J. C. Kneeland & G. M. Phelps.

Paper Cutter.

No. 5767. Patented Sept. 12. 1848.

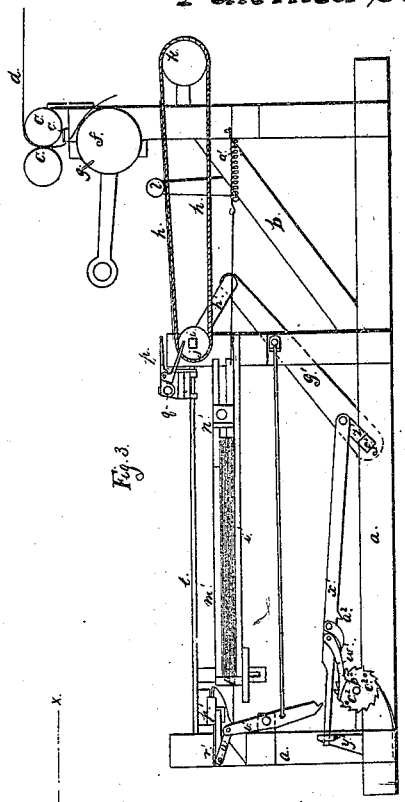

Fig. 3.

Fig. 4.

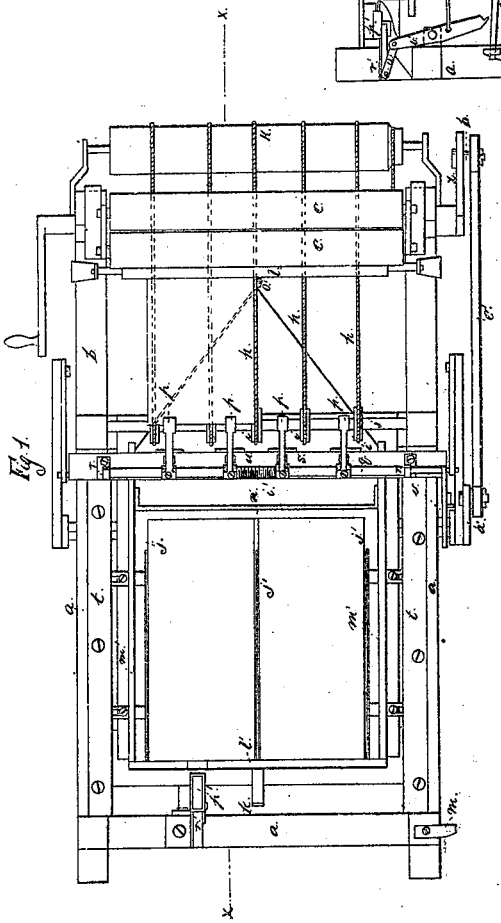

Fig. 1.

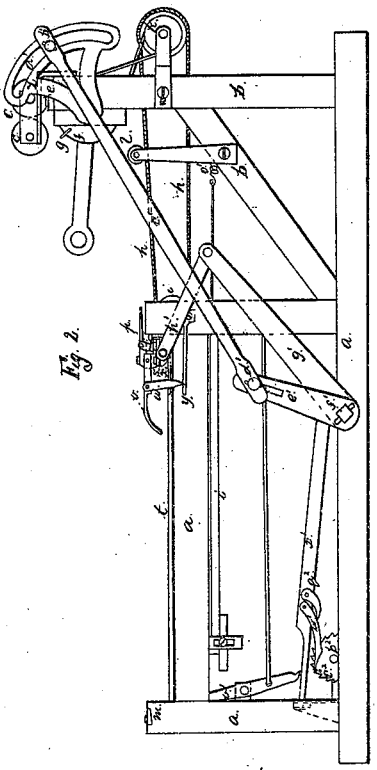

Fig. 2.

UNITED STATES PATENT OFFICE.

J. C. KNEELAND AND GEO. M. PHELPS, OF TROY, NEW YORK.

MACHINERY FOR CUTTING AND ARRANGING PAPER.

Specification of Letters Patent No. 5,767, dated September 12, 1848.

To all whom it may concern:

Be it known that we, JOSEPH C. KNEELAND and GEORGE M. PHELPS, of Troy, in the county of Rensselaer and State of New York, have invented a new and useful Machine for Arranging Sheets of Paper and Counting Them into Quires, Reams, &c., and that the following is a full, clear, and exact description of the principle or character which distinguishes it from all other things before known and of the manner of making, constructing, and using the same, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a plan of the machine; Fig. 2, a side elevation; and Fig. 3, a longitudinal vertical section.

The same letters indicate like parts in all the figures.

This machine is applied to, and makes part of the well known machine for cutting paper into sheets generally used.

The sheets of paper after being cut are delivered by a set of endless tapes or cords to gripping fingers that catch one edge of the sheets, carry them back and deposit them onto a table between guide strips or partitions which just admit the sheets between them to insure their parallelism at the sides, their ends being adjusted as they fall by the motion of two straight edges, one at each end and connected together so that as the bar to which the fingers are attached moves back, with the sheets, it gives a back movement to the frame that carries the two straight edges, one of which strikes against the back edge of the sheets (the edge not held by the fingers and which therefore first falls on the pile) and adjusts them relatively to the piles before the air between these sheets and the piles escapes, and on the return motion of the fingers, the sheets having been dropped by the fingers, the other straight edge is moved forward by a spring or weight to strike the other edge, to insure the adjustment of the sheets should they have been pushed too far by the first straight edge at the other end.

The first part of our invention consists in employing guide strips or partitions projecting from the surface of the table and parallel with each other and placed at such distance apart as just to receive the sheets and therefore to adjust the edges of the pile on two sides, these strips being placed on a line with the well known slitting knives of a paper cutting machine, or with guides when these are not used, so that the sheets when carried back shall be delivered properly between the guide strips or partitions.

The second part of our invention consists in adjusting the ends of the sheets by the motion of the straight edge against the edge of the sheets not held by the gripping fingers, and also in insuring this adjustment by means of the motion of the other straight edge against the other edge of the sheets.

The third part of our invention consists in taking the motion of the finger bar, that is the bar that carries the fingers, from the shaft of the rotating shear or cutter, that cuts the sheets of paper into lengths that the motions of the one may always correspond with the other to insure the presentation of the sheets to the gripping fingers at the proper time and place, and also in connecting the connecting rod which gives motion to the finger bar with the shaft or arbor of the cutter by means of a sector or its equivalents, so that by shifting the crank pin along the sector the length of sheets to be cut may be varied at pleasure without varying the point at which the edge of the sheets are to be presented to the gripping fingers. And the fourth part of my invention consists in separating the sheets as they are piled up into quires, or reams, or any other desired number of sheets, by dropping onto the last sheet of every such division a thin strip of metal or other substance, said thin piece of metal being discharged from a hopper by a slide operated by a lever connected with an index wheel that receives an intermittent motion from the same source as the finger bar so that at any given part of its rotation an index pin shall operate the lever and slide for the purpose described.

In the accompanying drawings (*a*) represents the frame of the machine attached to the frame (*b*) of a machine for cutting paper, such as is generally used in paper mills. The paper cutting machine consists of two rollers (*c*, *c*) by which the sheet of paper (*d*) is carried to the permanent shear (*e*); it passes around the edge thereof and over the cutter cylinder (*f*) which carries a radial shear (*g*) so that by the rotation of the cylinder this shear passes by the edge of the permanent shear and cuts off the sheet which is delivered onto the endless tapes or cords (*h*) carried by the series of wheels

(*i*) (on a shaft (*j*)) and a roller (*k*), the sheet being held down onto these tapes or cords by a roller (*l*.) In this way the long sheet of paper from the drying machine is cut into the required lengths; but when the sheet is to be slit lengthwise to make two or more sheets in the width, the usual slitting cutters are to be used above and back of the rollers (*c*, *c*) in manner well known to paper makers.

As the sheets of paper are carried by the tapes or cords toward the series of wheels (*i*) the forward edge is introduced between the series of open fingers (*p*), which, as the sheets move toward them, are advancing toward the sheets, and at the end of this motion they close and grasp the edge of the sheets preparatory to the return movement by which they carry them off. The upper half of these fingers are attached to an arbor (*q*) that turns in standards (*r*, *r*) one at each end of a finger bar (*s*) that slides in ways (*t*, *t*) on the top of the frame; and the under half of the fingers are jointed to the upper half near to the arbor, and about the middle of their length they rest on the edge of a plate attached to the forward part of the finger bar, so that when the upper half of the fingers are thrown up the tips of the under half are forced down, and thus the fingers are opened wide by a slight vibration of the arbor; the return vibration of this arbor of course closes the fingers. This opening and closing of the fingers is effected in the following manner: They are closed by a helical spring (*n*) coiled around the arbor and attached by one end to the arbor and by the other to the finger bar, and they are opened by an arm (*v*) on the end of the arbor which as the finger bar reaches the end of its back movement to deposit the sheet of paper on the table passes under an inclined plane (*m*) which forces it down thereby turning the arbor to open the fingers until a notch on a pendant link (*w*) catches under a piece (*x*) attached to the end of the finger bar, it is there retained holding the fingers open until the sheet of paper is delivered and the finger bar reaches the end of its forward movement to receive a fresh set of sheets at which time the pendant link strikes against a pin (*y*) which disengages it to permit the spring to close the fingers and hold the fresh sheets of paper.

The finger bar receives its reciprocating motions from the shaft of the shear cylinder (*f*) to the end of which is attached a sector (*z*) having a sector slot (*a'*) in which is secured a crank pin (*b'*) by means of a nut so that it can be shifted when desired to any part of the slot. This crank pin receives one end of a connecting rod (*c'*), the other end of which takes hold of a wrist (*d'*) secured in a slot at the end of an arm (*e'*) on the end of a rock shaft (*f'*) below the ways of the finger bar, and this rock shaft has two other arms (*g'*, *g'*) one near each end and outside of the frame connected each with one end of the finger bar by a joint link (*h'*, *h'*), so that as the crank pin (*b'*) rotates with the cylinder of the shear or cutter a vibratory motion is communicated to the rock shaft and from this to the finger bar which for every rotation of the shear makes one motion back and forth to carry off a sheet of paper and return to take another. But as the cutting machines generally used are adapted to cutting sheets of various lengths by changing the motion of the rollers (*c*, *c*) relatively to the motion of the shear or cutter it becomes necessary also to adapt the motion of the finger bar to these variations in the length of the sheets. This is effected by means of the sector groove to which the crank pin is secured—for instance if the position of the crank pin is such that when the rotating shear or cutter passes the main shear the finger bar will complete its motion toward the sheet to receive it, the motion of the finger bar will be adapted to the greatest length of sheet, but if the crank pin be shifted in the sector groove so that the rotating shear will cut off the sheet before the finger bar shall have completed its motion it will be obvious that that part of the motion of the finger bar will be lost and therefore it will be adapted to a shorter sheet. In this way the motions of the finger bar and rotating shear or cutter can be adapted to sheets of any length within the capacity of the machine and with the greatest accuracy. In case of any inaccuracy in the structure of the machine or the straining of the parts, the motions of the finger bar and rotating shear or cutter can be adjusted by shifting the wrist in the arm of the rock shaft.

The sheets of paper when carried back by the fingers fall onto a table (*i'*) and between guide strips (*j'*) made of thin metal with the upper edge reduced or beveled, and placed at such distance apart as that the width of a sheet of paper will just pass in between them. If the machine is intended for a single sheet two only of such strips are used, but if the cutting machine is used with slitting knives to slit a main sheet into two widths then there must be three guide strips, the middle one to be placed as near as practicable in a line with the slitting knife so that when the sheets are drawn onto the table they will fall just between the guide strips instead of lodging on one of them. If however the machine be intended for a greater number than two sheets, then an additional strip must be provided for every additional slitting knife. These guide strips are to be secured to the table in any desired manner which will admit of adjusting them laterally to different widths of paper, as for

instance, by making the lower edge of the strips with slotted flanches let into the surface of the table and secured by screws.

As the finger bar moves back with a sheet of paper the end thereof from the fingers will fall onto the table and settle on to the table between the guides, and as the finger bar approaches the end of its motion, it strikes against a stud (k') on a straight edge (l') which is connected by said bars (m', m') with another straight edge (n') thus forming a frame outside the guide strips, so that as the finger bar strikes the stud it draws the straight edge (n') against the end of the sheet of paper to adjust it, and when the other end of the sheet is liberated from the fingers and drops on to the table, the finger bar begins its return motion, liberates the stud which permits the straight edge to be drawn back to its original position by the tension of a spring (o') or by a weight, which return motion brings the back straight edge (l') against the other or back end of the sheet to readjust the sheet if by chance the motion of the front straight edge carried it too far back. In this way the position of the sheets, one on top of another, is adjusted with their edges properly arranged. And it will be observed that this adjustment of the sheets takes place before the sheet has been suffered to settle down on the table or the pile and before the air has been permitted to escape from under it, and therefore when it may be said to be floating in the air—this prevents the sheets from being bent up by the motion of the straight edges against its ends.

At the back of the machine there is a box or hopper (p') (one for each division of the machine) which receives a series of small thin plates of metal (q'). The bottom of the box is open and provided with a slide (r') formed as represented in the separate figure (4), it is cut out as at (s') so that when that part of it is under the hopper a plate from the hopper rests on the side (t') and when the slide is moved forward it carries with it the plate resting on it which falls off onto the sheet of paper last deposited on the table to mark the end of a quire or ream, and this motion is given to the slide every time that the required number of sheets have been deposited, which is done by jointing the back end of the slide by a joint link (u') with the upper end of a lever (v') the lower end of which is actuated at the required time by a trigger (w') jointed to a sliding rod (x'), one end of which slides in a standard (y') the other being jointed to an arm (z') on the rock shaft. This sliding rod (x') has a tooth or hand (a^2) that at every motion of the rock shaft turns a ratchet wheel (b^2) the distance of one tooth, and on the face of this wheel there are pins (c^2) which when at the top force up the trigger on the sliding rod that its end may strike against the end of the lever and push out the slide the full length of a plate to discharge one of them onto the paper.

The number of teeth on the ratchet wheel and the number of pins projecting from its face to lift the trigger must be so regulated that the marking plate of metal shall be dropped at the end of every quire, in which case there must be 24 ratchet teeth on the wheel for every pin on the face, and so of any other division that it may be desired to count and mark. There is to be a counting apparatus of this kind for each division of the machine, that is, for every sheet in width that the table is intended to receive. The machine should be so arranged as to have two pairs of fingers for each division.

It will be obvious on reflection that some of the parts of my invention may be used without others, as for instance the sheets may be piled and arranged without being counted by dispensing with the counting and marking apparatus. Or the sheets may be deposited and counted, and the divisions marked without accurately adjusting the ends, by dispensing with the movable straight edges at the ends which I denominate the check motion, but it will be found that the union of the whole will be far more advantageous. It will be obvious also that by means of a fixed crank on the shaft of the rotating shear the machine will perform all its functions, but it will only be adapted to one length of sheets, and hence the adjustment of this crank by the sector groove or its equivalents is of great importance, the same thing however can be effected by means other than the sector groove, as for instance, by attaching the crank pin to a crank arm that may be shifted on the shaft, and hence we do not wish to confine ourselves to the use of the sector groove, but to claim the principle of this adjustable connection, whether attained by the sector groove or any of its equivalents.

The sheets may be adjusted endwise by the action of only one of the straight edges of the check motion, and therefore only one of these may be employed, say, the one in front or the one behind, but, the adjustment will not be so certain, and therefore we prefer the use of the two which alone insure the proper adjustment.

What we claim as our invention and desire to secure by Letters Patent is—

1. Making the table on which the sheets are piled with guide strips, substantially as described, to adjust the two edges of the sheets widthwise as they are received from the cutting machine, whereby the necessity of adjusting the sheets against a straight edge by hand is avoided, and this we claim

irrespective of the manner in which the sheets are transferred from the cutting machine to the table.

2. We claim the method, substantially as described, of adjusting that end of the sheets which first falls onto the table, by means of the movable straight edge, called the check motion, substantially as described; and we also claim the method of adjusting the sheets by the action of the other straight edge against the other edge of the sheets, substantially as described. And we also claim the combined action of the two straight edges, or check motion, acting alternately against the two ends of the sheets, substantially as described, whereby any defect arising from the defective action of the first is remedied by the second as described.

3. We claim taking the sheets of paper from the cutting machine and delivering them onto the table, by a motion taken from the rotating cutter, in the manner described or in any other substantially the same, to insure the delivery of the sheets at the proper time.

JOSEPH C. KNEELAND.
GEORGE M. PHELPS.

Witnesses:
P. L. JONES,
M. RUSSELL.