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PATENTED MAY 8, 1906.

J. G. BEATTIE.

MACHINE FOR APPLYING ADHESIVES TO PAPER, &c.

APPLICATION FILED APR. 11, 1905.

4 SHEETS—SHEET 1.

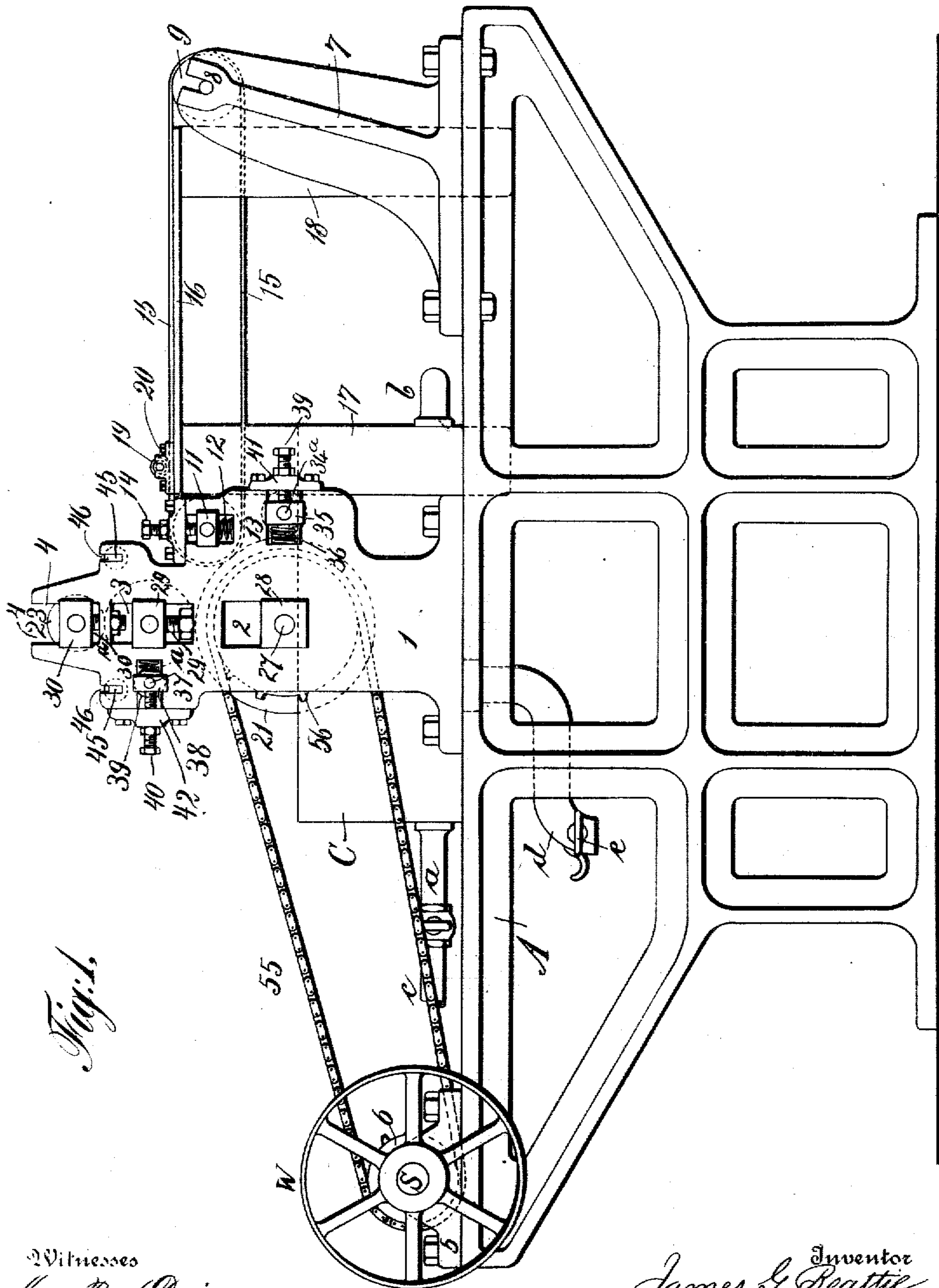


Fig. 1.

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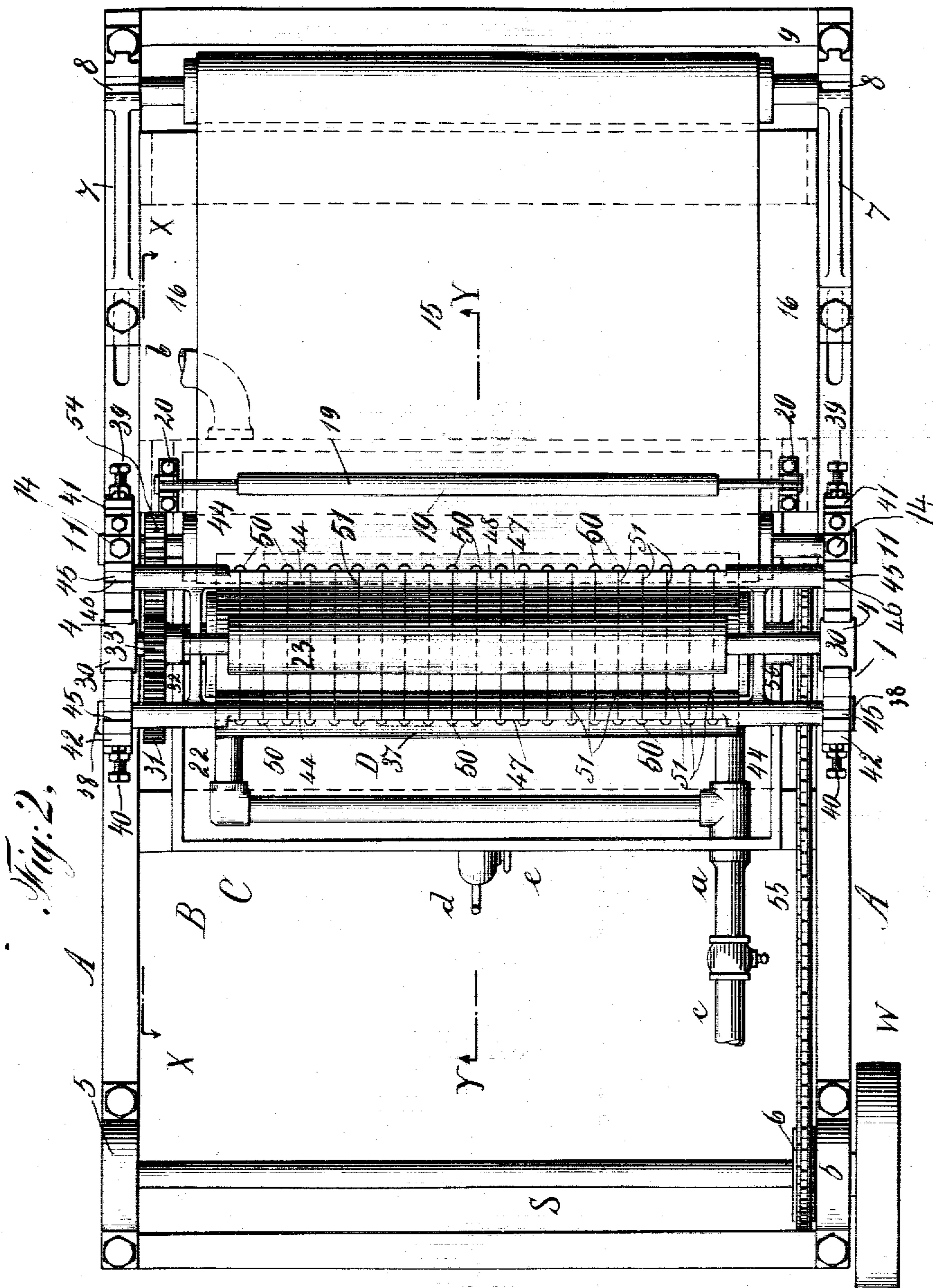
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4 SHEETS—SHEET 2



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4 SHEETS—SHEET 3.

Fig. 3.

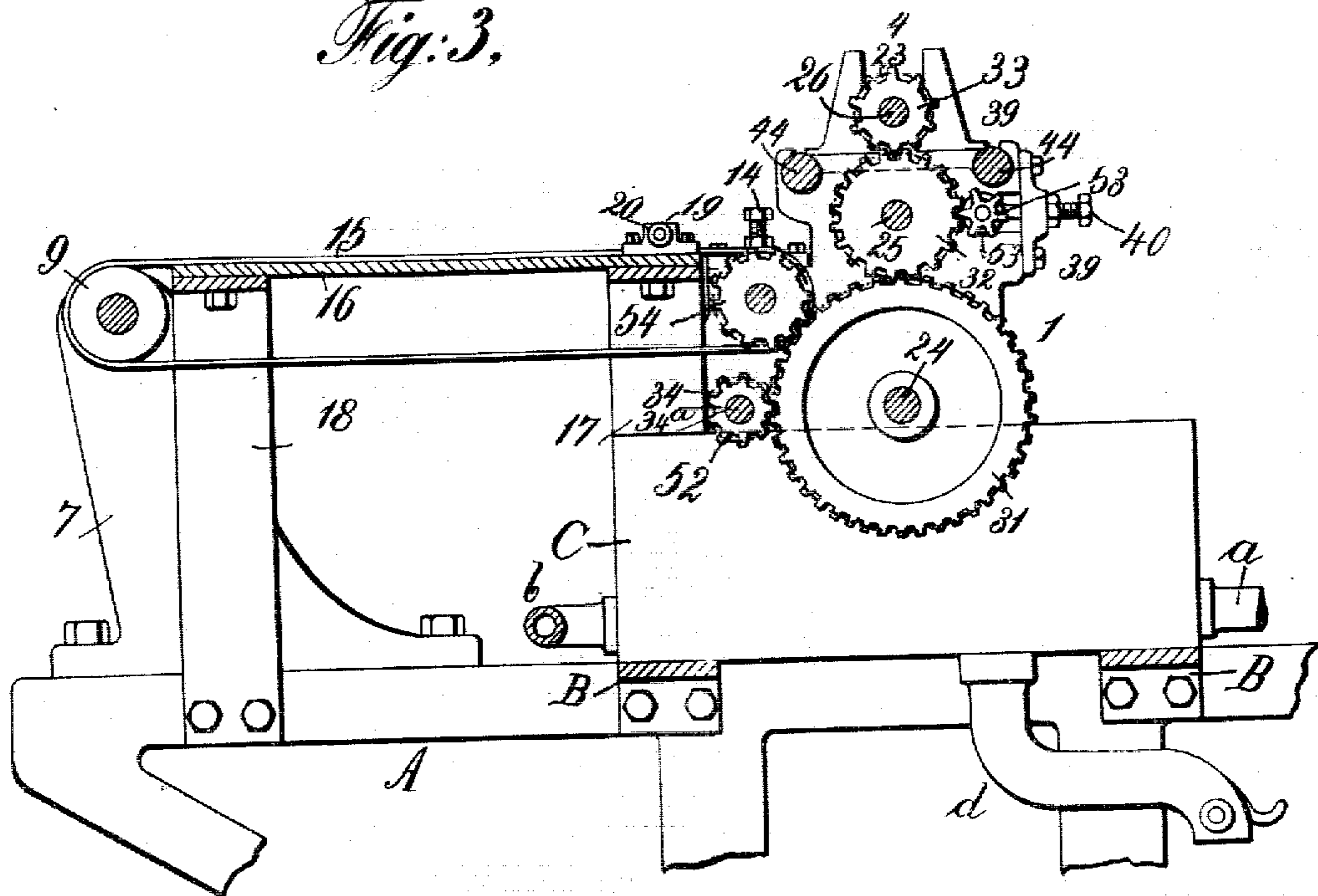
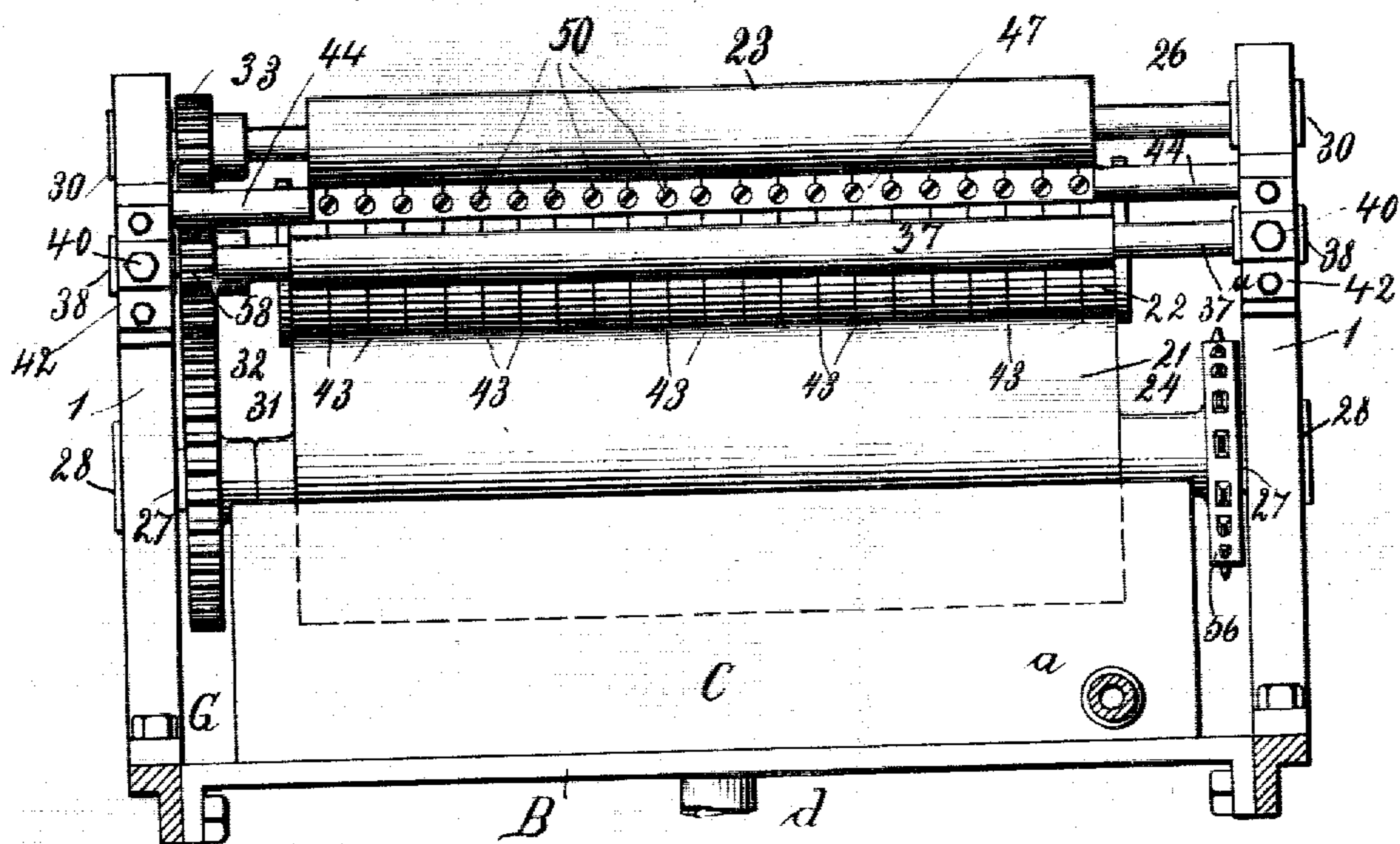


Fig. 4.



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4 SHEETS—SHEET 4.

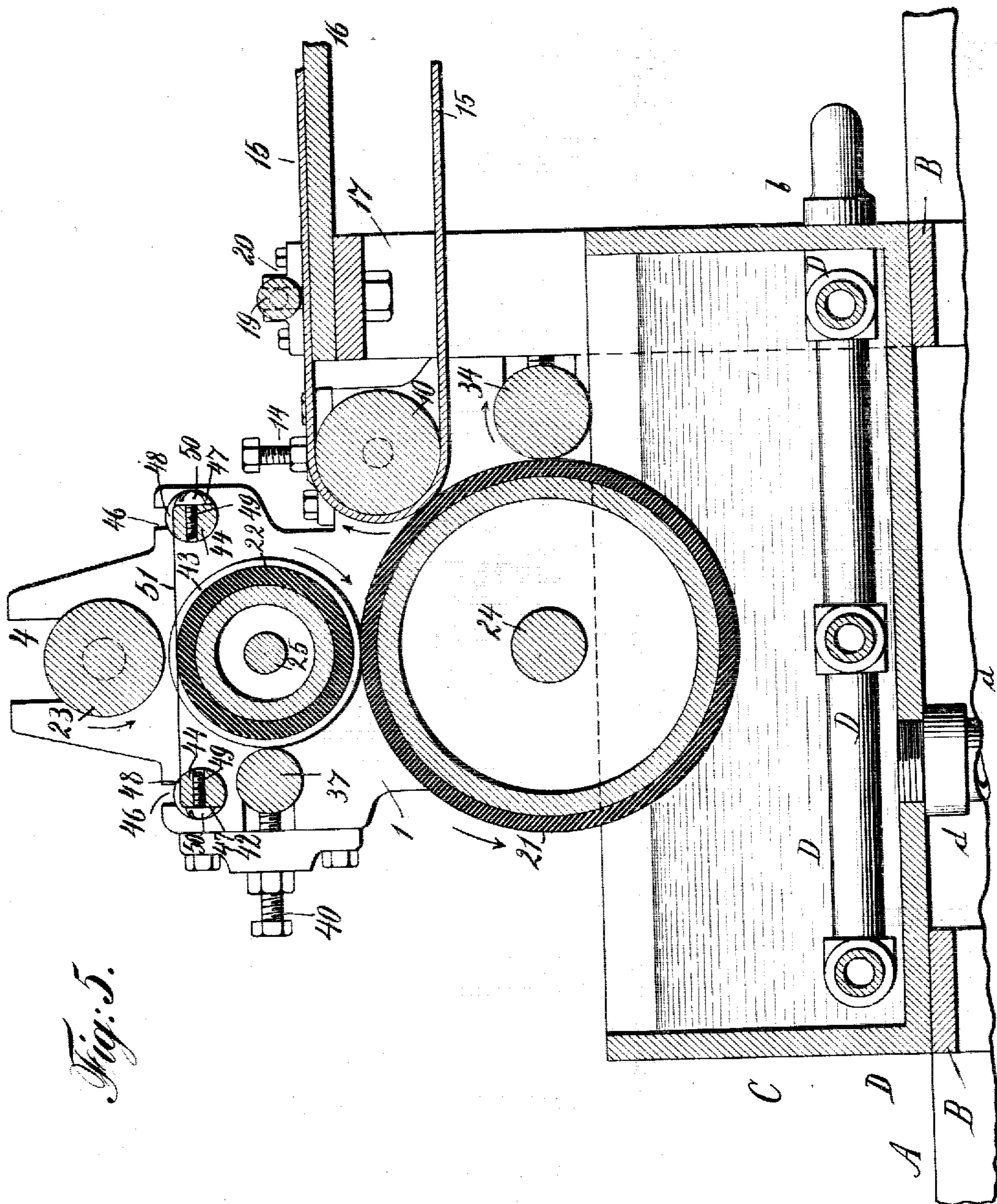


Fig. 5.

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UNITED STATES PATENT OFFICE.

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MACHINE FOR APPLYING ADHESIVES TO PAPER, &c.

No. 820,086.

Specification of Letters Patent.

Patented May 8, 1906.

Application filed April 11, 1905. Serial No. 255,029.

To all whom it may concern:

Be it known that I, JAMES G. BEATTIE, a citizen of the United States, residing at New York, borough of Brooklyn, in the county of Kings and State of New York, have invented a new and useful Machine for Applying Adhesives to Paper and other Materials, of which the following is a specification.

This invention relates generally to coating the surfaces of sheets of paper, cardboard, and the like and also other sheet materials and blanks made therefrom with glue or other adhesive to adapt the sheets or the blanks to be used for covering the objects or articles, these sheets or blanks being coated with the adhesive preparatory to and applied while the adhesive is wet and the material soft and pliable.

Specifically the invention has reference to a machine for applying adhesives to paper covers for paper or pasteboard boxes which are cut out from sheets of comparatively thin, soft, and pliable paper and shaped in the cutting to adapt them to form the covers.

Paper or pasteboard boxes are covered either with tight-wrapped or loose-wrapped covers. When a cover for a tight-wrapped box is employed, the surface which is stuck to the box is completely covered with the adhesive, so that every part of it will adhere tightly and smoothly to the entire surface and the edges of the box; but when prepared for a loose-wrapped box the adhesive is applied only at and near the edges in comparatively narrow lines, so that when the cover is applied the edges only adhere, the rest of the cover being left loose or unattached, thus giving a less rigid and curved or convex appearance to the surface of the sides, ends, and bottom, which is much desired in boxes for certain classes of trade. Applying adhesives to covers for tight-wrapped boxes has been done by hand-labor from time immemorial; but this mode is slow, tedious, expensive, and more or less imperfect and unsatisfactory because of the uneven distribution of the adhesive. To secure the cover properly, a mere pellicle of the adhesive is all that is necessary, and this should be laid on smooth, even, and of uniform thickness. If this is not done, the cover will not lie flat and smooth, and it is liable to blister, whereby the finish of the box is spoiled and its appearance rendered unsightly. Covers for loose-wrapped boxes

have the lines of adhesive applied by means of a stamp provided with impression-surfaces of the proper width and shape to apply the adhesive to the edges of the blank and cover, the stamp being supplied with the adhesive by pressing it against a surface on which the adhesive is spread in a more or less thin layer, from which it takes up sufficient for the edges of the cover, to which it is transferred by means of the stamp. Owing to the fact that the sheet of paper or the blank becomes soft when coated with the adhesive, it has a tendency to cling to the adhesive-applying device and also to curl up, more or less, along the edges. It has been found difficult to apply the adhesive by mechanical means. In machines which have been constructed for the purpose heretofore it has been found necessary to apply the adhesive in stripes by means of staggered rolls arranged in parallel shafts, by which the blank is alternately striped with the adhesive as it passes through the two sets of rolls successively. In this construction two feed-rolls are required to coact with the two sets of staggered gluing-rolls, and as these gluing-rolls are spaced more or less unevenness is imparted to the layer of adhesive at the junction of the adjoining stripes, which being laid on alternately, the adhesive is liable to be pushed out from under the ends of the rolls and form more or less of a ridge where the edges of the two stripes meet. Furthermore, the blank being liable to adhere to the gluing-rolls after the adhesive is applied in the machines heretofore constructed it is necessary to provide separate supports for the blank while moving through the two sets of rolls and receiving the adhesive and for lifting or, in a sense, stripping its forward end from the rolls. These supports being staggered like the rolls, there is a break at the center between the two sets, and one set has to be fixed in a slightly higher plane than the other to prevent the blank catching as it moves over the supports.

The object of my invention is, first, to produce a simple, practical, and efficient machine for applying adhesives to sheets of paper and blanks for box-covers, &c., made therefrom; second, to regulate the quantity of adhesive transferred to the gluing-roll and from that to the surface of the paper or blank in order to restrict the coating to a thin pel-

licle, and thus prevent the application of a
 greater quantity of the adhesive to the paper
 or blank than is requisite for sticking it to the
 surface to which it is to be applied, and there-
 5 by prevent blistering and unevenness of the
 cover of the box or other object; third, to
 make it practically impossible for the for-
 ward movement of the adhesive-coated paper
 or blank cover being intercepted or restrained
 10 by the means which support the paper blank
 after passing the bite of the gluing and feed-
 ing rolls; fourth, to apply the adhesive to the
 entire surface of the paper or blank by means
 of a single roll, and thus insure the uniform
 15 and complete application of the adhesive in a
 thin unbroken pellicle to the entire surface;
 finally, to combine in a single machine means
 for applying an adhesive to one surface of a
 sheet of paper or other material or a blank
 20 cover made therefrom and means for supply-
 ing adhesives to a moving surface from which
 to transfer the same by means of a stamp to a
 sheet of paper or a blank box or other cover
 or article made therefrom in broken or con-
 25 tinuous lines and to regulate the amount of
 adhesive transferred by the stamp, so that a
 thin pellicle only will be impressed upon the
 article by the stamp.

The invention will first be described in con-
 30 nection with the accompanying drawings and
 then particularly pointed out in the claims.

Figure 1 represents a side elevation of the
 gluing-machine. Fig. 2 is a plan of the
 same; Fig. 3, a sectional side elevation show-
 35 ing the gearing, the section being taken on
 line X X of Fig. 1. Fig. 4 represents a front
 end elevation of the operative parts of the
 machine above the frame. Fig. 5 represents
 a vertical longitudinal section of the ma-
 40 chine, taken on line Y Y of Fig. 2 and drawn
 to a larger scale than the plan.

Referring to the drawings, A A designate
 the side members of the machine, which are
 connected together by transverse members
 45 (not shown) at the ends and at intermediate
 points, so as to form a strong and steady sup-
 port for the operative parts of the machine.
 At about equal distances from the ends of the
 frame there are transverse beams B B, se-
 50 curely bolted thereto.

C is a tank that rests upon and is fastened
 to the beams B B. When the adhesive is
 used hot, as is the case with glue, means are
 provided for heating the tank and contents;
 55 but as cold adhesives can also be used for
 some purposes the heating attachments may
 be omitted from the tank. The means here
 shown consist of a steam-pipe D, fitted in the
 tank. A branch *a* of the steam-pipe is passed
 60 through a glue-tight joint in one side of the
 tank and coupled to a pipe *c*, that leads to a
 source of steam-supply, a valve being placed
 in this pipe to cut off the steam when neces-
 sary. Another branch *b* is also passed
 65 through a glue-tight joint in another side of

the tank and connected with a return steam-
 pipe. (Not shown.) While steam is pre-
 ferred for obvious reasons, other means of
 heating may be substituted for steam, if de-
 sired. The bottom of the tank is also fitted 70
 with a draw-off pipe *d*, provided with a cock *e*
 for discharging the contents of the tank when
 necessary for cleaning, changing the adhesive
 used, and other reasons.

The frame supports housings 1 1, connected 75
 with the frames opposite the ends of the tank.
 These housings are each provided with open-
 ings 2 3 in their sides and at the top with a
 slotted opening 4. These openings and slots
 are provided to receive the bearing-blocks of 80
 the fountain gluing and feeding rolls herein-
 after described.

At the front end of the machine there are
 journal-bearings 5 5, formed by pillow-blocks
 and caps, in which a driving-shaft S is sup- 85
 ported, that carries the driving-wheel W and
 a sprocket-wheel 6.

7 7 are standards bolted to the frames at
 the rear end. The upper ends of these stand-
 ards are slotted to form bearings 8 8 for the 90
 journals of the drum 9. A similar drum 10
 is supported between the housings at the rear
 on a shaft journaled in bearing-blocks 11 11,
 held in openings 12 in rear projections of the
 housings. The bearing-blocks rest on springs 95
 13 and are held down by means of adjusting-
 screws 14. A belt 15 (preferably, but not
 necessarily, made of rubber) is placed on the
 drums 9 10. A table 16 is connected with
 and supported under the upper side of the 100
 belt by vertical supports 17 17 18 18, bolted
 to the frame. This table supports the belt
 when pressure is applied to it for a purpose
 which will be referred to farther along in the
 specification. Over the belt there is a roller 105
 19, the journals of which are supported in
 slotted bearings 20 20, bolted to the table out-
 side of the edges of the belt and above the
 standards 17 17. The roller 19 rests upon
 the surface of the belt and by its weight it 110
 distributes the adhesive thereon evenly and
 uniformly, and if the supply carried to the
 belt is greater than is required the roller
 scrapes or rolls back the redundant adhesive
 and limits the thickness of the same on the 115
 surface of the belt to a thin pellicle. The
 roller 19 being of solid material, brass by pref-
 erence, it bears upon the belt with sufficient
 force to cause it to be rotated by friction, it
 not being geared to the driving mechanism. 120

The ductor or fountain roll 21, gluing-roll
 22, and feed-roll 23 are mounted on shafts 24
 25 26, respectively, which are journaled in
 bearing-blocks in the housings. The jour-
 nals 27 27 of the ductor or fountain roll are 125
 supported in the bearing-blocks 28 28 in the
 openings 2 in the housings, the journals of
 the gluing-roll are supported in the bearing-
 blocks 29 in the openings 3 in the housings,
 these blocks resting on the adjusting-screws 130

29^a, and the journals of the feed-rolls are supported in the bearing-blocks 30 in the slotted bearings on the adjusting-screws 30^a. The ductor or fountain roll, gluing-roll, and feeding-roll are geared together by means of toothed wheels 31 32 33 on the respective shafts. Behind and in contact with the fountain-roll there is a scraper or supply-regulating roll 34, mounted on a shaft 34^a, journaled in the bearing-blocks 35 in the openings 36 in the rear extensions of the housings, and in front bearing against the gluing-roll there is a similar scraping or supply-regulating roll 37, mounted on a shaft 37^a, journaled in the bearing-blocks 38 in openings 39 in the front extensions of the housings. The function of roll 34 is to scrape off the redundant glue brought up by the fountain-roll from the tank. Owing to the viscosity of the glue, the fountain-roll takes up a much greater quantity or a thicker layer than is required; but the supply-regulating roll 34 by rotating against and in close contact with the fountain-roll at a greater speed and in the opposite direction scrapes, rolls, or presses off the redundant glue and reduces it to a comparatively thin layer. Similarly, the roll 37, which bears against the gluing-roll, reduces the thickness of the layer of glue taken by the gluing-roll from the ductor or fountain roll by scraping, rolling, or pressing it off the surface thereof and reducing it to a very thin pellicle, which or a part of which is transferred to the surface of the paper or blank in a thin layer or pellicle, which is sufficient to cause the paper or blank to adhere to the surface to which it is applied. The pressure on the rolls 34 37 is regulated by means of the screws 39 40, which are passed through cap-plates 41 42, respectively, and contact with bearing-blocks 35 37. By means of the pressure-regulating screws the quantity or thickness of the glue on the rolls can be accurately controlled.

The surface of the fountain-roll is made of brass preferably, which is placed on a core of iron or steel. The supply-regulating rolls 34 37 and the feeding-roll 23 are made of iron or steel. The gluing-roll consists of a rubber cylinder placed on a metal core. The rubber cylinder is provided with parallel circumferential slits 43 cut into the rubber at regular intervals from end to end and to the depth of something less than half the thickness of the walls of the rubber cylinder. At opposite sides of the gluing-roll there are bars 44 44, having tenons 45 on their ends, which fit into slots 46 46 in the front and rear extensions of the housings, and thus support the bars horizontally in line with the top of the roll. The sides of these bars opposite the gluing-roll and their tops are squared to form flat surfaces 47 48 at right angles to each other. The vertical sides 47 of these bars have tapped holes 49 in them, which are spaced so that

their centers are in line with the slits 43 in the gluing-roll. These holes are fitted with screw-pins 50. Wires 51 are inserted in the slots 43, and their ends are carried across the horizontal flat surfaces 48 48 of the two bars and down against the rear sides, where they are connected with or held by the screw-pins 50. The wires are drawn tight through the slits in the gluing-roll, and they form the support for the blank when moving from the gluing-roll after the glue is applied. At the same time they are of such fineness that the sides of the slits, particularly the part thereof above the wires, close together over the wires, whereby the surface in the bite of the gluing and feeding rolls is unbroken and the glue is laid on the entire surface of the blank uniformly and evenly.

The shaft of the roll 34 carries a pinion 52, which meshes with the toothed wheel 31 on the shaft of the fountain-roll, and the shaft of the roll 37 carries a pinion 53, that meshes with the toothed wheel 32 on the shaft of the gluing-roll. These pinions are much smaller than the wheels they mesh with, and the rolls consequently are driven at a much higher speed than the fountain-roll and the gluing-roll. The shaft of the belt-drum 10 also carries a pinion 54, which meshes with the toothed wheel on the shaft of the fountain-roll, the belt 15 being thereby driven from the toothed wheel 31.

The ductor or fountain roll is driven by means of a sprocket-chain 55, running on the sprocket-wheels 6 56.

The machine is constructed and intended to be used for applying an adhesive to the entire surface of a blank—say, a box-cover blank—for a tight-wrapped box, and it is also designed and intended to be used for applying glue to the edges of such blanks when they are to be attached to the box by the edges only and form what is known as a "loose-wrapped" box. To coat a blank cover for a tight-wrapped box with the adhesive a pad of covers, with or without a stiffer card on top, is taken and passed between the feed-roll and the gluing-roll with the inside surface of the bottom blank exposed downward and next to the gluing-roll. This pad is laid upon the wires 51 and the forward edges moved into the bite of the rolls. The gluing-roll bears against the surface of the bottom blank and applies a thin pellicle of glue thereto over the entire surface. The wires form a support for the pad of blanks as they are passed through the rolls; but at the same time, owing to the closing of the slits in the rolls above the wires, there is no break in the coating of glue laid on the surface of the blank. The pad passes through in a horizontal position and the operator catches it, takes it up, and removes the bottom blank, to which the glue has been applied, lays another blank on the bottom of

the pad, and repeats the operation. The coated blank being softened and made very pliable by the wet adhesive applied to its under surface, it would adhere to the roll were it not that as it is moved by the pressure of the two rolls its forward end after passing the bite of the roll instead of being permitted to remain on the gluing-roll is held or lifted up by the wire supports, or, in other words, stripped off the roll, so that it moves away from the roll horizontally and is freed therefrom. If a blank is to be glued for a loose-wrapped box, this is done by means of a stamp applied to the thin pellicle of adhesive on the belt 15. This belt, it will be observed, rotates in contact with the fountain-roll above the regulating-roll 34 (see Fig. 5) and takes the glue therefrom in the same way as the gluing-roll takes it from the fountain-roll. The stamp is made up of a number of parts corresponding to the parts of the blank to which the glue is to be applied, and it is pressed against the top of the belt over the table 16 for the purpose of taking the glue therefrom. The blank is laid on a flat surface, and the stamp being applied thereto transfers a thin layer of glue to the same in lines corresponding to the shape of the face of the stamp.

I claim—

1. In a machine for applying adhesives to paper and other materials a single adhesive-applying roll having an unbroken surface, and stationary means embedded in the roll for stripping the coated blank from the roll, substantially as specified.

2. In a machine for applying adhesives to paper and other materials a single adhesive-applying roll made of an elastic material and having an unbroken surface, and stationary means embedded in the roll for stripping the coated blank from the roll, substantially as specified.

3. In a machine for applying adhesives to paper and other materials a single adhesive-applying roll having an unbroken surface, and stationary means embedded below the surface of the roll at the top thereof and extending rearward beyond the roll to form a support for the coated blank and to strip it from the roll, substantially as specified.

4. In a machine for applying adhesives to paper and other materials a single adhesive-applying roll having an unbroken surface, and stationary means embedded below the surface of the roll at the top or upper side thereof and extended from front to rear of the roll in the same horizontal plane for supporting the coated blank and stripping it from the roll, substantially as specified.

5. In a machine for applying adhesives to paper and other materials a single adhesive-applying roll having an unbroken surface, stationary means embedded below the surface of the roll at the top thereof for support-

ing the coated blank and stripping it from the roll, and a single feed-roll that coacts with the single adhesive-applying roll, substantially as specified.

6. In a machine for applying adhesives to paper and other materials the combination of an adhesive-applying roll having peripheral slits therein parallel to one another and at right angles to the axis of the roll, wires inserted in said slits at the top of the roll and extended from front to rear of the roll the said slits adapted to open in line with the wires and to close together when they pass the wires as the roll rotates, substantially as specified.

7. A machine for coating one surface of sheet material or a blank made therefrom with an adhesive comprising means for applying an unbroken pellicle of the adhesive to one surface of a moving sheet or blank during its movement in one direction, and means embedded within the adhesive-applying means for supporting the sheet or blank while moving and separating or stripping it from the adhesive-applying means after it has received the adhesive coating, substantially as specified.

8. A machine for coating one surface of sheet material or a blank made therefrom comprising an adhesive-applying roll, and a feed-roll between which the sheet or blank is passed and coated with the adhesive by the adhesive-applying roll and transverse supports for the sheet or blank extending from front to rear between the rolls and below the surface of the adhesive-applying roll, substantially as specified.

9. A machine for coating one surface of sheet material or a blank made therefrom comprising an adhesive-applying roll having an unbroken surface, a feed-roll, and transverse supports for the sheet or blank extending from front to rear between the rolls and below the surface of the adhesive-applying roll, substantially as specified.

10. A machine for coating one surface of sheet material or a blank made therefrom comprising an elastic adhesive-applying roll having parallel circumferential slits therein, a feed-roll, and supports for the sheet or blank extending from front to rear between the rolls through the slits and below the bite of the adhesive-applying and feed rolls, substantially as specified.

11. A machine for coating one surface of sheet material or a blank made therefrom comprising an adhesive-applying roll having parallel circumferential slits therein, a feed-roll, and transversely-arranged wires passed between the rolls from front to rear and through the slits and below the surface of the adhesive-applying roll, substantially as specified.

12. A machine for coating one surface of sheet material or a blank made therefrom

comprising an adhesive-applying roll having parallel circumferential slits therein, a feed-roll, and transversely-arranged wires passed between the rolls from front to rear through the slits and tangential to the bottom of the slits in the adhesive-applying roll to form a support for the blank moving from between the rolls after the adhesive is applied and to support or strip the sheet or blank from the adhesive-applying roll, substantially as specified.

13. A machine for coating one surface of sheet material or a blank made therefrom comprising an adhesive-applying roll and feed-roll, supports for the moving blank passed between the said rolls below the surface of the adhesive-applying roll, a ductor or fountain roll, a supply-regulating roll to scrape or remove the redundant adhesive from the fountain-roll, and a supply-regulating roll for removing the redundant adhesive from the adhesive-applying roll, substantially as specified.

14. A machine for coating one surface of sheet material or a blank made therefrom with an adhesive, comprising a single elastic

adhesive-applying roll having peripheral slits therein, horizontal wire supports for the paper embedded in the slits the sides of which close tightly above the wire supports, and bars, on opposite sides of the adhesive-applying roll, to which the ends of the wires are fastened, substantially as specified.

15. In a machine for applying adhesives to paper and other materials the combination of an adhesive-applying roll, supports embedded therein extending horizontally from front to rear to support the coated blank and separate and strip the same from the roll, a revolving belt or apron, and a single ductor-roll for supplying the adhesive simultaneously to the adhesive-applying roll and the belt or apron, substantially as specified.

In testimony that I claim the invention above set forth I have affixed my signature in the presence of two witnesses.

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