(No Model.) 3 Sheets—Sheet 1.

C. F. FÖRSTE.

PAPER FEEDING DEVICE.

No. 588,058. Patented Aug. 10, 1897.

Fig. 1.

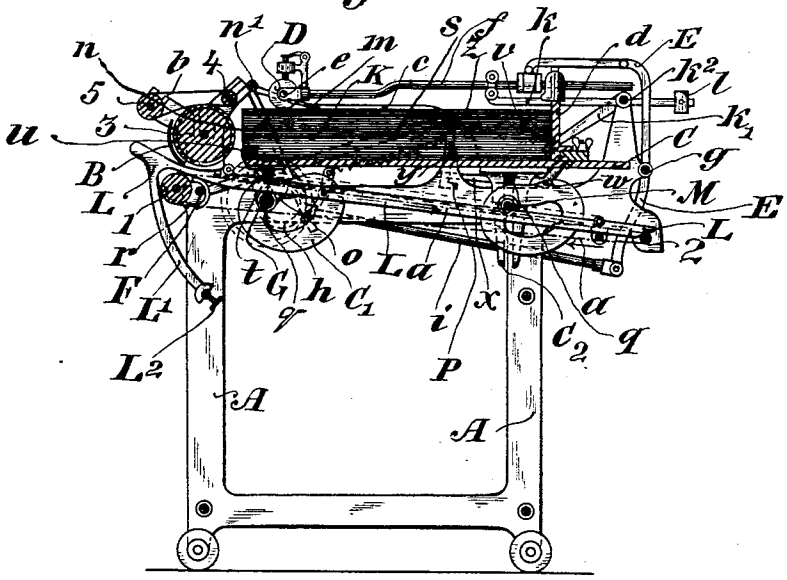
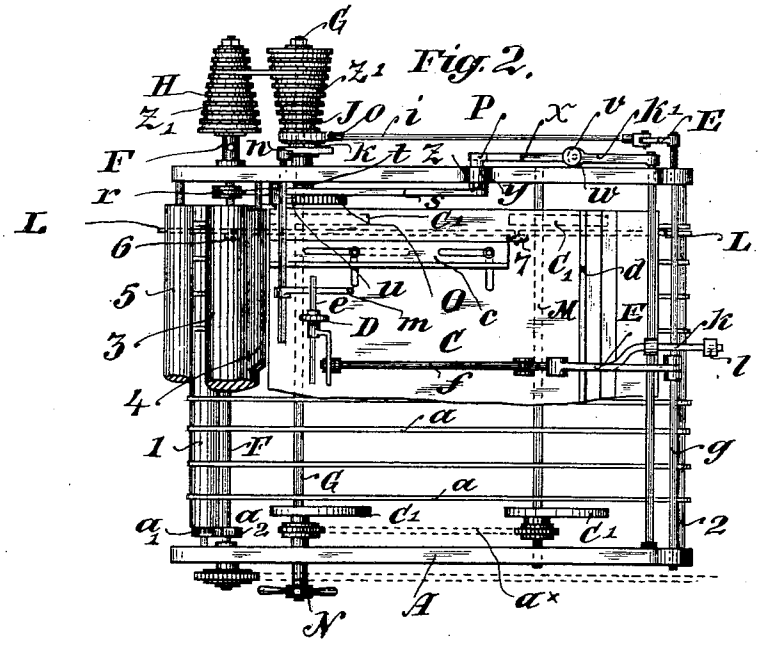


Fig. 2.



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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 3 Sheets—Sheet 2.

C. F. FÖRSTE.

PAPER FEEDING DEVICE.

No. 588,058. Patented Aug. 10, 1897.

Fig. 3.

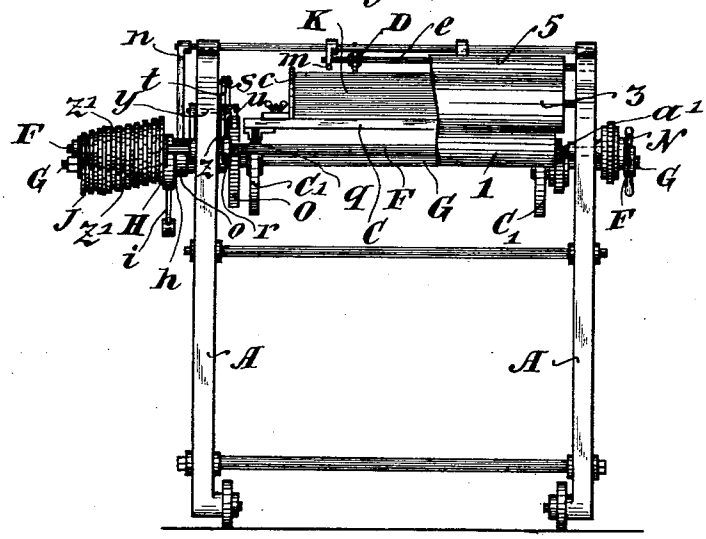


Fig. 4.

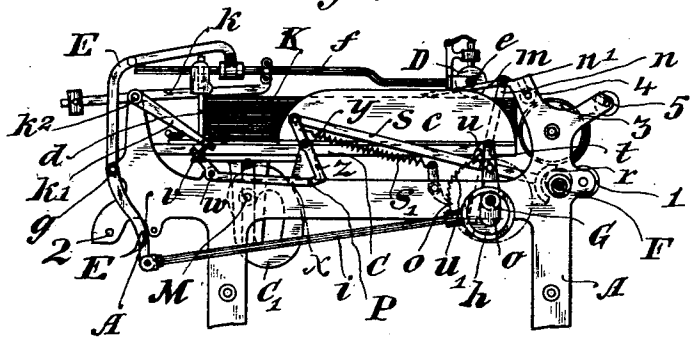
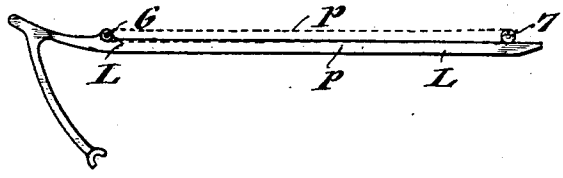


Fig. 5.



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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 3 Sheets—Sheet 3.

C. F. FÖRSTE.

PAPER FEEDING DEVICE.

No. 588,058. Patented Aug. 10, 1897.

Fig. 6.

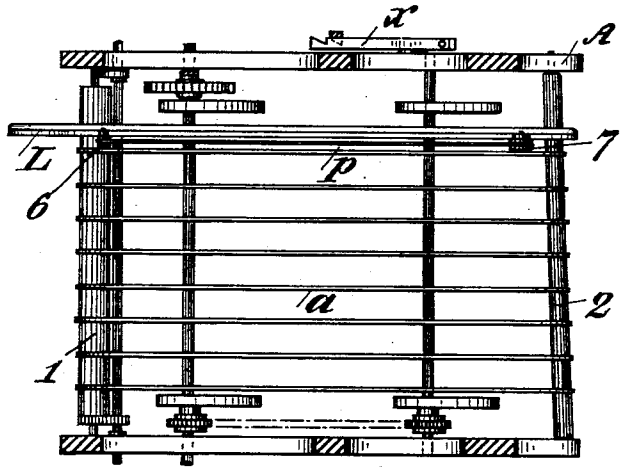
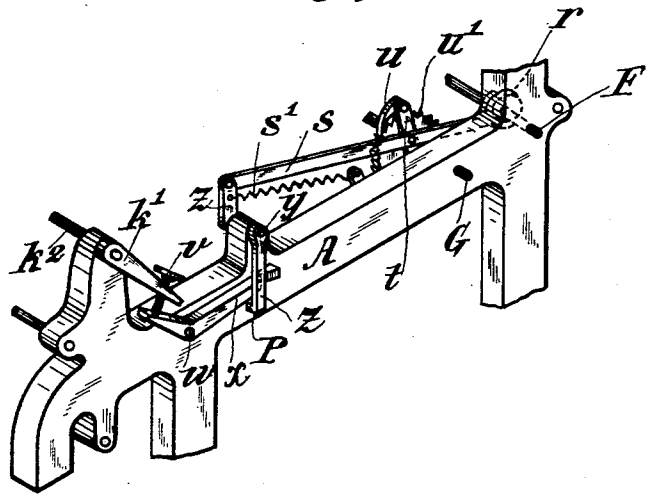


Fig. 7.



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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

CARL FRIEDRICH FÖRSTE, OF LEIPSIC, GERMANY.

PAPER-FEEDING DEVICE.

SPECIFICATION forming part of Letters Patent No. 588,058, dated August 10, 1897.

Application filed September 16, 1895. Serial No. 562,733. (No model.) Patented in Germany December 22, 1891, No. 69,443.

To all whom it may concern:

Be it known that I, CARL FRIEDRICH FÖRSTE, a subject of the King of Saxony, and a resident of Leipsic, in the Kingdom of Saxony, German Empire, have invented a certain new and useful Improved Automatic Feed Device for Ruling-Machines, of which the following is a full, clear, and exact description, and for which I have received a patent in Germany, No. 69,443, dated December 22, 1891.

The present invention consists of an improved device for automatically feeding sheets of paper to a ruling-machine; and it comprises, first, means for feeding the sheets of paper to the cylinder, and, second, means for regulating the height of the pack of paper from which the sheets are taken, so that the top sheet of the pile shall always be at the proper height with regard to the position of the conveyer-rolls, and in order to make the present specification more easily intelligible reference is had to the accompanying drawings, in which similar letters and figures denote similar parts throughout the several views.

Figure 1 is a longitudinal section through the machine; Fig. 2, a plan of the same; Fig. 3, an end elevation, partly in section; Fig. 4, a side elevation of the machine, seen from the opposite side to that of Fig. 1; Fig. 5, a detail side elevation of the guide-rail, as hereinafter more particularly described. Fig. 6 is a part plan view showing the arrangement of the rollers 1 and 2 and transport-bands, and Fig. 7 is a detail perspective view of the mechanism for controlling the height of the paper pile.

Referring to Figs. 1 to 4, the paper pile K is placed on the vertically-movable plate C, mounted on four cams C′ C′ C′ C′, said cams being mounted fast on shafts G and M of the machine-frame A and coupled in suitable manner by means of chain-gearing $a^{\times}$ or the like, so that they shall all move in the same direction and at the same time, so as to cause a regular raising and lowering of the plate C, supporting the paper pile, this latter being guided in its upward and downward passage by means of the guide-bars C^2, attached underneath the same, Fig. 1, and sliding on a pin *q*, arranged in the machine-frame. The plate C is provided with right-angular guides *c d* for the paper pile, said guides being of the usual construction. The top sheet of the paper pile is pushed by means of the rolls D D between the guide-roll 3 and band *b*, arranged over the rolls 4 and 5, and its end on emerging at the other side of the said rolls meets a guide-plate B, which turns the said sheet downward around the roll 3, passing the same onto the threads or bands *a*, running over rolls 1 and 2. The sheet thus turned is passed along by the endless bands *a* and pushed onto the receiving-plate of the printing-machine.

In order to bring the sheet into proper position on the band and to insure its passage to the printing-cylinder at right angles to the same, a guide-rail L is arranged at or near one side of the said bands *a*, said guide-rail being shown at Figs. 5 and 6. An extra band *p* is also arranged on rolls 6 and 7 of said guide-rail L above the bands *a* and adapted to press on the edge of the sheet from above to prevent the sheet from curling up against the said rail. The rolls 6 and 7, together with their band *p*, will be rotated by the sheet moving under them. The guide-rail L is adjustable at its upper end by means of an arm L′ and set-screw L^2. The guide-rail and band-rolls 6 and 7 are shown detached at Fig. 5 and in the plan view, Fig. 2, the sheet of paper coming from the guide-plate B being pushed toward the said guide-rail by means of the roll 2 and bands *a*, said roll being arranged slightly slanting, Fig. 6, so as to cause the sheet of paper to move toward the said guide-rail L and slide along the same. The rolls 1 and 2 are advantageously grooved to prevent the tapes from traveling along the same and becoming loose.

The guide-plate B is particularly important in this invention, since by turning over the sheets of paper in the manner specified the length of the machine may be reduced to about the half of what has hitherto been employed, it being well known that hitherto the paper pile has been arranged behind the transport-band *a*, so that by the arrangement of the guide-plate B great saving of room is effected.

The rolls D D, one of which is shown in the drawings, move backward and forward and at each forward stroke push one sheet of the

paper between the guide-rolls B and bands *b* of rolls 4 and 5. The said rolls D D are mounted on a transverse spindle *e*, carried in a fork at the end of a lever *f*, said lever *f* sliding in a pivotally-attached guide-lever *k*, having counterbalance-weight *l* and pivoted in the machine-frame at k^2. The rod or lever *f* is actuated backward and forward by means of a jointed lever E, pivotally coupled to the said rod and adapted to swing on a pivot *g*. The lower end of the lever E is connected to the eccentric-rod *i* of the eccentric *h*, from which the latter receives its motion, said eccentric *h* being fast on the conical sheave-pulley J, which is mounted loosely on the shaft G of the machine.

The rolls D D are prevented from moving the top sheet of the pile at their backward motion by the following device: A lever *n* is rigidly attached to a bar *n'*, supported in the machine-frame, said bar carrying also two arms *m m*, adapted to lie in the path of the axle of the rolls D D, while the lower end of the said lever-arm *n* rests against the cam or eccentric *o*, mounted on the shaft G, Figs. 1 and 2. Thus when the rolls D D have completed their forward movement, or nearly so, the cam pushes the lower end of the lever *n* to the right, Fig. 1, raising the arms *m m*, which in turn raise the cylinder *e* of the rolls D D, lifting the latter off the paper pile and preventing the displacement of the top sheet of paper on the return stroke of the lever *f*.

The self-adjustment of the vertical position of the paper pile is accomplished by the following mechanism: Fast on the shaft G at the side of the machine, Figs. 3 and 4, is a ratchet-wheel *u'*, in which a pawl *u*, Figs. 5 and 7, mounted on the end of a lever *t*, adapted to swing loosely on the shaft G, engages. At about the middle this swinging arm *t* is pivoted to a rocking lever *s*, rocked by an eccentric *r*, fast on the driving-shaft F of the machine. The rocking lever *s* is not connected to the eccentric *r* by straps, as is usual with eccentric connections, but simply rests on the said eccentric with its open forked end. The opposite end of the lever *s* is pivoted to the upper end of a double-arm rocking lever *z*, pivoted in its turn to the machine-frame at *y*, and the said lever *s* is normally held in contact with eccentric *r* by means of a spring *s'*, stretched between a point on the machine-frame and the upper end of the said lever *z*. The lower end P of the lever is provided with a notch or hook adapted to engage the notched or hooked end of a latch *x*, pivoted at *w* to the machine-frame and having an upwardly-extending arm in contact, by means of a screw *v*, with a lever-arm *k'*, fast on the spindle k^2, on which the lever *k* is also rigidly mounted.

When the paper pile K rises too high by reason of the action of the eccentric *r* propelling the ratchet-wheel *u'* too quickly, the rolls D D will also rise, tilting the rod *f* and with it the guide-lever *k*, which latter also turns the lever *k'* by reason of their both being fast on the spindle k^2. Thus the lower end of the lever *k'* will be raised, allowing the latch *x* to fall on its pivot *w*, bringing the catch at its lower end downward to engage the lower end of the lever *z* and thus prevent the backward stroke of the rod *s*, Fig. 7, whereby the ratchet movement *u u'* is stopped until the paper pile has attained the proper height, owing to the removal of one or more sheets. At this point the rolls D D will return to their normal position and the arm *k'* will fall, lifting, by means of screw *v*, the notch of lever *x* out of contact with the lever *z* and freeing the latter, so that the rod *s* can again perform its full stroke under the influence of the eccentric *r* and turn the ratchet-wheel, as aforedescribed, the ratchet-wheel turning the four cams C' C' and gradually raising the paper pile. By means of the mechanism just described the top sheet of the paper pile will be automatically kept in the proper position with regard to the rolls 3 and 4.

The conical sheave-pulley J is loose on the shaft G, and the eccentrics *h* and *o* are fast on said pulley, so that the mechanism for removing the sheets successively will continue to work independently as to whether the shaft G and with it the ratchet-wheel *u'* are rotated or not. By this means the height of the pile of paper will always right itself.

The conical sheave-pulleys H and J are provided with grooves *z'* by means of which to guide the driving-belt, so that the speed of the pulley J may be varied by shifting the driving-belt to suit the various sizes of the sheets of paper being fed by the rolls D D. Thus when large sheets are being fed it will be necessary to reciprocate the said rolls more slowly than when feeding small sheets.

I claim as my invention—

1. In a paper-feed mechanism, the combination of reciprocating rolls to remove the sheets successively from the paper pile, and means for automatically adjusting the height of the said paper pile, paper-transport bands arranged underneath the paper-carrying table, a guide-plate B to receive the sheets removed from the pile and turn the same downward, an adjustable lateral guide-rail L at one side of the transport-bands arranged under the paper-carrying table, said rail having rolls 6 and 7 and band *p* to keep the sheet edge down and means for actuating the sheet of paper under transport against the said guide-rail substantially as described.

2. In a paper-feed mechanism, the combination of reciprocating rolls to remove the sheets successively from the paper pile, and means for automatically adjusting the height of said paper pile, paper-transport bands arranged underneath the paper-carrying table, a guide-plate B to receive the sheets removed from the pile and turn the same downward, an adjustable lateral guide-rail L at one side of the transport-bands arranged under the paper-carrying table, said rail having rolls 6 and 7 and band *p* to keep the sheet edge down

and means for actuating the sheet of paper under transport against the said guide-rail consisting of a slantingly-arranged guide-roll for the transport-bands at one end substantially as described.

3. The combination of a vertically-movable paper-slab, coupled cams C′ fast on shafts M and G, to support the same, a ratchet-wheel u' mounted fast on the shaft G, a rocking pawl u to engage said ratchet-wheel, a lever s to rock said pawl-lever, an intermediate spring-retained lever z pivoted to the machine-frame and pivotally attached to said lever s at its upper end, a forked extension to said lever s and a positively-rotated eccentric to engage said fork, a reciprocating lever with rolls to push forward the top sheet of paper, and means to reciprocate same, said lever being pivotally mounted in the machine-frame and adapted to turn on its pivot as the paper pile varies its position in the vertical plane and means for transmitting the motion of said lever around its pivot to operate mechanism to engage and arrest the lower end of the lever z in the manner and for the purpose substantially as described.

4. The combination of a vertically-movable paper-slab, coupled cams C′ fast on shafts M and G to support same as specified, reciprocating rolls to successively remove the top sheets of paper and means for actuating same, a ratchet-wheel u' fast on the shaft G and a rocking pawl to operate same, a mechanism for interrupting the operation of said pawl when the paper pile has been raised too high, consisting of a rocking lever s having open forked end to engage a rotating eccentric r and having its farther end pivoted to a lever z mounted to swing on the machine-frame, a pivotally-mounted arresting-lever x to engage the lower end of said lever z, a pivoted balanced lever k having one end extending over the paper pile and an intermediate lever k' to transmit the motion of said balanced lever to the lever x and arrest the motion of the pawl-rocking lever substantially as described.

5. The combination of a vertically-adjustable paper-slab, guide-rolls at the end of same, a guide-plate B to turn the sheet of paper, a transport-band below said slab having lateral guide-rail L, reciprocating rolls D D to actuate the said sheet, a lever-arm f to carry said rolls D, a weighted guide-lever k fast on the pivot-spindle k^2 of the machine-frame, said lever f being adapted to slide in the end of said guide-lever, a pivoted hinged lever E attached to said arm f, an eccentric h loose on the shaft G and eccentric-rod from said eccentric to the lever E, means for driving said eccentric independently of the said shaft G and means for varying the speed of said eccentric substantially as described.

6. The combination of a vertically-adjustable paper-slab, guide-rolls at the end of same and a guide-plate to turn the sheet of paper, a transport-band below said slab having lateral guide-rail L, reciprocating rolls to actuate the said sheet, a lever-arm f carrying said rolls, a weighted guide-lever k fast on a pivot-spindle k^2 of the machine-frame, said lever f being adapted to slide in the end of said guide-lever, a pivoted hinged lever E attached to said arm f and an eccentric h loose on the shaft G, a conical pulley J also loose on said shaft and fast to the eccentric h, and a conical driving-pulley H and driving-belt substantially as described.

7. The combination of a vertically-movable paper-slab, and means for automatically raising the same gradually, guide-rolls at the end of same and a guide-plate B to turn the paper sheet, a transport-band arranged underneath the said slab having lateral guide-rail L, reciprocating rolls to push the top paper sheet between the said guide-rolls, a lifting device for said rolls at the end of their forward movement, consisting of a lever n pivotally attached to the machine-frame and having a downwardly-slanting finger m to contact with the top of the paper pile, and adapted to engage under the end of the spindle of the said reciprocating rolls, an eccentric o loose on the shaft G and fast on a continuously-rotating driving mechanism, adapted to actuate the end of said lever n at each stroke of the reciprocating rolls in the manner and for the purpose substantially as described and shown.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CARL FRIEDRICH FÖRSTE.

Witnesses:
JULIUS HUGO FRIERIGER,
RUDOLPH FRICKE.