

(No Model.)

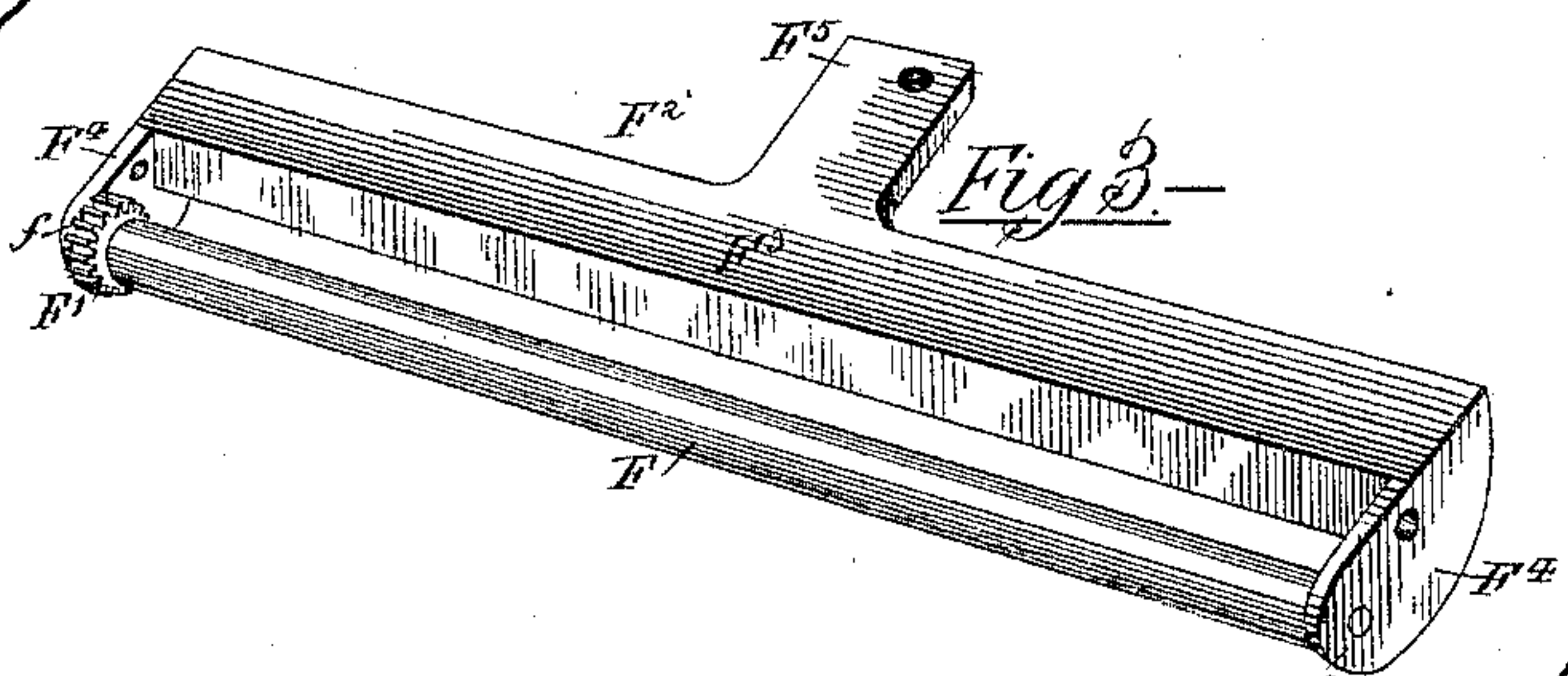
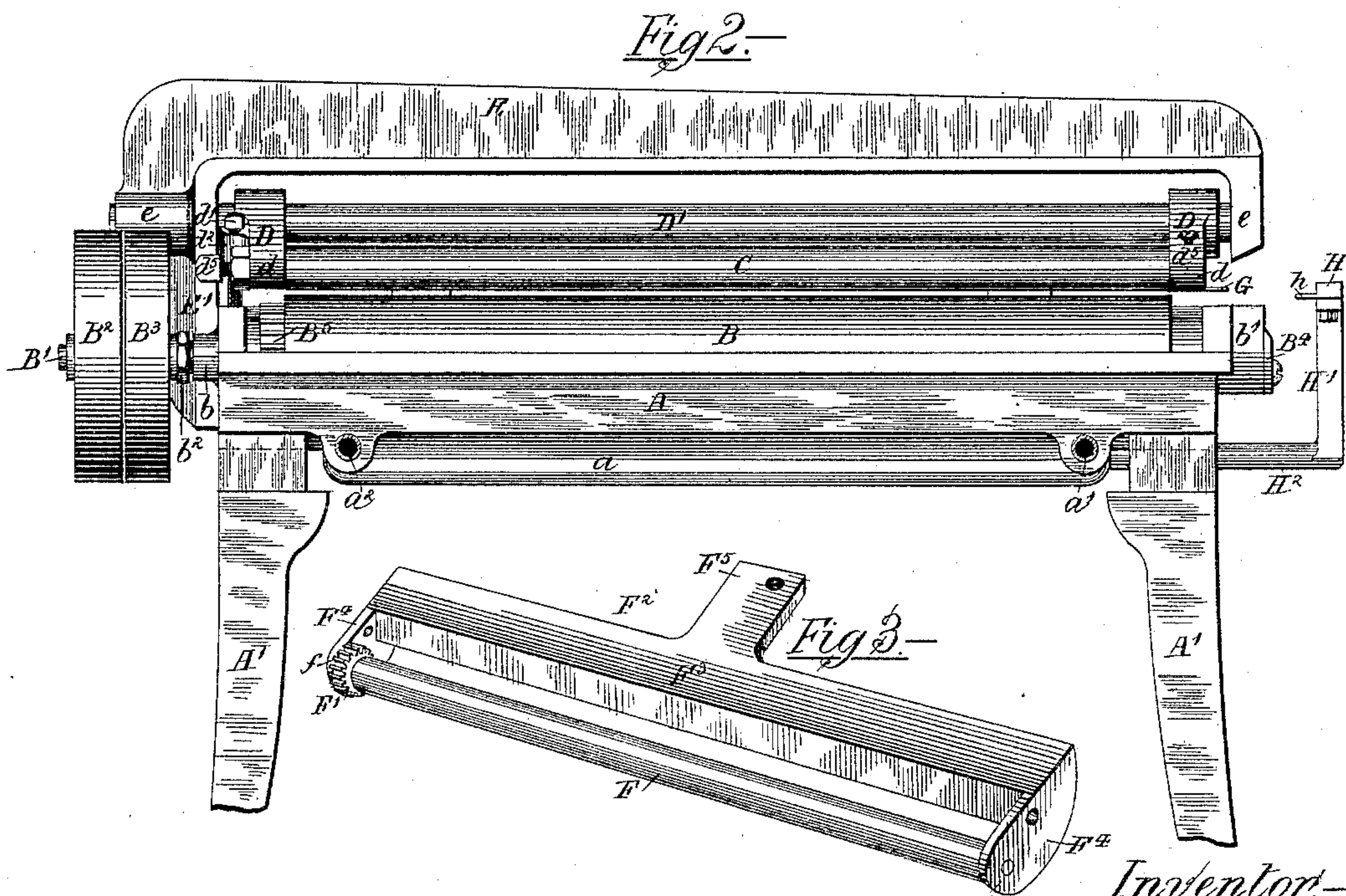
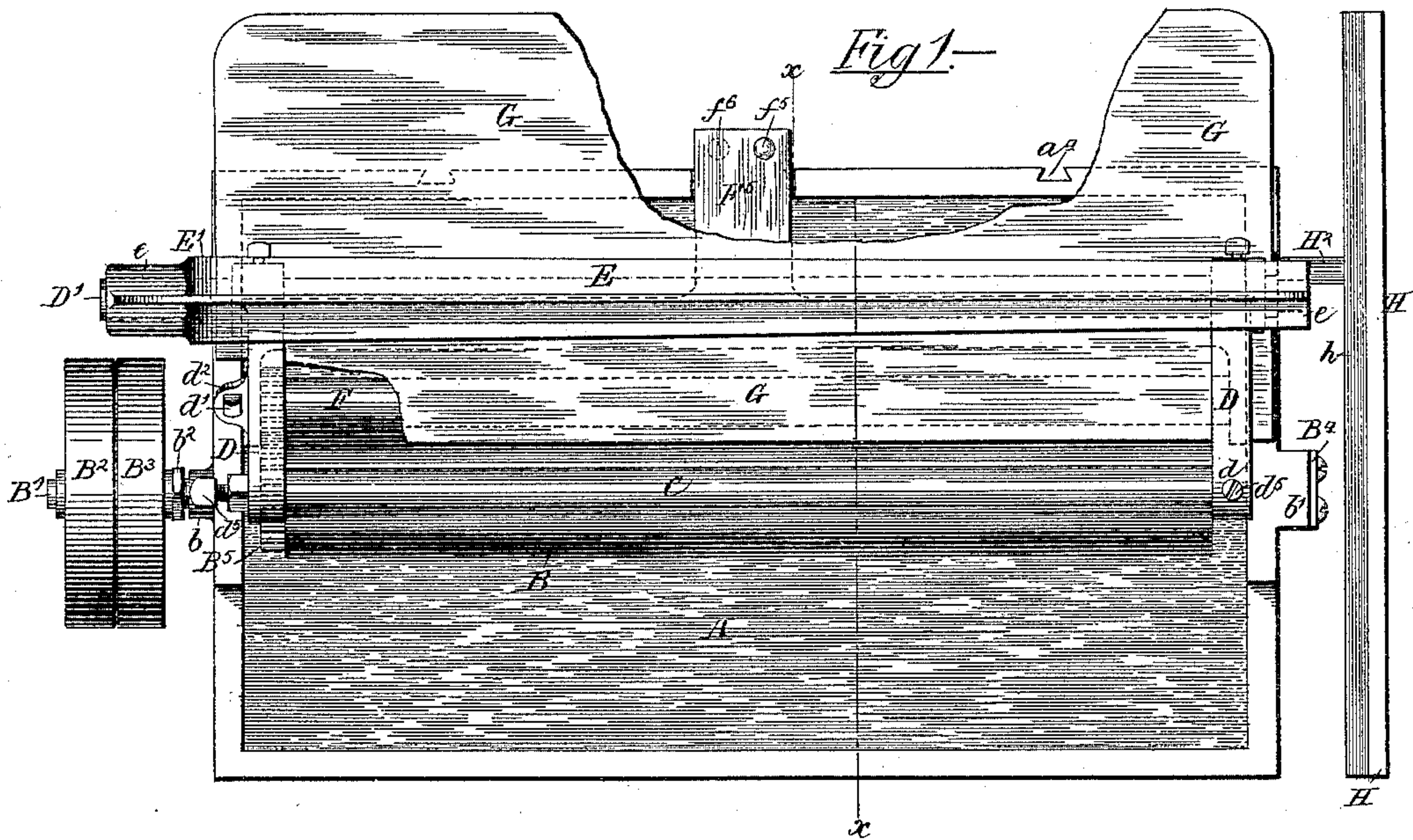
2 Sheets—Sheet 1.

M. D. KNOWLTON.

MACHINE FOR APPLYING LIQUID SUBSTANCES.

No. 452,844.

Patented May 26, 1891.



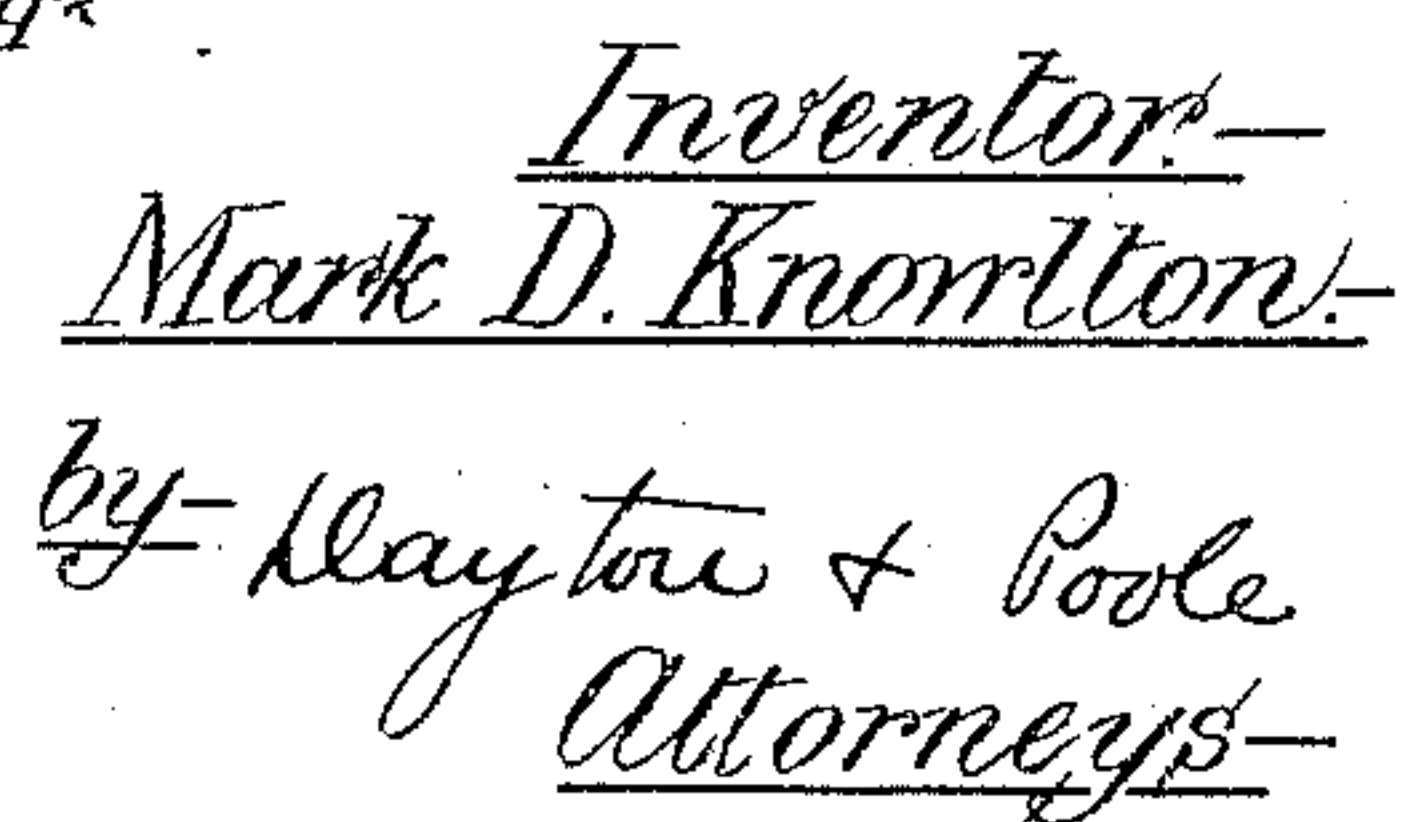
*Witnesses.*  
*Wm. S. Henning.*  
*Louis M. Whitehead.*

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*Attorneys.*

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# UNITED STATES PATENT OFFICE.

MARK D. KNOWLTON, OF CHICAGO, ILLINOIS.

## MACHINE FOR APPLYING LIQUID SUBSTANCES.

SPECIFICATION forming part of Letters Patent No. 452,844, dated May 26, 1891.

Application filed August 19, 1887. Serial No. 247,341. (No model.)

*To all whom it may concern:*

Be it known that I, MARK D. KNOWLTON, of Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Machine for Applying Liquid Substances; 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 an improved means for applying glue or other liquid or semi-liquid substance to the surface of sheets of paper, straw-board, or other material.

The invention consists in the matters hereinafter described, and pointed out in the appended claims.

In the accompanying drawings, illustrating my invention, Figure 1 is a plan view of a machine embodying the same. Fig. 2 is a front elevation thereof. Fig. 3 is a detail perspective view showing an adjustable frame carrying a wiping-roller removed from the machine. Fig. 4 is an end elevation of the machine illustrated in Figs. 1 and 2. Fig. 5 is a sectional view of the same, taken upon line *x x* of Fig. 1. Fig. 6 is a detail section taken upon line *x x* of Fig. 4. Fig. 7 is a detail section taken upon line *y y* of Fig. 4.

In said drawings, A is a tank or receptacle for the liquid glue or other substance, said tank or receptacle being constructed to form also a part of the frame of the machine.

A' A' are two legs or standards upholding the said tank at a convenient height above the floor.

In the use of glue as an adhesive substance it is necessary to keep the tank A warm, in order to retain the glue in a suitably liquid state, and for this purpose the tank is made of cast metal, and is provided in its bottom wall with a passage *a*, the opposite ends of which are connected with inlet and outlet steam-pipes *a'* *a''*, whereby steam may be admitted to said passage for the purpose of keeping the bottom of the tank at a desired temperature.

B is a feeding-roller for carrying and applying the liquid material to the sheets to which it is to be applied. Said feeding-roller is located within the tank longitudinally of

the same, with its lower surface near the bottom of the tank, so that it may always extend or dip into the liquid adhesive substance contained in the said tank. Said roller is sustained at its ends in bearings *b b'*, formed in the end walls of the tank, and at one end of the roller the latter is provided with a shaft B', which extends through the bearing *b* to a point outside of the tank, and is provided with fast and loose pulleys B<sup>2</sup> B<sup>3</sup>, whereby motion may be transmitted to the roller by suitable driving-belts. The bearing *b*, through which the shaft B' passes, is desirably provided with a gland *b<sup>2</sup>* to prevent the escape of liquid in case the tank is filled to a point above the shaft. The bearing *b'* at the end of the roller opposite to that at which the said shaft is located is desirably formed by an opening through the end wall of the tank, which opening is closed or covered by an external plate B<sup>4</sup> to prevent the escape of the liquid contents of the tank at this point.

C is a roller located over the feeding-roller B, said roller C being for the purpose of holding or pressing the sheets to which the adhesive substance is to be applied against or in contact with the surface of the said feeding-roller. It is mounted upon the free ends of two arms D D, which are rigidly secured to a rock-shaft D', journaled at opposite ends in bearings upon a metal frame or arm E, rigidly attached at one end to the tank A' by means of a standard E', bolted to the end of the tank, said frame or arm E being entirely disconnected from the tank at its opposite end. It will be observed that by this construction the arms are in effect pivoted on the frame, the rock-shaft serving as the pivot, the object of having them rigidly secured to said rock-shaft being that they are thereby rigidly connected and move up or down together. Said arm or frame E is arranged at a point laterally distant from or at one side of the roller B, as clearly shown in Figs. 1, 4, and 5, so that the rock-shaft D' is laterally removed from the roller C and the arms D rest normally in a nearly horizontal position. The roller C may thus be lifted from and carried toward the roller B by the rotation of the said rock-shaft.

The presser-roller C is sustained in a posi-



tion close to but free from the roller B by a suitable stop upon the arm D engaging a stationary part of or upon the machine-frame or tank. A set-screw  $d'$  is inserted through a lug  $d^2$  upon one of the arms D and is adapted to bear against the upper edge of the end wall of the tank A, thereby serving as an adjustable stop, limiting the downward movement of the presser-roller and enabling the vertical position of said roller to be adjusted as desired. The said presser-roller is held in position adjacent to the roller B by gravity; but it may be pressed or forced toward the said roller B for the purpose of giving the desired pressure of the sheets being operated upon against said roller B by springs or otherwise, as found convenient or desirable in practice.

In a machine in which the presser-roller C is sustained by an overhanging frame or arm E in the manner stated the free end of the arm is liable to sag or to be thrown out of place vertically by unequal expansion or other causes, thereby throwing the presser-roller C out of parallel with the roller B. In order to enable the ends of said roller C to be independently adjusted in the arms D D for the purpose of bringing the said roller C parallel with the roller B, I have herein provided, as a further and special improvement, devices as follows: The ends of the arms D D are provided with circular apertures or sockets  $d$   $d$ , within which are fitted cylindric plugs  $d^4$   $d^4$ , which are held in place by means of set-screws  $d^5$   $d^5$ . Upon the inner ends of the said plugs  $d^4$   $d^4$  are formed or attached eccentrically-arranged bearing-pins  $d^3$   $d^3$ , Fig. 7, constructed to engage bearing-apertures formed in the ends of the roller C. By rotating one or the other of the plugs  $d^4$   $d^4$  in its sockets the adjacent end of the roller C may obviously be raised or lowered, as desired, and a means is thus provided for accurately adjusting the said roller with reference to the feeding-roller, notwithstanding variations in the position of the frame E, by which said roller C is upheld.

F is a roller located adjacent to and adapted to bear against the feeding-roller B at the upwardly-moving side of the latter and above the level of the liquid adhesive substance in the tank A. The purpose of said roller F is to wipe off or remove the surplus substance from the surface of the roller B and to thereby give an even and uniform thickness or coating of the said substance to a sheet passed over or in contact with said feeding-roller. The wiper-roller F is preferably driven by suitable gearing in such a manner that its side nearest the roller B moves upwardly or in the same direction as the adjacent surface of the said roller B, so that the surplus liquid is squeezed backwardly into the tank instead of being scraped or rubbed from the surface of the roller. The surface speed of both of said rollers F and B is approximately the same. This method of operation is especially desirable in the case of glue, in order that a

smooth and uniform layer of glue may be transferred to the sheets being operated upon.

Any suitable arrangement of gearing may be employed for driving the roller F. As a simple and convenient construction for this purpose, the roller B is provided at one end with a gear-wheel  $B^5$ , which intermeshes with a gear-wheel  $F'$  upon the end of the said roller F. The roller F is mounted in a movable frame  $F^2$ , made separate from the tank and consisting of a longitudinal bar  $F^3$ , and two flat parallel end plates  $F^4$   $F^4$ , cast integral with said bar and affording bearings  $f$   $f$  for the said roller F. Said plates  $F^4$   $F^4$  are constructed to fit within the end walls of the tank A, and the entire frame  $F^2$  is sustained in position by means of pins  $f'$   $f'$ , Figs. 6 and 4, secured in the said end wall of the tank and entering the plates  $F^4$   $F^4$ . Said pins  $f'$   $f'$  are attached eccentrically to plugs  $f^2$   $f^2$ , having bearings in apertures  $f^3$   $f^3$  in the end walls of the tank, said plugs being held from movement therein by set-screws  $f^4$   $f^4$ . By loosening the set-screws  $f^4$   $f^4$  the plugs  $f^2$   $f^2$  may be turned and the pins  $f'$   $f'$  thereby shifted so as to bodily move the frame  $F^2$ , and thereby move the roller F nearer to or farther from the feeding-roller. The said plugs  $f^2$   $f^2$  are provided with slots for a screw-driver in their outer faces, whereby they may be conveniently rotated for adjusting the wiper-roller in the manner above stated. For holding the said frame  $F^2$  in position the said frame is provided with a rearwardly-projecting arm  $F^5$ , which extends over the rear margin of the tank and is adjustably connected therewith by means of two set-screws  $f^5$   $f^6$ . The set-screw  $f^5$  extends through a slot or opening in a marginal lug  $a^3$  upon the rear edge of the tank A and has screw-threaded engagement with the said arm  $F^5$ , thereby holding the said arm from upward movement. The set-screw  $f^6$  is inserted through the said lug  $a^3$  and bears upwardly against the lower surface of the said arm  $F^5$ . By moving said set-screws  $f^5$   $f^6$  said arm  $F^5$  may obviously be raised and lowered as rendered necessary by the shifting of the pivot-pins  $f'$   $f'$ , sustaining the frame  $F^2$  at its middle part.

G is a flat guide plate or table, said table being for the purpose of directing the paper or board accurately to and between the said rollers B and C, located at the side of the roller B at which the sheet of paper, straw-board, or other material is fed to the latter. Said table extends from a point exterior to the tank inwardly over the roller F to a point near the rollers B and C, and it may be sustained or supported from the tank A or the machine-frame in any manner found convenient or desirable. In the particular construction illustrated the tank A is provided at its rear wall with two vertically-arranged dovetailed slots  $a^4$   $a^4$ , Figs. 1 and 5, within which are inserted vertical depending dovetailed bars  $g$ , affixed to the under surface of the table G.



H is a guide employed to determine the position of the edges of the sheets of paper or board with relation to the end of the roller B when it is desired to apply the liquid substance to portions only of the sheets. Said guide has the form of a horizontal bar provided with a rabbet  $h$  to receive the edges of the sheets, and is sustained by means of an L-shaped supporting-bar  $H'$ , the lower horizontal part  $H^2$  of which extends beneath the tank A and is there engaged by and supported in a guide  $A^2$ , said guide being provided with a set-screw  $a^5$ , whereby the supporting-arm  $H'$  may be clamped immovably after the guide H has been placed in a desired position relatively to the adjacent end of the roller B. The distance between the end of the said roller B and the guide H obviously determines the width of the part of the sheet which is left uncoated, so that by moving said guide H nearer to or farther from the end of the roller the relative widths of the coated and uncoated parts of the sheet may be changed, as desired. The application of adhesive substance to parts only of sheets of paper or straw-board is useful, for instance, in the manufacture of paper or straw-board tubes, where the part of the sheet which is first wrapped about the forming-mandrel is without adhesive substance, while the exterior layers are suitably coated to cause them to adhere to the layers beneath them. The presser-roller C is held at such distance above the roller B as to prevent the transference of liquid substance from the surface of said roller B to the said roller C, it being entirely obvious that unless the presser-roller is kept free of the glue or other substance the same will be transferred to the upper or outer sides of the sheets as well as to the sides of the roller B.

In operating upon thick board the roller C may obviously be brought near enough to the roller B to give a desired pressure upon the sheet without liability of the presser-roller coming in contact with the coating of material upon the said roller B. In operating upon thin board or paper, however, it may be necessary, if single sheets alone are passed through the machine, to bring the roller C in such close proximity to the roller B that the adhesive substance will be transferred from one roller to the other. To avoid this result, in operating upon thin straw-board or paper I commonly place above the sheet of paper or board before it is passed through the machine one or more additional sheets of the material being operated upon or a special sheet or mat of suitable material, whereby the necessary pressure is obtained to force the lowermost sheet or that adjacent to the roller B in contact with the latter.

I claim as my invention—

1. The combination, with the tank A and a feeding-roller therein, of a rigid overhanging frame, a presser-roller, and rigidly-connected

vertically-movable supports engaging opposite ends of said presser-roller, said supports being movable in parallel paths, whereby said presser-roller is maintained constantly parallel with the feeding-roller, substantially as described.

2. The combination, with a tank and a feeding-roller therein, of a rigid overhanging frame, a rock-shaft  $D'$ , pivoted in the frame, arms  $D$   $D$ , rigidly secured upon said rock-shaft, and a presser-roller supported by said arms, substantially as described.

3. The combination, with a tank and a feeding-roller therein, of a rigid frame E, supported at one end only, a presser-roller, rigidly-connected arms pivotally secured to the frame, and cylindric plugs adjustably mounted in said arms and provided with eccentric pins engaging bearing-apertures in the ends of the presser-roller, whereby pivotal support is afforded thereto, substantially as described.

4. The combination, with the tank A and feeding-roller therein, of the rigid frame E, the presser-roller C, pivotally connected to the frame E so as to have vertical movement, and devices at the ends of said roller for adjusting the same with reference to the feeding-roller regardless of the variations in the position of the frame E, substantially as described.

5. The combination, with the tank A, feeding-roller B therein, and rigid overhanging frame, of a presser-roller C, located over said feeding-roller, rigidly-connected arms  $D$   $D$ , pivotally connected to the frame and affording bearings for said presser-roller, and an adjustable stop limiting the approach of the said arms toward the machine-frame, substantially as described.

6. The combination, with the tank A and feeding-roller B, of a frame  $F^2$ , made separate from and secured to the tank, and a roller F, pivoted between the end plates of said frame for removing surplus material from the feeding-roller, the end plates of said frame being pivoted to the tank and the rear of said frame being adjustably secured to the tank, substantially as described.

7. The combination, with the tank A and feeding-roller B, of the frame  $F^2$ , composed of a longitudinal bar  $F^3$  and flat end plates  $F^4$ , a roller F for removing the surplus material from the feeding-roller, pivoted between the end plates of said frame, said end plates being adjustably pivoted to the walls of the tank, and a rearwardly-extending arm  $F^5$ , adjustably secured to the tank, substantially as described.

8. In combination with the tank and feeding-roller therein, a presser-roller over the feeding-roller, a wiping-roller F for removing the surplus material from the feeding-roller, and a plate G, supported on the machine-frame, extending inwardly over the roller F for directing the material between the feeding and presser rollers, substantially as described.



9. The combination, with the machine-  
frame, the tank A, and rollers B and C, of a  
horizontal guide-bar H and a horizontal arm  
H<sup>2</sup>, supporting said guide-bar, and a clamp  
5 device upon the machine-frame engaging said  
arm H<sup>2</sup>, substantially as described.

In testimony that I claim the foregoing as

my invention I affix my signature in presence  
of two witnesses.

MARK D. KNOWLTON.

Witnesses:

C. CLARENCE POOLE,

O. N. WILLIS.