(No Model.)

E. DUMMER.

SHEET SEPARATING AND FEEDING MACHINE.

No. 566,671. Patented Aug. 25, 1896.

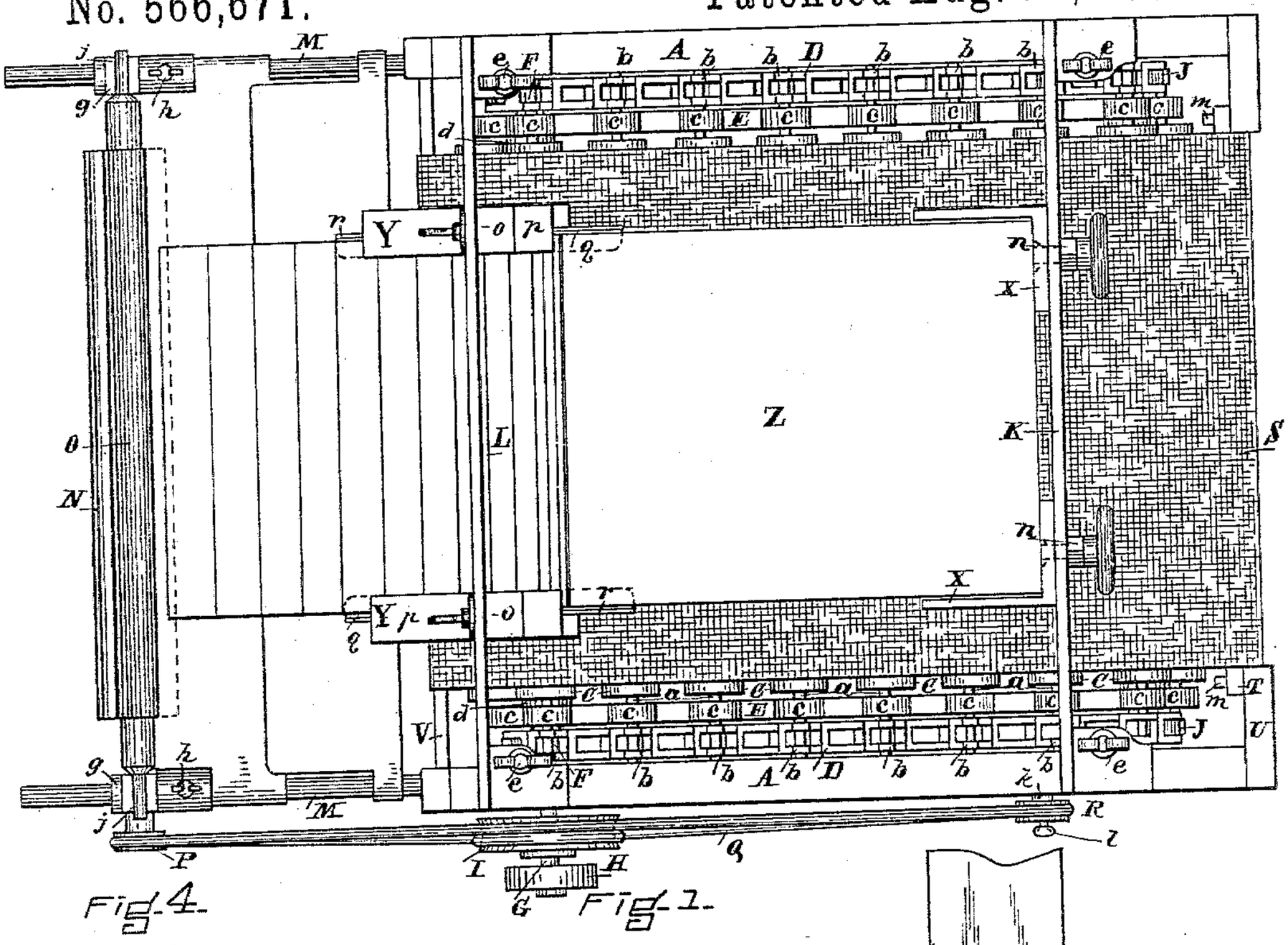

Fig. 4.

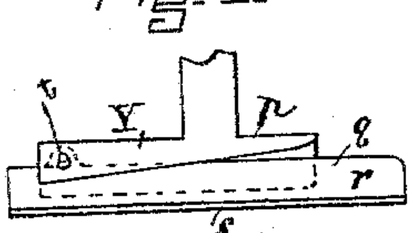

Fig. 2.

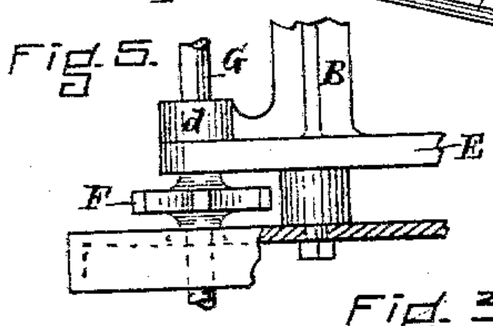

Fig. 5.

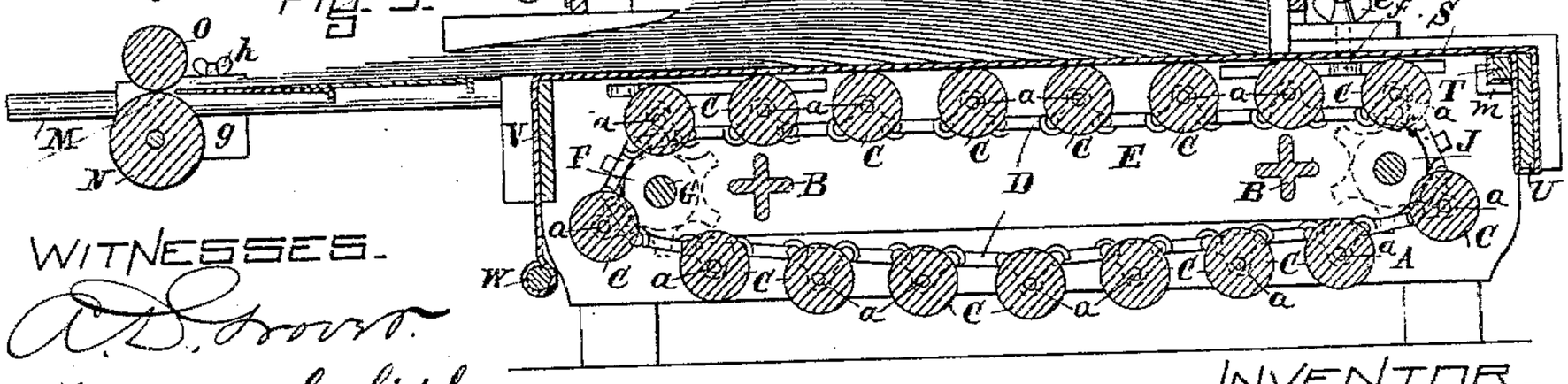

Fig. 3.

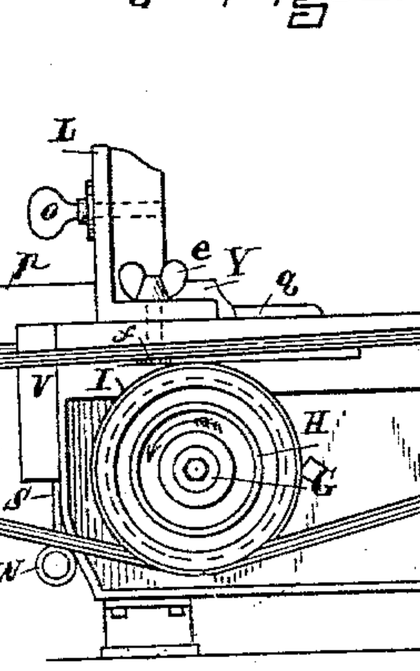

Fig. 1.

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SHEET SEPARATING AND FEEDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 566,671, dated August 25, 1896.

Application filed July 12, 1895. Serial No. 555,785. (No model.)

To all whom it may concern:

Be it known that I, EDWARD DUMMER, a citizen of the United States, residing at Auburndale, in the city of Newton, county of Middlesex, and State of Massachusetts, have invented a new and useful Improvement in Sheet-Feeding Mechanism, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to mechanism for separating sheets (of paper or like flexible material) individually from a pile of sheets; and it consists in the devices and combinations of devices hereinafter set forth, and specifically pointed out in the claims.

In the drawings, Figure 1 is a plan, Fig. 2 a side elevation, and Fig. 3 a central longitudinal section, of a machine embodying my invention. Figs. 4 and 5 show details.

Assuming the previous state of the art to be such that repeated progressive action of a suitable instrument on the surface of a pile of sheets, as, for instance, rolling a roller under pressure on the surface of the pile, causes the sheets to be offset, so that an edge of the outermost sheet will project sufficiently beyond the adjacent sheet as to be seized and removed from the pile; furthermore, that such offsetting may be caused though an apron of flexible material intervene between said instrument and the pile, which apron moves in the direction of the movement of the sheets, I now so apply and adapt said apron that it will not move as above said. This improvement is accompanied with important results, not only modifying the operation of the machine, but greatly increasing its simplicity and efficiency, as will hereinafter appear.

Referring to the machine illustrated in the drawings, the sides A of the frame are maintained in suitable relation to each other by transverse rails B. There are several transverse rollers C, each one of which is on a shaft *a*. Each of the shafts *a* has bearings *b* in two endless chains D. Each roller C may revolve freely about its axis. The shafts *a* will be prevented from moving endwise, since their ends will meet the inner surfaces of the sides A. On each of the shafts *a* are two pulleys or small rollers *c*. Each of these pulleys may revolve freely on its shaft, and is located between a roller C and a bearing *b*. A way E is secured on the inner side of each side A, on which the pulleys *c* (on that side of the machine) roll. Sprocket-wheels F fastened on a transverse shaft G engage with the chains D. This shaft has bearings *d*, one at each side of the machine. On this shaft is a driving-pulley H and a grooved pulley I. There are two other sprocket-wheels or pulleys J to revolve freely. The sprocket-wheels F and the sprocket-wheels or pulleys J are located as shown, and so that the chains will move about the same and be driven by means of the sprocket-wheels F. On the sides A are located transverse bars K and L. These bars are adjustable forward and backward, the upper part of each side A being formed to provide a guide therefor, each bar being secured in the desired position by means of thumb-nuts *e* and screws *f*. On extensions M of the sides A are stands *g*, having bearings for a transverse roller N. These stands are adjustable forward and backward on the extensions M (which are formed as ways therefor) and are secured in position by means of thumb-screws *h*. Each stand *g* is also provided with a slot *j*, in which is held one end of a shaft for a roller O. Thus this roller O, being of the required weight, will bear as required on the roller N and constitute a preferable form of a gripper and a carrier for a sheet. There is a grooved pulley P secured to revolve with the roller N. A belt Q extends about the pulley P, a pulley R to revolve freely on a stud *k*, (adjustably secured to the frame by means of a thumb-screw *l*,) and once around the pulley I.

Assuming the machine, so far as above described, to be substantially of previous invention, I now combine therewith certain devices, as follows: One end of an apron S is secured at the rear of the machine, being fastened to a transverse rod T, which is held at its ends in sockets *m*, so as to readily be removed, if required. The apron S is of flexible material, as woven cloth, and extends over a fixed transverse rail U, over the rollers C, and over a fixed transverse rail V. The forward end of the apron preferably hangs down and has a weight W secured thereto, which serves to keep the apron from being

accidentally displaced. To the transverse bar K are secured (adjustably by means of screws and thumb-nuts *n*) two right-angled corner-pieces X, which serve (being of any required height) as an abutment for the pile of sheets and as gages at the sides of the pile. To the transverse bar L are secured (adjustably by means of screws and thumb-nuts *o*) two guides Y. Each of these guides is formed of the rigidly-secured part *p* and a part *q*, which consists of a vertical plane strip *r* and a thin horizontal strip *s*. The part *q* of the guide is prevented from moving sidewise, since the strip *r* is partially within a vertical slot in the part *p*. The part *q* is prevented from sliding endwise by means of a pin *t*, which extends horizontally through the part *p* and the strip *r*. The part *q* may, however, move freely up and down, the hole therein for the pin *t* being a vertical slot.

The abutment and gages X and the guides Y having been set as required, a pile of sheets Z is placed on the apron S, so that the rear corners will be within the pieces X, as shown, and the strips *r* of the guides Y will be, as to their rear-end portions, at the sides of the pile and the strips *s* partly under the pile, as shown. The rollers N and O are set so that the distance from them to the pile is sufficient to allow the bottom sheet to be readily drawn from under the remaining sheets when seized by these rollers. The shaft G being revolved, (in the direction indicated by the arrow,) the rollers C will roll forward and freely against the under surface of the apron S, which is pressed on the rollers by the weight of the pile. The result of this action is to cause a certain number of the lower sheets of the pile to move forward, each sheet of this number to move faster than the adjacent sheet thereabove, and also cause the balance of the pile to press rearward against the abutment X. When the lowest sheet has reached the rollers N and O, it will be gripped by these rollers, and these rollers (the peripheries of which move much faster than the movement of the sheets caused by the rollers C) will pull the sheet from under and carry it away from the remainder of the sheets.

While it may not be incumbent on me to explain herein the nature of the action which occurs to produce the result, which is as above set forth, yet (according to my present understanding of this action and in the absence of a better expression) I style the action of the rollers on the pile "progressive compression." The pile is pressed (by the weight thereof) on each roller C thereunder, and since each roller moves forward the line of pressure thereat progresses correspondingly. Furthermore, it appears that the sheets are not moved as by the friction of an instrument moved against, in contact with the pile, since the apron S does not move bodily forward. The pressing of the main body of the pile backward against the rear abutment appears to result from a reaction caused by preventing the apron from moving bodily forward.

If the apron S did move forward, (which occurred in a machine previously invented by me, the apron being endless and suitably guided in its movement,) then the sheets would be offset somewhat, as herein shown, but the offset of each sheet with reference to the adjacent sheet would not be so great as in the present case. If the apron S moved forward, the pile as a body would press against an abutment at the forward end. Thus, not only is the machine provided with a stationary (with reference to a movement bodily forward) apron quite different from the machine in which the apron travels, but the result is far superior. The machine is simpler, since no provision is required for maintaining and guiding a moving apron, and may occupy much less space, since the seizing-rollers N O or grippers may be much nearer the pile, the offset of each sheet with reference to the adjacent sheet being greater; and, furthermore, and which experiments have clearly demonstrated, the offset is much more certain and regular, so that the machine is much more reliable. Indeed, thus equipped with a "stationary apron" (so styled) quite surprising results are attained whether the sheets be thick or thin.

As to the guides Y, they seem to be necessary, at least in some cases, owing to liability of an uneven condition of the pile or slight variation in the action of the rollers on the pile. Such variation, though slight, is accumulative in effect, so that the offset sheets may not progress in a straight line and meet the rollers N O at right angles, as they should. I have found that by acting against the edges of several sheets of the bottom of the pile while these sheets are being slightly and progressively lifted or loosened by the action of the rollers, the outcoming sheets may be directed in their movement as required.

If the rollers and shafts thereof should stick at their bearings and thus be held rigidly so as not to revolve, but be carried along as transverse slats under the apron and sheets supported thereby, an effect somewhat like that which occurs when the rollers revolve would result, namely, the sheets would be offset for the reason that the apron is prevented from moving forward. If the apron could move forward or was wholly dispensed with, then the action and effect of such slats on the sheets would be quite different. The pile would be pressed forward against the transverse bar L and the sheets would be offset or fanned out on account of the rubbing or friction of the slats against the sheets. Such offsetting or fanning out by rubbing or friction would, however, affect more of the sheets at one time, would be irregular, and owing to the pressure of the pile the sheets would probably move in masses and the amount of offsetting between any two contiguous sheets be slight, so that the result would be of no

use for the desired purpose, namely, to separate the sheets individually from the pile with the required degree of certainty.

I claim as my invention—

1. In a machine for separating sheets individually from a pile, the combination of several transverse rollers each mounted to revolve freely, means for maintaining and carrying said rollers from the rear to the front of the machine and returning the rollers to the rear of the machine, a flexible apron lying on the upper surface of said rollers and restrained with reference to a movement bodily toward the front of the machine, and an abutment at the rear of the machine for the pile on said apron suppported by said rollers, substantially as set forth.

2. The combination of several transverse shafts, rollers to revolve freely on said shafts, pulleys one at each end of each of said shafts, guides on which said pulleys roll, two endless chains each having a bearing for one end of each of said shafts, sprocket-wheels for each of said chains on a revoluble shaft, a flexible apron to lie upon the upper surfaces of said rollers and restrained as to a forward movement in the direction of its plane, and an abutment for a pile of sheets on said apron and rollers, substantially as specified.

3. In a machine for separating sheets from a pile of sheets, a support for a pile of sheets which has several places of bearing for said pile, means for causing said support to travel forward under said pile, an apron on said support with which the pile is in contact and which is restrained as to a movement forward, and an abutment for said pile, substantially as specified.

4. The combination of a support for a pile of sheets, an abutment for said pile, a guide at a side of said pile, a flexible apron on said support between the support and pile, and means for moving said support forward under said pile and apron said support providing several separate places of contact with said apron, the apron being restrained as to a forward movement, substantially as specified.

5. The combination of several transverse rollers free to revolve and to be carried forward, a flexible apron on said rollers restrained as to movement bodily forward, means for carrying said rollers forward, an abutment, and gripper and carrier adjustable to position for seizing the lowermost and foremost sheet of a pile of sheets on said rollers when the sheets are offset, substantially as set forth.

6. In a machine for separating sheets individually from a pile, a roller maintained in position to press against said pile, means for moving said roller forward, an abutment for the pile, and a flexible apron between said roller and pile, said apron being restrained as to a movement bodily forward, substantially as specified.

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Witnesses:
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