

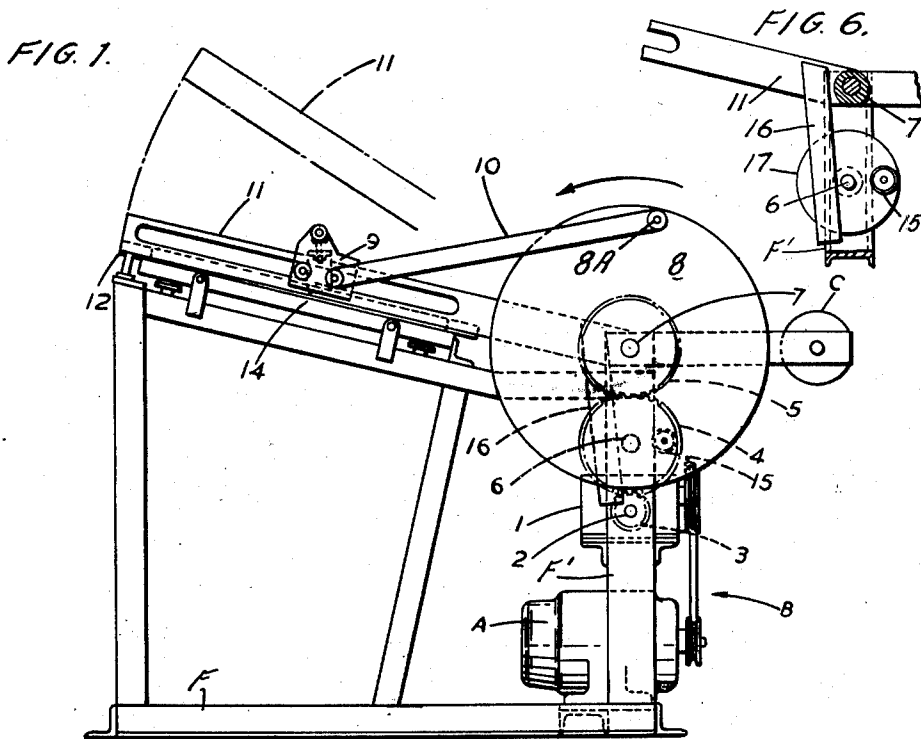
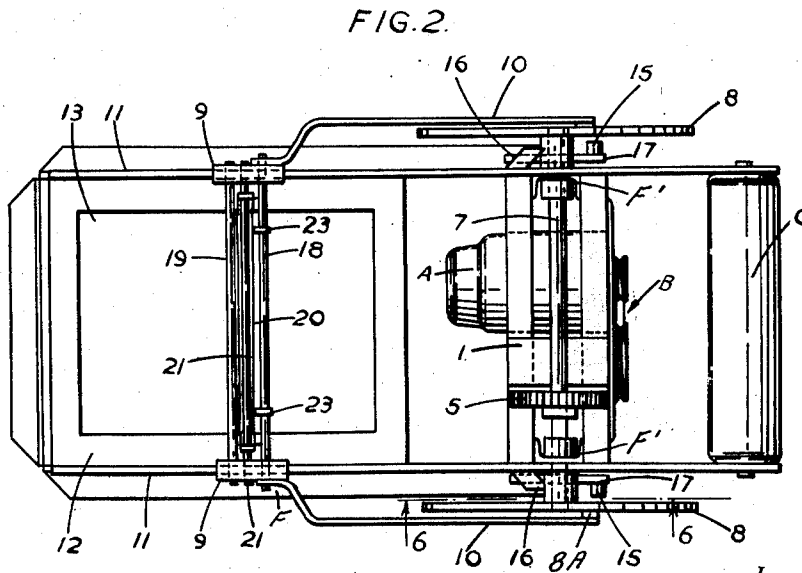
Dec. 30, 1952

W. P. McCORMICK ET AL
STENCILING MACHINE

2,623,456

Filed Oct. 7, 1948

2 SHEETS—SHEET 1



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STENCILING MACHINE

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2 SHEETS—SHEET 2

FIG. 3.

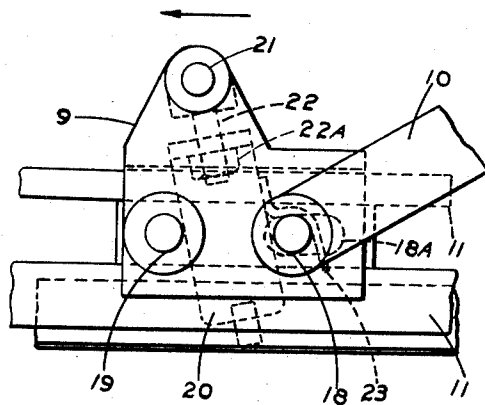


FIG. 4.

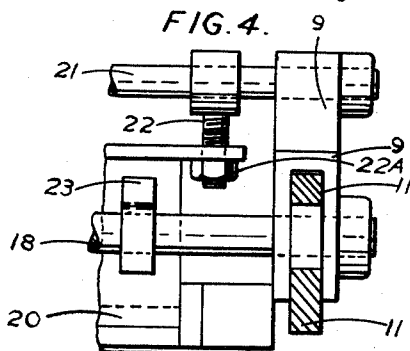
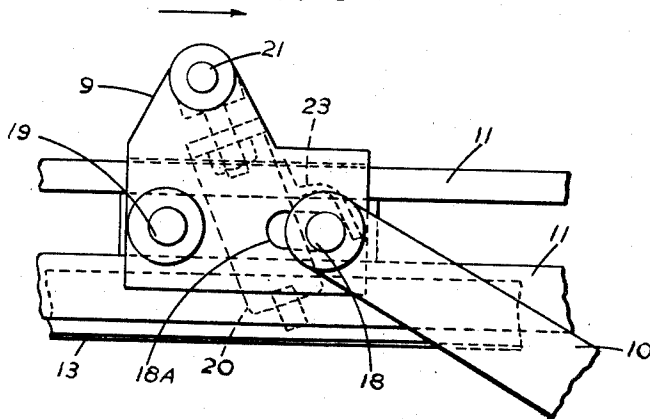


FIG. 5.



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UNITED STATES PATENT OFFICE

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STENCILING MACHINE

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7 Claims. (Cl. 101—123)

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This invention relates to a stencilling machine for stencilling paint, paste or ink on to paper, board, glass and the like (hereinafter referred to as the sheets to be printed) through a prepared gauze stencil by means of a travelling squeegee or scraper.

More especially, the invention relates to a stencilling machine of power-operated type comprising a supporting table to which are fed the sheets to be printed, a pivotal frame for the gauze fabric screen to which a stencil is applied and a squeegee pivoted to a carrier that is reciprocable on said frame to perform forward working strokes and return strokes, the squeegee being engageable with the screen when lowered upon the table during the forward working strokes in order to spread printing material over and press it through the stencil screen.

An object of the invention is to provide in such a machine a power-operated crank rotating in a vertical plane about a horizontal axis, a connecting-rod pivotally connected at opposite ends to said crank and to the squeegee, the arrangement being such that during each working stroke the connecting-rod pushes the squeegee forwards and during each return stroke the connecting-rod pulls the squeegee rearwards, a pivotal connection incorporating a lost-motion device between the connecting-rod and the carrier, and additional power-operated means which during each return stroke of the squeegee acts, firstly, to lift the frame for a predetermined period of time in order to expose the table for the sheet-feeding operation, the period of time available in the cycle of operations for said lifting operation being extended beyond the end of the return stroke by the action of the lost-motion device at said end, and secondly, to control the lowering of the frame towards the table for the next forward working stroke.

Another object is to incorporate the lost-motion device in the pivotal connection between the connecting-rod and the carrier to ensure that the forward push of the connecting-rod will be translated into forceful downward pressure of the squeegee on the table-supported screen and to arrange that the connecting-rod pushes the squeegee at a downward inclination so as to assist in holding the frame down upon the table against the reaction thereof on the squeegee.

Other objects of the invention will be apparent from the following specification and claims.

An embodiment of the invention will now be described, by way of example, with reference to the accompanying drawings, in which:

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Fig. 1 is a side elevation of the stencilling machine,

Fig. 2 is a plan view corresponding to Fig. 1,

Fig. 3 is a detail side elevation of part of the machine,

Fig. 4 is a fragmentary end view in the direction of the arrow in Fig. 3, and

Fig. 5 is a view corresponding to Fig. 3, showing the part in a different position.

Fig. 6 is a section on the line 6—6 of Fig. 2.

Referring to Figs. 1 and 2, the machine is driven by an electric motor A, as shown, or by suitable alternate means, through a V-rope drive B to a worm reducing gear box 1 and thence to a shaft 2.

A train of gears 3, 4 and 5 on horizontal shafts 2, 6 and 7 respectively continues the drive, and the shaft 7 has fixed at each extremity a driving disc 8 having a pin 8A which serves as a crank rotating in a vertical plane. During the rotation of the discs 8, their cranks 8A transmit simultaneous reciprocating motion to carrier members or blocks 9 by means of drive-connecting members or connecting rods 10.

The shafts 2, 6 and 7 are journaled one above another in upright members F' of the machine frame F.

The blocks 9 are slidably mounted on guide bars 11 which are pivotally mounted on the shaft 7, said blocks carrying the squeegee.

During the forward or working stroke, as Fig. 1 shows, the connecting rods 10 are arranged to push forwards at a downward inclination relative to the guide bars 11. Throughout each working stroke the guide bars 11 to which a frame 12 carrying a stencilled gauze screen 13 is fixed, are supported on a printing table 14 as shown in full lines in Fig. 1. It is the table 14 which receives the sheets to be printed.

During the back or non-working stroke, the connecting rods 10 are arranged to pull rearwards at a downward inclination relative to the guide bars 11. During the first portion of the non-working stroke, the guide bars 11 together with the frame 12 and stencil 13 are elevated to the position shown diagrammatically in chain dotted lines in Fig. 1, by the action of cams or rollers 15 on levers 16. The arrangement of the connecting rods 10 to push downwards and also pull downwards is gotten by locating the crank-disc shaft 7 approximately in the plane of the printing table 14.

The rollers 15 project laterally from, and are freely rotatable on pins fixed to discs 17 which are mounted on and rotate with the shaft 6, and

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the rollers 15 are so positioned on the discs 17 that they make contact with levers 16 when the blocks 9 are at the end of each forward or working stroke.

The levers 16 are attached to the guide bars 11 so as to give the required elevation to the guide bars 11, frame 12 and stencil 13 and allow them to lower again to rest on the table 14 at the end of the non-working stroke.

During the period of elevation the printed sheet is removed by hand and a fresh sheet to be printed is placed in position on table 14 in preparation for the next working stroke.

The action of the squeegee during the working and non-working strokes is shown in more detail in Figs. 3 and 5 which for convenience are located horizontally on the sheet.

Fig. 3 shows a side elevation of the sliding carrier blocks 9 during a forward or working stroke. A cross-member or rod 18 interconnects the ends of the connecting rods 10 and is pivotally mounted therein, each end portion of the rod passing through a slot 18A in each block. In effect, the end portions of the rod 18 and the slots 18A form pin-and-slot connections between the rods 10 and blocks 9 (see also Fig. 5). Each slot 18A is elongated in the direction of travel of the block and the rod 18 is slidable in the slots. It will be obvious that the connection between the connecting rods 10 and the carrier blocks 9 through the cross-rods 18 and slots 18A is a lost-motion device. That is to say, at the start of each push (or pull) of the connecting rods, the cross rod 18 will move forwards (or rearwards) to the then opposite end of the slots before the blocks start their stroke. A second cross-member or rod 19 is provided which extends between and is fixedly secured at each end to the carrier blocks 9, and assists the blocks to maintain correct alignment with each other.

The squeegee 20 fulcrums about a rod 21 the ends of which are mounted in the blocks 9, and vertical adjustment of the squeegee is provided by bolts 22 and nuts 22A.

Thus, during the forward or working stroke of the connecting rods 10, the rod 18 pushes the squeegee 20, pivoting it about its fulcrum and pressing its lower end on to the gauze 13. By virtue of the lost-motion device 18, 18A, and the low point of application of the thrust of the connecting rods 10 below the fulcrum 21, as Fig. 3 shows, the connecting rods 10 can push the squeegee very hard upon the screen, which of course is supported by the table 14 below. The reaction to the downthrust of the squeegee 20 is transmitted through the fulcrum 21 to the carrier blocks 9 and thence to the frame 11, 12.

Fig. 5 shows a view corresponding to Fig. 3, but during a backward or non-working stroke. The squeegee 20 is lifted clear of the gauze stencil 13 by the rod 18, which moves back along elongated slots 18A provided in the blocks 9 and the rod 18 is attached to the squeegee 20 by clips 23 so that the squeegee is caused to pivot about the rod 21 and lift the squeegee clear of the stencil 13.

When the rod 18 has taken up the total backward travel allowed by the elongated slots 18A, as shown in Fig. 5, it then drives the blocks 9 on the backward or non-working stroke at the end of which the action described above is reversed and the position shown in Fig. 3 is resumed. At the start of the next forward stroke, the already described lost-motion effect in the device 18, 18A occurs, thus delaying the actual start

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of the squeegee's working stroke in relation to the crank discs 8. The arrangement of the crank-and-connecting-rod mechanism in combination with the action of the lost-motion device is such that an appreciable period occurs between the end of the return stroke and the re-start of work by the squeegee, such period being an extension of the period available for the hand-feed operation.

It will be understood that the pressure of the squeegee 20 on the gauze stencil 13 during the working stroke stencils the ink, paint or paste through the gauze stencil 13 on to the sheet on the table 14.

Extensions of the guide bars 11 support a counterweight C. However, as will be understood, the distribution of weight in the pivotal frame 12 and its associated parts is such that they are biased to bear upon the table 14. The action of the mechanism 4, 15, 16 is positive in one direction only, namely the direction in which it elevates the frame to the chain-dot position in Fig. 1. As regards lowering of the frame, this is gravitational, being due to the bias referred to, although normally under the control of the mechanism 4, 15, 16. Thus, should the operator fail to do the hand-feed operation in time, he can hold up the frame and there is no danger of accident to his hands.

It has already been shown that the upward reaction to the forcible down-thrust by the squeegee 20 during its working stroke is transmitted through the fulcrum 21 and carrier blocks 9 to the frame 11, 12. It will be appreciated that the frame opposes the reactive upthrust under its downward gravitational bias assisted by the downwardly inclined thrust of the connecting rods 10 during the working stroke.

We claim:

1. In a stencilling machine of power-operated type comprising a supporting table to which are fed the sheets to be printed, a pivotal frame for a fabric screen to which a stencil is applied, a carrier reciprocable on said frame to perform forward working strokes and return strokes, and a squeegee pivotally connected to said carrier, said squeegee being engageable with the screen during the forward working strokes in order to spread printing material over and press it through the stencil screen; the combination of a power-operated crank rotating in a vertical plane about a horizontal axis, a connecting-rod pivotally connected at opposite ends to said crank and to the carrier and squeegee, the arrangement being such that during each working stroke the connecting-rod pushes the squeegee forwards and during each return stroke the connecting-rod pulls the squeegee rearwards, a lost-motion device incorporated in the pivotal connection between the connecting-rod and the carrier, and additional power-operated means which during each return stroke of the squeegee acts, firstly, to lift the frame for a predetermined period of time in order to expose the table for the sheet-feeding operation, the period of time available in the cycle of operations for said lifting operation being extended beyond the end of the return stroke by the action of the lost-motion device at said end, and secondly, to control the lowering of the frame towards the table for the next forward working stroke.

2. In a stencilling machine according to claim 1, in which the pivotal frame is biased downwards, the arrangement of the crank and con-

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necting-rod so that during the forward working stroke the connecting rod pushes at a downward inclination to press the squeegee upon the stencilled screen and also to assist the bias on the frame in holding the frame down upon the table against the reaction thereof on the squeegee.

3. In a stencilling machine according to claim 1, lever means rigidly connected to the pivotal frame and projecting downwardly therefrom and cam means which is rotated in conjunction with the crank and which operates the lever means during the return stroke of the squeegee to positively raise the frame clear of the supporting table and allow the frame to lower freely by gravity under control of the cam means.

4. In a stencilling machine of power-operated hand-feed type comprising a supporting table to which are fed the sheets to be printed, a pivotal frame for a fabric screen to which a stencil is applied, a carrier reciprocable on said frame to perform forward working strokes and return strokes, and a squeegee pivotally connected to said carrier, said squeegee being engageable with the screen during the forward working strokes in order to spread printing material over and press it through the stencilled screen; the combination of a power-operated crank rotating in a vertical plane about a horizontal axis, a connecting-rod pivotally connected at opposite ends to said crank and to the carrier and squeegee, a lost-motion device incorporated in the pivotal connection between the connecting-rod and the carrier by virtue of which device the squeegee can be forced by the connecting-rod to press hard upon the stencil screen, the arrangement of the crank and connecting-rod being such that during each working stroke the connecting-rod pushes forwards on the squeegee at a downward inclination to assist in holding the frame down upon the table and during each return stroke the connecting-rod pulls the squeegee rearwards, and additional power-operated means which during each return stroke of the squeegee acts, firstly, to lift the frame in order to expose the table for the sheet-feeding operation, and secondly, to control the lowering of the frame towards the table for the next forward working stroke.

5. In a stencilling machine of power-operated type comprising a supporting table for the sheets to be printed, a pivotal frame for a fabric screen to which a stencil is applied, a carrier slidably mounted on said frame and reciprocable to perform forward working strokes and return strokes, a squeegee depending from said carrier and being engageable at an acute angle with the screen during the forward working strokes in order to spread printing material over and press it through the stencil screen and a pivot between the squeegee and carrier; the combination of a power-operated push-pull rod connected directly to the squeegee at a level below the pivot thereof and a pin-and-slot connection between the squeegee and the carrier, said push-pull rod being so arranged that during each working stroke it pushes at a downward inclination, the push being imparted to the squeegee and to the carrier and frame so as to flex the squeegee hard down on the screen and also assist in holding the frame upon the supporting table against the reaction thereof on the squeegee.

6. In a stencilling machine of power-operated type comprising a supporting table to which are

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fed sheets to be printed, a pivotal frame for a fabric screen to which a stencil is applied, a carrier slidably mounted on said frame and reciprocable to perform forward working strokes and return strokes, means for raising and lowering said frame during each return stroke and a squeegee depending pivotally from said carrier and being engageable at an acute angle with the screen during the forward working strokes in order to spread printing material over and press it through the stencil screen; a power-operated crank rotating in a vertical plane, a cross-rod connected to the squeegee at a level below the pivot thereof and having a lost-motion connection with said carrier and a connecting-rod pivotally connected at opposite ends to said crank and to said cross-rod, the arrangement being such that during each working stroke the connecting-rod pushes at a downward inclination both on the squeegee and on the carrier so as to flex the squeegee hard upon the screen and also assist in holding the frame down upon the supporting table against the reaction thereof on the squeegee and during each return stroke the connecting-rod pulls the squeegee clear of the screen.

7. In a stencilling machine of power-operated type comprising a supporting table to which are fed the sheets to be printed, a pivotal frame for a fabric screen to which a stencil is applied, said frame being downwardly biased to bear upon said table, a carrier slidably mounted on said frame and reciprocable to perform forward working strokes and return strokes and a squeegee depending pivotally from said carrier and being engageable at an acute angle with the screen during the forward working strokes in order to spread printing material over and press it through the stencil screen; a shaft on which said frame is pivotally mounted, said shaft being located approximately in the plane of said table, a power-operated crank rotating in a vertical plane about said shaft as axis, a cross-rod connected to the squeegee at a level below the pivot thereof and having a lost-motion connection with said carrier, a connecting-rod pivotally connected at opposite ends to said crank and to said cross-rod, the arrangement being such that during each working stroke the connecting-rod pushes at a downward inclination both on the squeegee and on the carrier and frame so as to flex the squeegee hard down on the screen and also assist the downward bias to hold the frame upon the supporting table and during each return stroke the connecting-rod pulls the squeegee pivotally clear of the screen, and additional power-operated means which during each return stroke acts, firstly, to lift the frame in order to expose the table for the sheet feeding operation, and secondly, to allow the frame to lower under its bias upon the table for the next forward working stroke.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

70 Number	Name	Date
1,776,459	Tull et al.	Sept. 23, 1930
1,891,622	Flockhart	Dec. 20, 1932