

(No Model.)

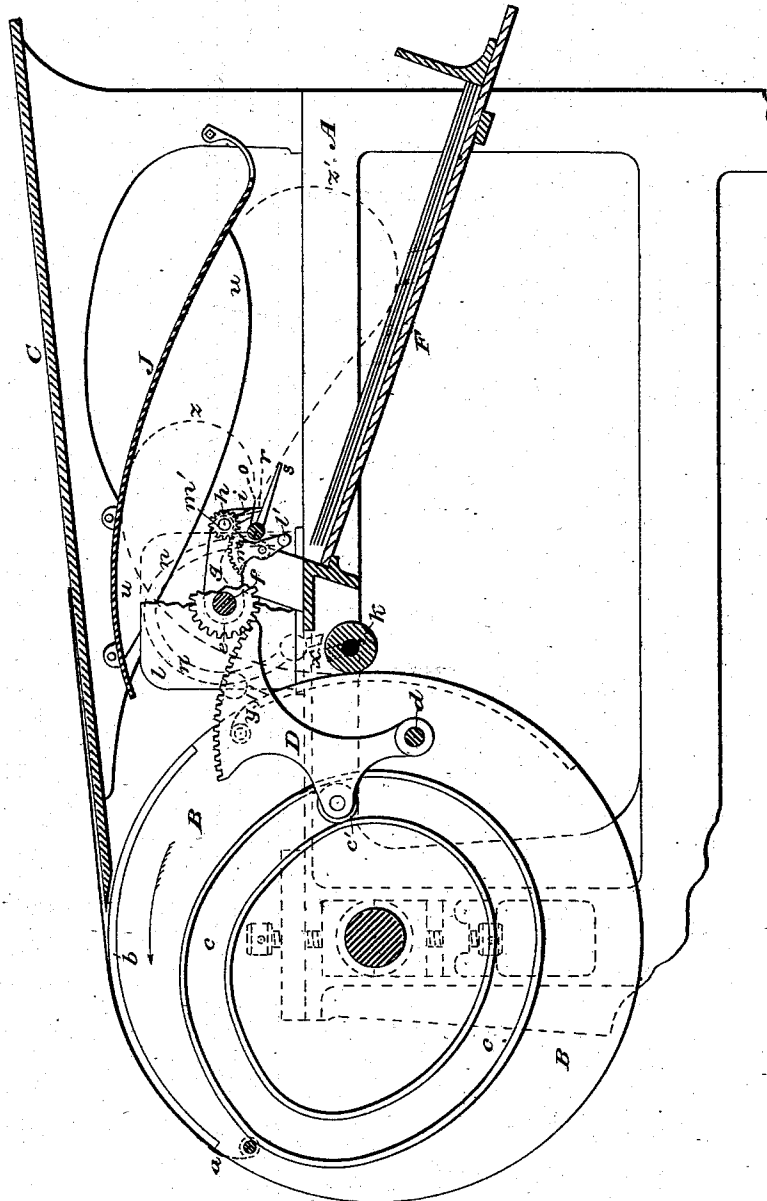
3 Sheets—Sheet 1.

A. CAMPBELL.
PRINTING PRESS.

No. 283,201.

Patented Aug. 14, 1883.

Fig. 1.



WITNESSES:

E. B. Bolton
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A. CAMPBELL.

PRINTING PRESS.

No. 283,201.

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Fig. 2.

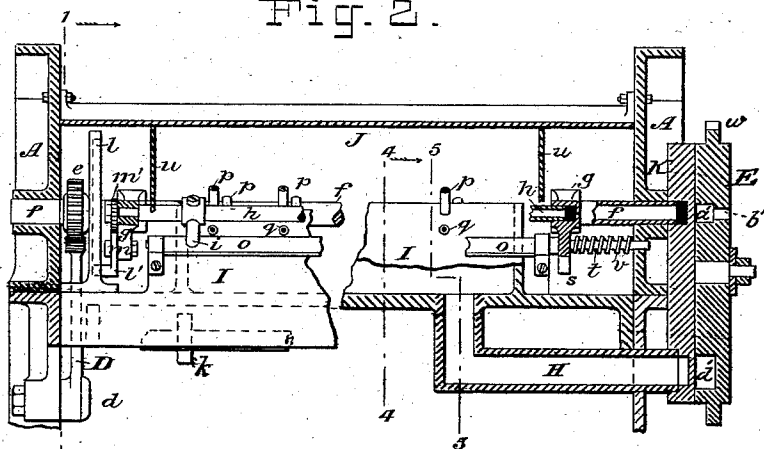
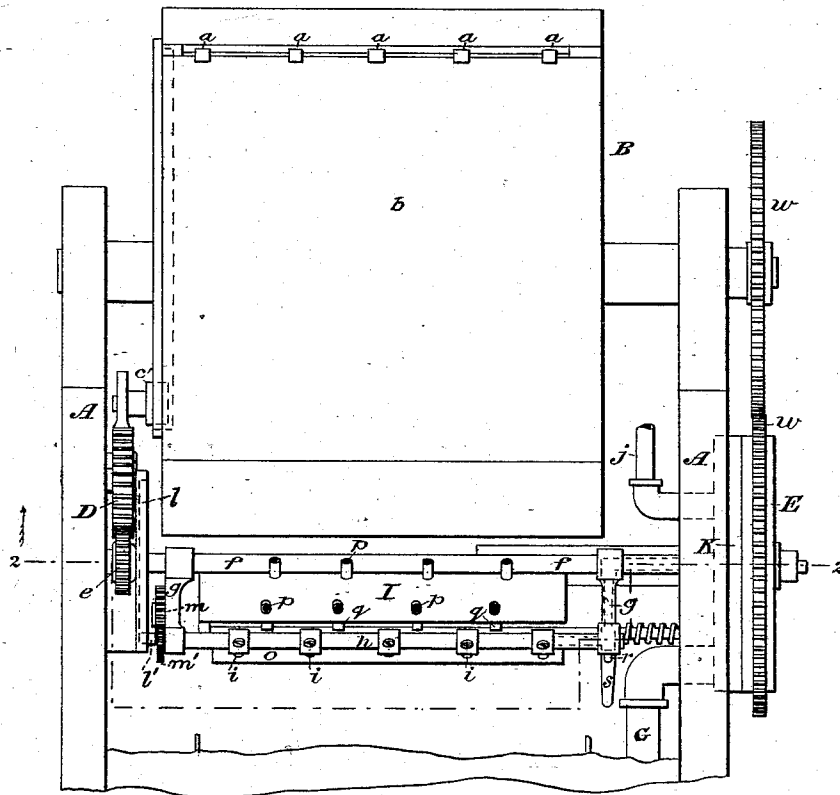


Fig. 3.



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3 Sheets—Sheet 3.

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PRINTING PRESS.

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Fig. 4.

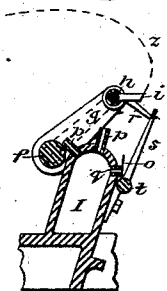


Fig. 5

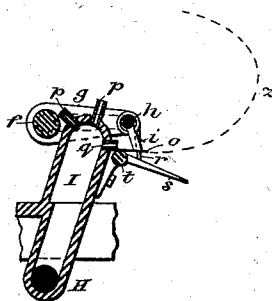


Fig. 6.

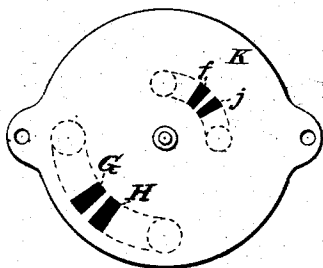


Fig. 7.

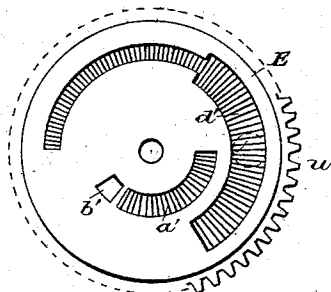
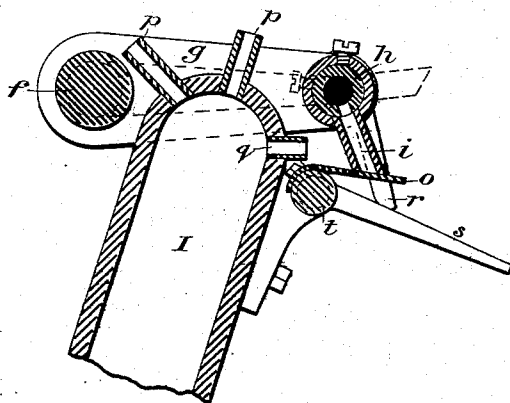


Fig. 8.



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UNITED STATES PATENT OFFICE.

ANDREW CAMPBELL, OF BROOKLYN, ASSIGNOR TO JOHN McLOUGHLIN AND EDMUND McLOUGHLIN, OF NEW YORK, N. Y.

PRINTING-PRESS.

SPECIFICATION forming part of Letters Patent No. 283,201, dated August 14, 1883.

Application filed June 20, 1882. (No model.)

To all whom it may concern:

Be it known that I, ANDREW CAMPBELL, a citizen of the United States, residing at Brooklyn, Kings county, New York, have invented certain Improvements in Printing-Presses, being a means for effecting the delivery of the printed sheet from the printing-cylinder, of which the following is a specification.

My invention appertains to presses of the bed and cylinder class, having a sheet-delivery at the back under the feeding-table, and wherein the sheet is freed before the cylinder has made one entire revolution. Heretofore in nearly all presses of this character the sheet, when freed by the printing-cylinder, is transferred directly to a second cylinder or drum, (or to a series of narrow pulleys substituted for a drum,) and tapes or fingers carry the sheet with its freshly-printed surface in contact with the drum until the advancing or front edge of the sheet is turned in a downward direction, when it either slides the whole length of a fly, or is carried by ordinary tapes until freed by the biting tapes which bind it to the discharging-drum, or by a biting-roller as a substitute for the tapes. When the fly is liberated and set violently in motion, it comes in contact with the freshly-printed face of the sheet, arrests the sheet in its forward motion edgewise, and carries it over facewise in an arc until it is placed face up on the receiving-table. The fly rests for an instant and then turns back to receive the next sheet. It will be observed that in this case the freshly-printed side of the sheet is during its entire delivery in contact with some portion of the delivery apparatus, the peculiar construction of which in all cases presents surfaces moving at two different velocities to the freshly-printed surface upon which the sheet must travel to its final discharge, and therefore must, of necessity, have a sliding motion on some one of the surfaces in contact. This will inevitably smut the sheet to some extent. This difference of velocity in the bearing-surfaces will be understood when it is considered that the tapes must have some thickness, and therefore, if run on a smooth cylinder or drum, the exposed surface of the drum will have a less velocity than that of the tapes. If the tapes are sunk

in grooves in the drum, then the surfaces of the tapes will have a variable velocity. At the point where they break over the drum the upper surfaces of the tapes will have a velocity equal to the velocity of the general periphery of the drum, but beyond this point the whole tape will move with a velocity about equal to that of the surface of the drum at the bottom of the groove, as in the case of any belt and pulley. If no tapes are employed, the sheet must slide over the fingers of the fly which are at rest. Several attempts have been made to obviate this difficulty, but thus far no delivering apparatus has been constructed adaptable to this type of press, except such as contained the defect above noted, and which would cause more or less "mackle" or "slur."

The object of my invention is to deliver a sheet below or under the feeding-table with the printed side up, and without any portion of the printed surface coming in contact with any portion of the delivery mechanism, or any other part, whereby I obtain a clean and perfectly-printed sheet without mackle, slur, or smut, and without reference to the amount of ink employed. To accomplish this I employ means for seizing the advancing edge of the sheet, turning or rolling it, and carrying it back to a rest, and holding it fast while the sheet is turned by the advancing movement of the cylinder, aided by jets of air which uphold the body of the sheet and assist to turn it. To avoid counter-currents of air exteriorly, which would fold the tail or corners of the sheet back upon the body before it could be laid, I provide a close roof plate or shield, with side plates, arranged over the mechanism, and to extend over, or substantially over, the receiving-table. To avoid disturbing the sheets already laid, I also arrange the mechanism in such a way as to hold the edge of the sheet being delivered out of contact with the pile until the said sheet is fairly laid on the table, when the said edge is released.

In the drawings, which serve to illustrate my invention, I have not deemed it necessary to show the entire printing-press, limiting the illustration to the novel delivery apparatus and to those parts of the press which operate in connection therewith.

Figure 1 is a longitudinal vertical section

taken in the plane of line 1 1 in Fig. 2, being substantially a side elevation of the delivery mechanism. Fig. 2 is a transverse vertical section substantially on line 2 2 in Fig. 3, the part of the delivery apparatus to the left being in elevation, viewed from the rear of the press. Fig. 3 is a plan of the mechanism, the feeding-table and roof-plate being removed. Figs. 4 and 5 are detached sectional views taken on lines 4 4 and 5 5, respectively, in Fig. 2. Fig. 6 is a detached view of the air-valve seat, and Fig. 7 is an elevation showing the under side of the air-valve. Fig. 8 is an enlarged detail view, which will be referred to hereinafter.

A represents the main frame of the press; B, the printing-cylinder, mounted rotatively in the same in the usual way; and C, the feeding table. The full lines, Figs. 1 and 2, represent the grippers *a* as having taken a sheet and drawn it partly off from the feeding-table onto the printing-surface *b* of the cylinder. This position of the cylinder is chosen for the reason that it is at this moment the delivering mechanism has reached the end of its stroke, with the last-printed sheet.

On the end of the printing-cylinder is a cam-groove, *c*, in which plays a roller, *c'*, mounted on a toothed segment, D. This segment is mounted on an axis, *d*, fixed in the main frame, and oscillated through a predetermined arc at every revolution of the cylinder, being actuated by the cam *c*. The teeth of this segment mesh with teeth on a pinion, *e*, fixed on the end of a partly-hollow shaft, *f*, mounted rotatively and transversely in the press-frame and extending across from side to side. On this shaft are fixed two or more arms, *g*, one of which is hollow, and the cavity in which communicates with that in the shaft. In the ends of these arms is rotatively mounted a hollow shaft, *h*, provided with a number of short tubular suckers or nozzles, *i i*. There is air communication through these nozzles *i i*, the shaft *h*, hollow arm *g*, and shaft *f* with an air-exhaust pipe, *j*, Fig. 3, through an ordinary disk cut-off valve, E, which will be referred to more particularly hereinafter.

The arm *g* to the right in Figs. 2 and 3 is the hollow arm, and only the right-hand end of shaft *f* need be hollow, although it might be hollow throughout and all of the arms *g* be hollow as well.

On turning the cylinder B in the direction of the arrow the cam *c* acts on segment D in a manner to first rotate shaft *f* and swing the arms *g*, with shaft *h*, over toward the cylinder until the nozzles *i* assume the position shown in dotted lines at *x* in Fig. 1. Then, as the cylinder continues to rotate, the said parts turn back again, the nozzles *i* reaching the point *y* as the grippers with the advancing edge of the newly-printed sheet (shown in dotted lines) reach the same point and release their hold. At this moment the exhaust begins to act and the advancing edge of the sheet

leaves the printing-cylinder and adheres by atmospheric pressure to the nozzles *i*. The continued rotation of the cylinder swings the nozzles on over back again, bearing the sheet toward the position shown in full lines in Fig. 1. The movement of the nozzles is not, however, quite rapid enough to keep the sheet taut or strained as it leaves the cylinder, but allows it to belly upward in an arch, a series of narrow bearing-rollers, *k*—two or more—being provided to keep the sheet up to the cylinder below the point *y*.

In order to turn or roll the edge of the printed sheet properly, I provide a means for slowly rotating the shaft *h* partly around in its bearings as the shaft *f* swings said shaft *h* back. This means consists of a cam-groove in a fixed plate, *l*, Figs. 1, 2, and 3, in which plays a stud or roller, *l'*, on a toothed segment, *m*, mounted to oscillate on one of the arms *g*. This segment meshes with a pinion, *m'*, on the end of shaft *h*.

In Fig. 1 I have broken away part of plate *l* and part of pinion *e*, the better to show the parts beyond, and have indicated the shape of the cam-groove in *l* by dotted lines at *n*, as it is on the opposite face of the plate. It will be a sufficient description of this cam-groove to say that it is a nearly-circular curve drawn slightly eccentric to the shaft *f*, and that its effect is to cause the nozzles *i* to swing, independently of shaft *f*, through an arc of about one hundred and twenty degrees as they pass from the point *x* to the delivery-point. As the nozzles approach the latter point, however, the roller *l'* enters a part of the cam-groove *n*, which turns the nozzles sharply down upon a shelf or rest, *o*, which will be referred to more particularly hereinafter. At this moment the exhaust is broken or cut off by valve E, and the sheet is held by the nozzles *i* on the shelf *o* as a gripper.

I have now described the mechanical devices for carrying the forward edge of the sheet from the printing-cylinder over to the delivery-point. Other means, however, are employed to assist in turning over the body and tail of the sheet, in order that it may be properly delivered with the printed side up on the receiving-table F. This means I will now describe.

G in Fig. 3 is a blower-pipe, which connects through the valve E and pipe H with an air-chamber or wind-chest, I. This chamber is provided with several sets of radially-arranged jet-tubes *p p* and *q q*, the former of which are normally open and emit jets of air at all times while the air-blast is on. The latter are closed by the shelf *o*, except at the final delivery of the sheet. When the nozzles *i* have seized the sheet and have started back, the air from the blower is admitted by the valve E, and jets from the tubes *p* take under the bellying sheet and bear it upward and backward, being limited by a roof-plate or shield, J, which is arranged over the delivery mechanism and extends out over or nearly over the receiving-

table. As the nozzles *i* bear its edge onward, gradually turning it over and down, the jets of air cause the sheet to assume the position shown by the dotted lines *z* in Figs. 1, 4, and 5—that is to say, well on its way toward being turned completely over.

On one of the arms *g* is a rigid projection, *r*, which, when the arms assume the advanced position shown in Fig. 4, impinges against an arm, *s*, on the shaft *t*, to which the shelf *o* is attached, and turns said shaft on its axis, thus displacing said shelf and opening the jet-tubes *q*, the mouths of which stand normally covered by the shelf *o*. This causes jets of air from the tubes *q* to be directed backward horizontally over the sheet to complete its inversion. The movement of the sheet in straightening out is indicated by the dotted lines *z* in Fig. 1. To avoid counter-currents and prevent the air from escaping laterally I make the roof-plate or shield *J* solid or unperforated, and provide it with side plates or walls, *u*. The shaft *t* is provided with a spring, *v*, Fig. 2, which turns it back and causes the shelf *o* to again close the jet-tubes *q*, when the nozzles *i* rise and release the sheet. The edge of the sheet is held gripped between the nozzles *i* and the shelf or rest *o* until the sheet is fairly at rest on the receiving-table, and the gripping-point is raised above said table in order not to interfere with the sheets already laid thereon. The sheet, in turning, may or may not touch the shield or roof-plate *J*.

The nozzles *i* are attached to sleeves which slip over the shaft *h*, an aperture in the shaft coinciding with the bore in the nozzle when the latter is in operative position. If it be desired to cut off one or more of the nozzles, it is only necessary to loosen the set-screws which secure the sleeves in position on the shaft *h* and turn said sleeves until the apertures are out of coincidence, when the exhaust will be cut off. This is illustrated in the detail view, Fig. 8.

The disk-valve *E* is mounted rotatively on a stud projecting from a valve-seat, *K*. (Shown detached in Fig. 6.) This valve-seat is connected with the exhaust-pipe *j* and the blower-pipe *G*, as well as with shaft *f* and pipe *H*.

The valve *E* is provided with a toothed wheel or wheel-rim, *w*, which meshes with a toothed wheel, *w'*, of the same diameter, on the axis of the printing-cylinder, whereby the valve is caused to rotate in unison with said cylinder.

The valve is provided with a recess, *a'*, to connect the exhaust-pipe *j* and hollow shaft *f* for the proper interval, and an aperture or port, *b'*, to coincide with the end of shaft *f* at the instant of delivery to break the exhaust and free the sheet from the nozzles *i*. The valve is also provided with a recess, *d'*, of variable width to connect the blower-pipes *G* and *H*. The object in making this recess of variable width is to provide an increased volume of air at the moment of delivery, in order to supply the tubes *q* when opened, and to furnish a diminished blast at the beginning.

Rotary-disk valves for cutting off and admitting a current of air are not new; but such a valve provided with a recess or channel of variable width is new, so far as I am aware.

In lieu of a rotary-disk valve, other means of controlling the air-currents and exhaust may be employed, and separate valves may be used, if desired. The ordinary forms of pressure and exhaust-blowers may be employed, and I have not deemed it necessary to show these in the drawings.

I wish it understood that I do not limit myself to the precise construction and arrangement of the mechanical parts herein shown, as they may be varied somewhat without departing from the spirit of my invention—as, for example, the cam *c* may not be on the cylinder *B*, but be driven from the same motor, and the valve *E* may be driven by other means than the gearing shown.

It must be understood that the sheet is seized by its advancing edge, carried back only far enough to clear the mechanism, and turned over with the printed face uppermost. The carrying back is only required in order to clear the mechanism and to bring the body of the sheet over the air-jets. Some room is also required in which to turn the sheet, and the advancing edge is held down fast in position until the sheet turns completely over. The roof-plate *J* prevents the sheet from being blown away by the jets. Without it it would be impracticable to regulate the blast so nicely as to suspend the sheet properly in the air. With it it is only necessary that the blast shall have force enough, and an excess of force within limits will do no harm.

Having thus described my invention, I claim—

1. A sheet-delivery mechanism for cylinder printing-presses, constructed and arranged to operate substantially as set forth, and comprising, first, means for taking the advancing edge of the sheet by its margin, means for turning or rolling said edge and carrying it over and clamping it down upon a rest, and for holding it so clamped until the body of the sheet is turned by the movement of the printing-cylinder; second, an air-blast device arranged to assist in turning the body and tail of the sheet; third, a close roof-plate or shield, with side plates arranged over the delivery mechanism to prevent counter-currents; fourth, means for releasing the sheet when it is laid on a receiving-table; and, fifth, a receiving-table for the sheets, arranged under the shield, all combined and arranged to operate substantially as and for the purposes set forth.

2. In a sheet-delivery mechanism for printing-presses, the mechanism for gripping and holding the advancing edge of the sheet while the sheet is being turned over, constructed substantially as described, and arranged to hold said edge of the sheet out of contact with the sheets already laid on the receiving-table until said sheet is laid on the table, substantially as and for the purposes set forth.

3. A sheet-delivery mechanism for printing-presses, substantially as described, comprising two or more nozzles connected with an air-exhaust apparatus, and arranged to take the
5 advancing edge of the printed sheet from the printing-cylinder and carry it back to the delivery-point, suitable mechanism for actuating said nozzles, jet-pipes connected with a blowing apparatus arranged to emit jets of air under the sheet as it is being borne back, and a
10 suitable valve or valves to control the exhaust and air currents, all arranged to operate substantially as set forth.

4. The combination, in a sheet-delivery
15 mechanism, of the air-trunk I, provided with jet-tubes *p* and *q*, said trunk being connected with a controlled air-blast, the roof-plate J, and the shelf *o* for closing the jet-tubes *q*, all arranged to operate substantially as set forth.

20 5. The combination of the printing-cylinder, the oscillating segment D, the cam C, for actuating said segment, the shelf *f*, bearing the pinion *e* and arms *g*, the shaft *h*, provided with nozzles *i* and pinion *m'*, the segment *m*, the
25 fixed cam-plate *l*, provided with a cam-groove to actuate segment *m*, the shelf *o*, arranged to be depressed by arm *g*, and the air-trunk, provided with jet-tubes *p* and *q*, and arranged to re-

ceive a regulated supply of air from an air-forcing mechanism, all arranged to operate
30 substantially as set forth.

6. The combination, in a sheet-delivery mechanism for printing-presses, of an oscillating shaft, *f*, partly hollow and connected with a controlled exhaust, and provided with arms
35 *g*, mechanism, substantially as described, for oscillating said shaft in unison with the movements of the printing-cylinder, a hollow shaft, *h*, provided with suction-nozzles *i*, and rotatively mounted in the arms *g*, mechanism, constructed substantially as described, for giving
40 the shaft an oscillatory movement independent of the shaft *f*, whereby the sheet is turned over as it is borne back, jet-pipes connected with a blowing apparatus arranged to emit jets of air
45 under the sheet as it is being borne back and turned, and a roof-plate, J, all arranged to operate substantially as set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing
50 witnesses.

ANDREW CAMPBELL.

Witnesses:

HENRY CONNETT,
ARTHUR C. FRASER.