal flanges B⁴. Said rollers are conveniently mounted on the pivots which connect the links *d′ d′*, as clearly shown in the drawings, Fig. 13. The width of the slats or supporting-plates *d* is such with relation to the length of the connecting-links *d′* that the outer surface of the belt forms when the belt is traveling in a straight line a practically continuous supporting-surface upon which the blanks are supported in their passage through the machine.

D′ D², Figs. 1, 4, and 5, designate shafts mounted in suitable journal-bearings formed in the bed B, so as to extend transversely and horizontally through said bed adjacent to each end thereof. Each of said shafts is provided with a pair of sprocket-wheels *d⁴ d⁴*, which serve as guides or supports to carry the carrier-belt around the ends of the bed B, the lower lap of said belt passing beneath said bed. The shaft D² at the rear end of the machine is extended out beyond the side frame and is provided with a drive sprocket-wheel D³, keyed thereon. A chain belt D⁴ extends from the sprocket-wheel C³ around the sprocket-wheel D³ and also around a third sprocket-wheel D⁵, mounted upon the side of the main frame at a point about midway of its length, Fig. 1, thereby communicating motion to the carrier-belt D from the main driving-shaft C and at the same time actuating the wheel D⁵, through the medium of which motion is given to the pasting devices of the machine, as will hereinafter be described.

The sprocket-wheel D⁵ at the middle of the frame is carried by a short or stub axle *d⁵*, (see Fig. 11,) mounted in a journal-bearing *d⁶*, formed in a bracket D⁶, suitably secured upon the side of the bed B. The sprocket-wheel D⁵ is secured upon the stub-axle *d⁵*, which also carries a gear-wheel D⁷, which in turn meshes with a similar gear-wheel D⁸, mounted upon a shaft *d⁷*, arranged parallel with the shaft *d⁶* and carried by the same bracket D⁶. The shaft *d⁷* carries at its outer end a sprocket-wheel D⁹, from which the traveling pressure devices, hereinafter referred to, are actuated. Said shaft D is also provided at its inner end adjacent to the bed-frame with a miter-gear D¹⁰, which intermeshes with a second similar miter-gear D¹¹ on an upright shaft K⁷, by which the pasting devices are actuated, as will be hereinafter more fully described.

In order that the blanks which are engaged and carried rearwardly upon the upper surface of the carrier-belt may be held in frictional contact with the latter, so as to be positively drawn or carried along therewith, traveling pressure devices are arranged to act upon the top surfaces of the blanks, the same being constructed and arranged as follows:

F F′ F² F³ designate four standards (see Figs. 1, 2, and 3) rigidly mounted upon laterally-extending brackets B¹⁵, arranged at equal intervals apart along one side of the bed B, and F⁴ F⁵ F⁶ F⁷ designate four similar standards arranged upon the other brackets B¹⁶ upon the opposite side of the bed B at points transversely opposite the brackets B¹⁵. The standards F⁴ F⁵, &c., have movable connection with the brackets B¹⁶, being provided with guide-flanges *f f*, which engage and slide within ways *b b*, Fig. 10, formed in the upper surfaces of the brackets, so as to extend parallel with each other and at right angles to the bed-frame. The standards F⁴ F⁵, &c., are held and actuated within the ways

b by means of adjusting-screws G, Fig. 10, mounted in journals b' at the outer ends of the brackets and engaging depending screw-threaded lugs upon the lower sides of said standards. The adjusting-screws G are held from endwise movement within the journals b' by means of fixed collars g, which engage the inner sides of the said journals and the hubs of the actuating sprocket-wheels G', attached to the outer ends of said screws.

Each of the standards on both sides of the bed B is provided at its upper end with a journal-box F^8, having vertically-movable connection with the standards conveniently afforded by vertical studs f' f', inserted in each standard at the outer sides of the boxes and on which the latter are adapted to slide, Figs. 1, 4, and 5, the journal-box carried by each pair of oppositely-arranged standards being arranged in axial alinement with each other. Within these journal-boxes F^8 are mounted transverse shafts H H' H^2 H^3. Upon each of the shafts H and H' are mounted three belt-pulleys H^4 H^4 H^5 and H^6 H^6 H^7, respectively, while the shaft h^2 is provided with a single pulley H^8, Figs. 1 and 2. All of said pulleys are of equal diameter and relatively narrow, as indicated clearly in the drawings.

H^9 H^9, Figs. 1 and 10, designate friction-belts trained around the two outer pairs of pulleys H^4 and H^6. These belts will preferably be made of steel or other suitable metal.

H^{10} designates a single belt trained over the center pulley H^7 of the shaft H' and the single pulley H^8 of the shaft H^2. This belt will preferably be made of rubber or leather.

The pulleys H^7 and H^8 are shown as grooved and the belt which rests thereon as provided on its inner or contact surface with a corresponding rib, so that it will be prevented from running off from the pulleys should they be set slightly out of line with each other, this provision being made for a purpose hereinafter described. The outer pairs of pulleys may or may not be grooved, as desired.

The diameter is of the several pulleys referred to such with relation to the height of the standards upon which their shafts are mounted that said pulleys will rest at their lower sides upon the carrier-belt D, and in order that they may be held in yielding contact with said carrier-belt springs F^{11} F^{11} are arranged to act on the boxes F^8 of said shafts in a direction to press the same downward. In the particular construction illustrated the vertical studs f' f' are extended above said journal-boxes F^8 and provided at their upper ends with cap pieces or blocks F^9 and F^{10}, between which and the upper side of the journal are arranged the springs F^{11}, which are of coiled form and under compression and which act to hold the journals yieldingly in their lowermost positions. The said cap-pieces F^9, at each side of the machine, are provided with eyes or sockets f^2 to support longitudinal bars I I, which in turn carry tension-pulleys I' I', (see Fig. 2,) arranged to act upon the upper sides of the belts H^9 at points midway between the pairs of pulleys H^4 H^6. In the particular construction shown herein the mountings of said tension-pulleys consist each of a clip I^2, provided with an opening through which the bar I passes, the clip being secured in position upon the latter by means of a set-screw i. Said clip is provided with a pair of vertical parallel sockets through which are inserted upright rods i^2, Figs. 1 and 10. Upon the upper ends of said rods i^2 is mounted a journal-block I^3, within which is journaled a stub-shaft i^3, carrying the pulley I'. The rods i^2 i^2 are arranged to slide vertically within their sockets, and in order that the tension-pulley may be held in contact with the belt H^9 with a yielding and adjustable tension said rods i^2 are provided at their lower ends with an adjustable cross-head i^4, between which and the lower side of the clip is arranged a coiled compression-spring i^5, Fig. 1. In order that the outer pulleys H^4 H^6 upon the adjustable side of the machine may be adjusted upon their respective shafts H and H' simultaneously with the adjustment of the standards F^4 F^5, each of said outer pulleys is splined to the shaft and is provided at its hub with an annular groove h, (see Fig. 10,) which is engaged by a hook-shaped fork or yoke h', secured upon the upper side of the journal F^8 adjacent thereto.

In order to actuate the train of belt-pulleys hereinbefore described, the shafts H' H^2 are provided at their ends exterior to the journals F^8 with sprocket-wheels H^{11} H^{12}, about which sprockets is trained a chain belt H^{13}, driven from the sprocket-wheel D^9, which is located near the center of the machine-frame, as hereinbefore described, (see Fig. 11,) the relative size of the several sockets being such that the rate of travel of the belts H^9 and H^{10} will be uniform with that of the carrier-belt D.

The central pulley H^5 of the shaft H carries no belt, but in lieu thereof is provided around its periphery with a rubber or other frictional covering, said pulley thus constructed serving to act both as a feed-roller to assist in drawing in the blank and also as a pressure-roller.

Next describing the devices by means of which the side portions of the blank are bent upwardly at right angles to the central portion thereof, J J', Figs. 2, 15, and 16, designate two sheet-metal guide-plates or folders, one of which is shown in detail in Figs. 15 and 16. Ends of said plates have the form of an elongated metal strip provided between its sides with a half-twist, so that one end portion stands in a plane at right angles to the other, Figs. 15 and 16. The folders are oppositely curved or twisted. The folders are secured to the bed so as to extend longitudinally thereof, the forward end of the folder J being secured horizontally upon the top surface of the bracket B^{15} and the adjacent part of the top surface of the bed at the front

end of the machine, with its inner margin approximately registering with the inner vertical face of the side plate or web B^2. (See Fig. 10.) The rear end of the said folder J is secured and held rigidly in vertical position flush with the said vertical face B^2 of the bed by means of an angle-iron J^5, bolted to the top surface of the bed and to the outer vertical face of said guide-plate, as indicated clearly in said Fig. 10. The folder J′ is mounted in similar position, but is made adjustable laterally, together with the standards for the pressure-pulleys and parts carried thereby. To this end the horizontal forward end of the plate is provided with a lateral extension *j*, (see Fig. 4,) which is secured to the under surface of an angle-iron J^3, carried by the front standard F^4, while the rear end of the said folder J′ (see Fig. 10) is carried upon the end of the inwardly-projecting bracket J^4, which is in turn attached to the adjustable standard F^5.

The guide-plates or folders J and J′ are provided at their rear ends with extensions in the form of vertically-arranged guide-straps J^5 J^6, one of which, J^5, is provided with a right-angled base portion *j*′, through which are inserted suitable securing-bolts entering the top of the bed B, while the other strap J^6 is supported from the adjustable standards F^5 by the bracket J^4, to which the rear end of the folder is attached, and to the standard F^6 by a like bracket J^7.

Next describing the paste-applying mechanism, this is located in rear of the point where the sides of the blanks assume vertical positions under the action of the folders J J′, conveniently and as herein shown at a point midway between the standards F′ and F^2 and at the fixed or non-adjustable side of the machine. Referring now in detail to the several parts comprising said pasting mechanism, K, Fig. 11, designates a vertical standard mounted upon the side of the bed B, and herein shown as having the form of a cylindric rod threaded at its lower end to engage a suitable socket *b* cast on said bed. Upon this standard K is mounted a head or frame casting K′, (see Fig. 11,) properly formed to support the various parts of the pasting mechanism proper, the said head K′ being provided with a socket *k*, which is engaged by the upper end of the standard K, and with a set-screw *k*′, by means of which the head may be adjustably secured upon the said standard. The upper end of the part K′ is provided with divergent arms k^2 k^2, (see Fig. 1,) which terminate in a flat horizontal supporting-surface, upon which is mounted a paste pot or receptacle K^2, containing any suitable adhesive material.

The particular construction of the paste-pot is of course not vital, but as an improved construction herein shown consists of an outer hollow jacket K^3, having outer and inner walls k^3 k^4, inclosing an intervening space k^5, adapted to be filled with steam or other suitable heating medium, and an inner sheet-metal vessel K^4, adapted to fit closely within the outer jacket K^3. The outer jacket is provided with a centrally-located depending part k^6, forming the bottom outlet thereof, which part is vertically slotted to receive a feed-roller K^5 and transversely apertured, as at k^7, at right angles to said slot to receive the trunnions k^8 of said feed-roller. The journal-apertures k^7 are elongated horizontally, so as to permit a limited bodily-vertical movement to the said roller K^5, which latter is of such diameter as to project at its lower side some distance below the depending part k^6. The inner sheet-metal pot K^4 is made removable and is also provided with a centrally-located depending part k^9, adapted to extend downwardly within the depending part of the jacket k^6, with its lower end adjacent to the upper periphery of the feed-roller K^5. The lower end of the part k^9 is provided with an outlet-aperture k^{10}, which is controlled by means of two sheet-metal slides k^{11}, arranged to slide toward and from each other within closely-fitting ways k^{12} k^{12}, each slide being provided at its outer end with a downturned flange k^{13}, Fig. 20, forming a finger-hold, by means of which it may be adjusted to regulate the flow of paste or other adhesive liquid contained within the pot.

From the foregoing description it will be obvious that the inner paste-pot may be removed to replenish or clean it or to substitute a similar one at any time by simply closing the slides and lifting it bodily out of the outer jacket or vessel. It may be noted in this connection that the paste will usually be kept hot by steam or hot water within the outer jacket, and the latter is for this purpose shown as provided with an inlet-opening k^{14}.

The paste or other adhesive material is transferred from the feed-roller K^5 to the flap of the box by means of devices arranged as follows: K^6, Figs. 1, 11, and 12, designates a laterally-extending arm or part of the head K′, provided at a point intermediate of its length with a vertical journal-aperture bearing, arranged in vertical alinement with a circular bearing k^{16}, formed in the bed B. In said bearings is mounted the shaft K^7, which extends below the bed and is there provided with the miter-gear D^{11}, hereinbefore referred to. The upper end of said shaft K^7 extends through a journal-bearing k^{17}, formed in an overhanging part of the head K′, and is secured against vertical movement therein by means of a nut k^{18}, secured upon the upper end of the shaft, so that the latter will be carried with the head K′ in the vertical adjustment of the latter. In order to provide for the vertical movement of the said shaft K^7 through the gear D^{11} and at the same time provide an operative connection between said parts, the hub of the gear is provided with a spline which engages a corresponding keyway in the shaft. The gear D^{11} is held in position to intermesh with the gear D^{10} by means of

the under surface of the bed B, against which its upper side rotates, and collar or sleeve k^{19}, interposed between its lower side and the bracket D^6, through which the lower end of the shaft extends.

K^8 designates a belt-pulley mounted rigidly upon the shaft K^7, adjacent to the lower side of the laterally-extending arm K^6, and K^9 K^9, Fig. 12, designate two similar belt-pulleys mounted upon a shaft K^{10}, arranged at right angles to the shaft K^7, in a suitable journal-bearing k^{20}, formed transversely through the head K'.

K^{11} designates a fourth belt-pulley mounted upon a stub-shaft K^{12} and arranged to rotate in the same plane with and immediately below the feed-roller K^5. A distributing-belt K^{13} is trained around the horizontal guide-pulley K^8, thence beneath the pulleys K^9 K^9, and around the vertical guide-pulley K^{11}, as shown clearly in Fig. 11. The journal-bearings for the trunnions of the feed-roller K^5 have the form of vertically-extended slots, which permit of vertical movement of the said feed-roller, and the diameter of the belt-pulley K^{11} is such that the feed-roller rests by gravity upon a distributing-belt and is therefore rotated by frictional contact with said belt, thus serving to transfer paste from the paste-pot to the distributing-belt. The diameter of the horizontal guide-pulley K^8 is such that its periphery projects inwardly to a point in the same vertical plane with or slightly beyond the guide-plate J^5, and the pasting mechanism will be so adjusted vertically as to bring said horizontal guide-pulley opposite that part of the flap of the blank to which the paste is to be applied. In order that the edge of the blank may be pressed firmly into contact with the paste-laden distributing-belt as the blank passes the guide-pulley K^8, the laterally-extending arm K^6 is provided at points radially outside of the periphery of said guide-pulley and at the front and rear of the same with two vertical depending stub-shafts K^{14} K^{14}, (see Fig. 12,) upon which are mounted presser-rollers K^{15} K^{15}, arranged to rotate in the same horizontal plane with the guide-pulley K^8 and serving to press the vertical upturned edge of the blank against the guide-pulley, thus insuring a perfect contact with the latter. The paste having been thus applied to the blank the next operation of the machine is to fold the upturned sides of the latter down, one upon the other, upon the central part of the blank, and it will be obvious that this must be accomplished in such manner that the edge of the paste-coated side or flap will be certainly brought beneath the edge of the opposite side, so that the said sides may be properly united. This is accomplished by mechanism constructed and arranged as follows:

The shafts H^2 and H^3 are provided with fixed sprocket-wheels H^{14} H^{15}, arranged in alinement with each other, and the one H^{15} of which is driven from the other by means of a chain belt H^{16}. The shaft H^3, Fig. 5, is provided with two belt-pulleys H^{17} H^{18} and a presser-roller H^{19}, arranged in the same manner as those at the front end of the machine, except that these latter pulleys are arranged slightly farther apart upon the shaft H^3.

L L', Fig. 2, designate two guide-pulleys mounted upon vertical studs l l', projecting from the upper side of the horizontal parts of the guide-straps J^5 J^6. The pulleys L L' are so located as to bring their peripheries flush with the inner faces of the vertical parts of said guide-straps J^5 J^6 and adjacent to the rear ends thereof, one pulley L' being located somewhat in rear of the other.

L^2 L^2 designate folding-belts trained around the said pulleys L and L' and the pulleys H^{17} and H^{18} on the shaft H^3.

L^3 L^3 designate guide-pulleys mounted upon suitable horizontal journal-studs l^2, carried by the rear ends of the guide-straps J^5 J^6, Fig. 2. Inasmuch as the pulleys H^{17} H^{18} rotate in vertical planes and the pulleys L L' in a horizontal plane, it will be obvious that the folding-belts L^3 must each have a half-twist between said guide-pulleys, and by reason of the fact that the lower laps of said belts travel closely adjacent to the traveling carrier-belt B and that the twist or turns in said folding-belts are formed in opposite directions said belts act, in conjunction with the carrier D, to gradually fold down the vertical sides of the blank upon the central portion thereof as the blank passes rearwardly beneath said belts. The belt L^2 on the side of the blank to which the paste has been applied will be reached and begin to act upon the blank first in the rearward movement of the latter, so that the pasted side of the blank will be brought underneath the other. The further rearward movement of the blank carries it beneath the presser-roller H^{19}, which latter presses the unpasted upper flap firmly down upon the other and at the same time assists in carrying the blank onward through the machine.

Next describing the receiving and counting mechanism hereinbefore referred to, M, Figs. 3 and 6, designates as a whole a bed or frame mounted to extend transversely at the rear end of the main machine and comprising vertical side webs M' M^2, united by means of a horizontal web M^3, conveniently made of skeleton form, as indicated in dotted lines, Fig. 3. The bed-frame is conveniently and as herein shown made separate from the main machine and secured at one of its sides M' to the rear end of the main machine by means of suitable bolts m m, (see Fig. 6,) while its opposite side is carried by suitable standards or legs M^4 M^4. The bed M is arranged horizontally in a plane somewhat below the level of the top of the carrier D and extends at one end a considerable distance beyond the side of the main machine. At each end of said bed are supported transversely-arranged guide-rollers N N', which carry a receiving-belt O of practically the full

width of the bed and arranged to run above and below the horizontal web portion thereof in a manner substantially like that of the carrier-belt D, hereinbefore described.

The receiving-belt O is driven with a step-by-step movement, so that each blank delivered thereon from the carrier D of the main machine will be deposited slightly in rear of the preceding one, thus bringing the blanks into overlapped position upon the belt. At predetermined intervals the receiving-belt is moved forward a double step, so as to separate the blanks into lots containing a desired number. The mechanism for this actuating-belt is arranged as follows: The journal n of the roller N′ is extended at its end next the main machine out beyond the side of the bed M and has keyed thereon a ratchet-wheel P, comprising two members P′ P², (see Figs. 8 and 9,) secured rigidly to each other, so as to rotate together. The member P′ is provided with ratchet-teeth p around its entire periphery, while the member P² has in this instance but a single ratchet-tooth p'.

Q Q′ designate two oscillatory pawl-carrying arms pivoted concentrically with the ratchet-wheel and each carrying a pawl q q', adapted to act upon the ratchet members P² P′, respectively. The oscillatory arms Q Q′ are arranged to extend oppositely from each other, and in order to communicate movement thereto they are connected, by means of links q^2 q^3, (see Fig. 6,) with the upright arm r of a bell-crank lever R, pivoted to oscillate in a vertical plane at the side of the bed M at a point about midway of the length of the latter.

S designates a shaft journaled in suitable bearings s s', mounted upon the lower parts of the legs B⁷ B⁸ of the main machine, so as to extend transversely of the latter. The shaft S is provided at a point beneath the bell-crank lever R with an eccentric S′, with which is engaged an eccentric-strap S², carried upon the end of an eccentric-rod S³. The eccentric-rod extends upwardly and is connected at its upper end with the horizontally-extending arm r' of the bell-crank lever R, thereby communicating oscillatory motion to the latter, which in turn oscillates the pawl-carrying arms Q Q′. The extent of the oscillatory movement thus imparted to the arms Q Q′ is such as to move the ratchet-wheel forward one notch each time a pawl acts thereon, and inasmuch as the periphery of one of the members of said ratchet-wheel is entirely smooth except for the single notch p' therein it will be obvious that the pawl resting on this member can only act when the notch comes into proper relation thereto. The ratchet-wheel as a whole will therefore be rotated only upon each outward oscillation of the arm Q until the single notch of the member P² is carried around into proper relation to the pawl on the arm Q′, whereupon this pawl will act upon the return movement of the arms and thus impart to the ratchet-wheel twice its usual movement.

Driving connections by means of which the receiver-belt is driven at a speed bearing certain relation to the rate of travel of the carrier-belt D and whereby the relative rates of speed of the said two belts may be changed are constructed and arranged as follows:

The shaft S is provided at a point intermediate its length with a sprocket S⁴.

T designates a shaft journaled in suitable bearing-apertures t t', (see Fig. 4,) formed in the front legs B⁵ B⁶ of the main machine, so as to extend parallel with the shaft S, said shaft T being also provided with a sprocket T′, arranged in alinement with the sprocket S⁴. A belt S⁵ connects said sprockets S⁴ T′.

T² designates a shaft journaled in suitable bearings t^2 upon the leg B⁵ parallel with and above the shaft T. At its outer end said shaft T², Figs. 1 and 11, is provided with a sprocket T³, which is driven by means of a belt T⁴, leading from a sprocket T⁵, mounted on the end of the shaft D′.

The connections between the shaft T² and shaft T are as follows: Upon the shaft T is mounted a fixed gear T⁵, and adjacent thereto an arm T⁶, (see Fig. 14,) loosely connected with the shaft and provided at a point intermediate its length with a journal-stud t^3. Upon the stud t^3 is mounted a gear T⁷, arranged to intermesh with the gear T⁵.

T⁸ designates a third gear splined or otherwise removably, but non-rotatively, secured upon the shaft T².

T⁹ designates a link connected with the outer end of the arm, and extending thence upwardly to and passing through a socket t^4, conveniently formed integral with the journal-box t^2 of the gear T⁸, as indicated clearly in dotted lines, Fig. 14. The end of the link T⁹ is adjustably held within said socket, conveniently by means of a set-screw t^5, in position to hold the swinging gear T⁷ in mesh with the gear T⁸.

When it is desired to change the relative speeds of the carrier and receiver belts, this is accomplished by removing the gear T⁸, substituting therefor one of different size, and readjusting the link T⁹, so as to bring the gears into mesh with each other.

Inasmuch as it is necessary when adjusting the machine for a different width of blanks to adjust the movable parts of one side of the machine an equal amount throughout its entire length, each of the adjusting-screws G is provided at its outer end with a sprocket-wheel G′, and said sprocket-wheels are all connected by means of a sprocket-belt G², (see Fig. 2,) whereby said adjusting-screws may be rotated simultaneously and to an equal extent by shifting the belt in one direction or the other, as required.

The adjustment of the central pressure-rollers H⁵ H⁹ and belt-pulleys H⁷ H⁸ is not affected by the adjusting-screws G, and inasmuch as it is necessary that these latter be readjusted, so as to occupy a position practically central between the side pulleys, said

central rollers and belt-pulleys are movably mounted upon the shaft and are provided with set-screws h^2 h^3 h^4 h^5, whereby they may be secured in position after adjustment. In this connection it may be noted that the belt-pulley H^8 will usually be set slightly nearer the non-adjustable or pasting side of the machine than the pulley H^7, so that the belt H^{10} will have a tendency to crowd the blank snugly against the side of the machine carrying the pasting device, and in order that the belt may not run off when the pulleys are thus set out of line the latter are grooved, as hereinbefore described.

In order that the main guide-belt may be thrown from the fast to the loose pulley, or vice versa, by an operator at either end of the machine, a rock-shaft U is mounted to extend longitudinally of the machine in suitable bearings u u, formed in the bracket B^9 and the smaller bracket B^{10}, carried by the front leg B^6 and provided at each end with a hand-lever U' U^2, by means of which it may be oscillated. The shaft U is provided at a point beneath the drive-belt with a belt-shifter U^3, of the usual yoke form, whereby the belt may be shifted to either pulley in a familiar manner.

The operation of the machine may be briefly described as follows: The paste-pot having been supplied with a suitable adhesive material and the slides opened, so as to permit the escape of the proper supply of paste, the machine is started. The blanks are fed to the front end of the machine beneath the front pulleys H^4 H^4 and feed-roller H^5 and are carried rearwardly by the carrier-belt and the friction-belts which travel with the same. As the blank passes between the folders the latter will turn the two side portions a' a^2 upward into a vertical position, and further movement of the blank carries the outer flap a^3 into contact with the paste-distributing belt, from which it receives a proper supply of adhesive material. The continued further movement brings the blank beneath the folding-belts, which latter fold the sides down upon the central portion of the blank, the blank finally passing beneath the presser-roller H^9, and thence to the receiving-belt of the table M. The mechanism of the receiving-belt will be so adjusted as to move the latter forward one step for each blank received thereon until a number of blanks corresponding to the number of ratchet-teeth in the ratchet-wheel have been delivered upon the receiving-belt, whereupon the belt will be moved forward a double step, thus separating the preceding blanks from the blanks which follow by a space of double width. From the receiving-belt the blanks will be removed in separate lots by an attendant.

Obviously it is necessary that the blanks be fed to the machine at practically equal intervals, in order that the counting mechanism shall properly separate them into lots, and it will be further obvious that if blanks of different lengths be fed to the machine the relative speed of the receiving-belt must be correspondingly changed, and this will be accomplished by the substitution of change-speed gears in the manner hereinbefore described.

If the blank does not enter straight, the side-folders will act to straighten the same at the time they make the first fold.

I claim as my invention—

1. A machine for folding and pasting box-blanks comprising stationary tracks or ways, cross-slats pivotally connected with each other to form an endless traveling carrier and provided with rollers which run on said ways, feed belts and pulleys located above said carrier, stationary folders located at opposite sides of the carrier for bending the marginal part of the blank, pasting mechanism acting on one of the bent margins of the blank after the same has been acted upon by the folders, means for folding the marginal parts of the blanks to bring their edges together, and pressing mechanism for pressing together the pasted edges.

2. A machine for folding and pasting box-blanks comprising an endless traveling carrier, a traveling pressure device located over the same, stationary folders located at the sides of said traveling pressure device for bending the edges of the blank upwardly, means located in position to act on the blank after it has passed said folders, for applying paste to one of the upwardly-bent edges of the blank, said means embracing a paste-applying roller, and guide-rollers for holding the edge of the blank in contact with the paste-applying roller, means for folding the parts of the blank to bring the edges thereof together, and pressing mechanism for pressing together the pasted edges.

3. A machine for folding and pasting box-blanks comprising an endless traveling carrier, a traveling pressure device located over the same, stationary folding-guides located at the sides of said traveling pressure device, a pasting mechanism located in position to act on the blanks after they have passed the said folders and comprising a paste-applying roller, and guide-rollers adapted to hold the edge of the traveling blank in contact with the paste-applying roller, means for folding together the pasted edges of the blank, and a pressing mechanism for pressing together the said pasted edges.

4. A machine for folding and pasting box-blanks comprising feed mechanism for giving movement to the blanks, means for folding the marginal parts of the blank at right angles to the central part, and means for folding said marginal parts to bring their edges together comprising pulleys turning on vertical axes at the sides of the path of the blank, other pulleys mounted on horizontal axes and overhanging the path of the blank, and belts trained over said pulleys.

5. A machine for folding and pasting box-

blanks comprising an endless traveling carrier, a traveling pressure device located over the carrier, stationary folding-guides located at the sides of said traveling pressure devices, and means for folding down the marginal parts of the blanks comprising pulleys mounted on vertical axes at the sides of the carrier, other pulleys mounted on horizontal axes and located over the carrier, and belts trained over said pulleys.

6. A machine for folding and pasting box-blanks comprising a machine-frame, an endless traveling carrier, a traveling pressure device comprising shafts located over the carrier-belt, pulleys on the shafts, and belts on said pulleys, the pulleys at one side of the carrier being movable laterally on the shaft, standards for supporting the shafts, which are at one side of the carrier, constructed to slide laterally on the machine-frame, connections between said standards and the laterally-movable pulleys by which the pulleys are moved with the standards when the latter are shifted on the frame, and folding-guides for the blank of which those at one side of the carrier are attached to and move with the said standards.

7. A machine for folding and pasting box-blanks comprising a machine-frame, an endless traveling carrier, a traveling pressure device comprising shafts located over the carrier-belt, pulleys on the shafts, and belts on said pulleys, the pulleys at one side of the carrier being movable laterally on the shaft, standards for supporting the shafts, which are at one side of the carrier, constructed to slide laterally on the machine-frame, connections between said standards and the laterally-movable pulleys by which the pulleys are moved with the standards when the latter are shifted on the frame, and folding-guides for the blank, of which those at one side of the carrier are attached to and move with the said standards, and actuating devices attached to the several standards whereby the same may be moved at one time.

8. The combination with feed mechanism and folding mechanism, embracing folders which are laterally adjustable to correspond with the width of the blank, of pasting mechanism embracing a paste-applying roller, and means for supplying paste thereto, said pasting mechanism being vertically adjustable to correspond with the width of the folded margin of the blanks.

9. The combination with folding devices of pasting mechanism comprising a paste-receptacle, a paste-receiving roller located beneath the discharge-opening of the paste-receptacle and turning on a horizontal axis, a paste-conveying belt, two supporting-pulleys for the belt, one of which is mounted on a vertical axis and the other on a horizontal axis, and guide-pulleys engaging said belt between the two pulleys last mentioned.

10. The combination with an endless traveling carrier of means for folding inwardly the marginal parts of a blank resting on the carrier comprising two pulleys mounted on vertical axes at either side of the carrier, two pressure-pulleys mounted on horizontal axes over the carrier, belts trained over said pulleys, and two guide-pulleys mounted on horizontal axes in the same plane with the pressure-pulleys.

In testimony that I claim the foregoing as my invention I affix my signature, in presence of two witnesses, this 16th day of March, A. D. 1896.

JOHN W. LOW.

Witnesses:
C. CLARENCE POOLE,
WILLIAM S. HALL.