Dec. 20, 1932. H. MIERSCH 1,891,286

SHEET DELIVERING AND PILING APPARATUS FOR PRINTING, RULING, CUTTING MACHINES AND THE LIKE

Filed Sept. 28, 1929 2 Sheets-Sheet 1

Fig. 1

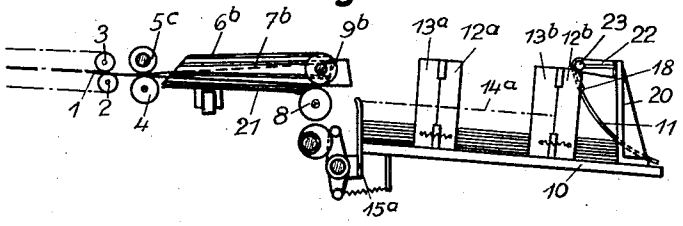


Fig. 2

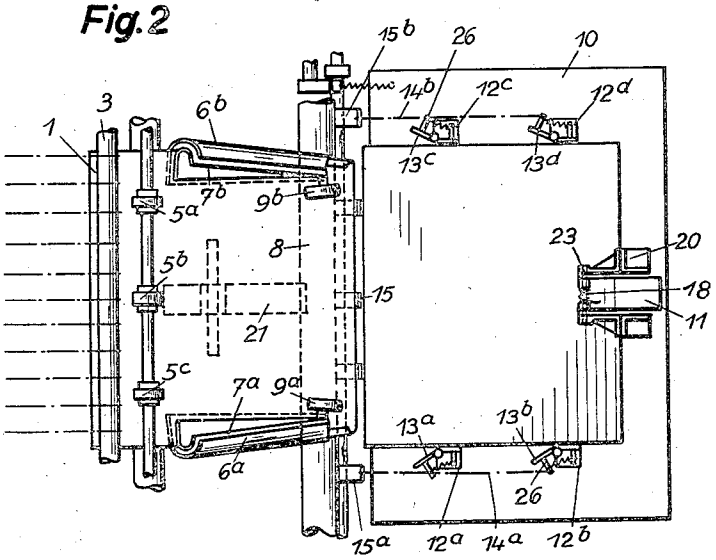
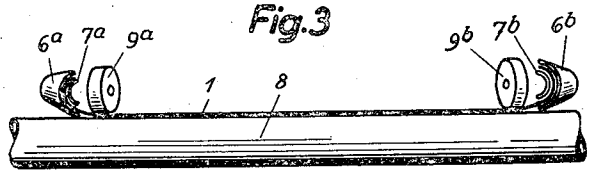


Fig. 3



Inventor:
Heinrich Miersch
by Karl Viertel
Attorney

Dec. 20, 1932. H. MIERSCH 1,891,286

SHEET DELIVERING AND PILING APPARATUS FOR PRINTING, RULING, CUTTING MACHINES AND THE LIKE

Filed Sept. 28, 1929 2 Sheets-Sheet 2

Fig. 4

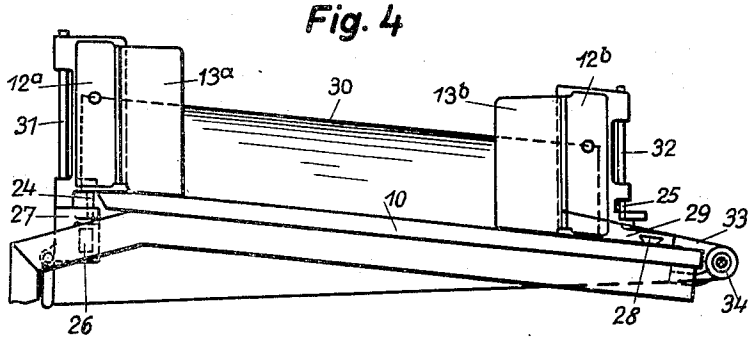


Fig.5

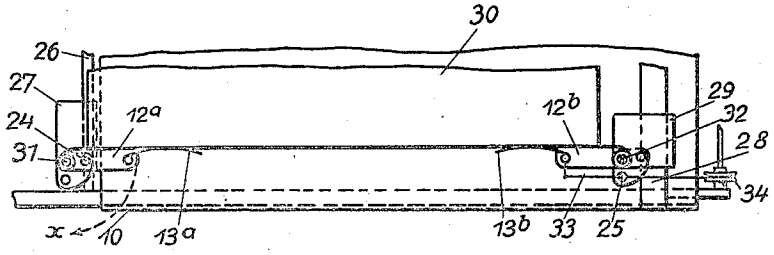
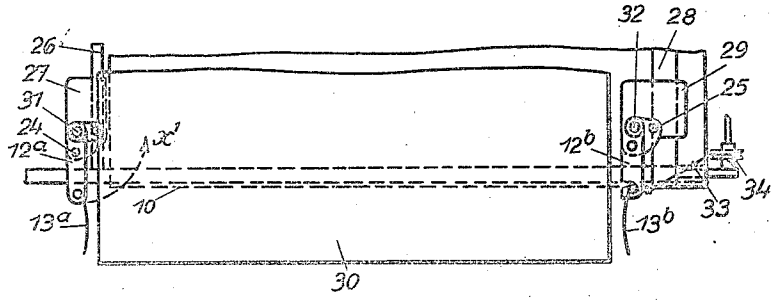


Fig.6



Inventor:
Hermann Miersch
by Karl Viertel
Attorney

Patented Dec. 20, 1932

1,891,286

UNITED STATES PATENT OFFICE

HEINRICH MIERSCH, OF LEIPZIG, GERMANY, ASSIGNOR TO MESSRS. G. E. REINHARDT, OF LEIPZIG, GERMANY

SHEET DELIVERING AND PILING APPARATUS FOR PRINTING, RULING, CUTTING MACHINES, AND THE LIKE

Application filed September 28, 1929, Serial No. 395,857, and in Germany October 31, 1928.

My invention relates to improvements in apparatus for collecting and piling up on a receiving table paper sheets, as they issue from printing, ruling and like machines.

It is a strange fact—known only to comparatively few practitioners in this field—that the greatest possible speed at which a printing machine can be run in practice does not depend on the normal working speed of the automatic sheet feeding apparatus, which may be cooperatively attached to the printing machine, but is limited by the speed at which the printed sheets can be safely transferred to and piled up on the receiving table.

I have found, that great difficulties will arise by causing the sheets to travel from the printing machine to the receiving table at a rate of speed much higher than usual. The said difficulties are mainly due to the increased frictional resistance, the air tending to curl downwardly the front edge of the sheets in transit, and last—not least—to the cushioning effect of the air which is all too slow in escaping from underneath each sheet when being dropped on the receiving table.

The principal object of the invention is to provide an improved sheet transferring and collecting apparatus, which can be worked at a speed considerably higher than it was known and possible heretofore, viz. exceeding 160 feet per minute, and by which various kinds of paper sheets, widely differing as to their pliability, including extremely thin sheets of the largest sizes, can be safely collected on the receiving table and with greater accuracy than it was possible heretofore, viz. so as to present a strictly straight edged pile ready for immediate further treatment, for instance for being re-ruled or cut into a number of sections of equal size.

In other words the invention aims at considerably increasing the output of printing and kindred machines by providing improved means for transferring and collecting at an unusually high rate of speed sheets of paper, and to thus design the sheet collecting means that the sheets are piled up one upon the other with such accuracy that the usual re-straightening of the pile of sheets by hand—by knocking limited portions in vertical position against the flat top face of a table—can be dispensed with.

In connection therewith the invention aims at eliminating the risk of damaging the sheets on their rapid transit to the receiving table.

It has been proposed to rigidify paper sheets in transit to a receiving table by slightly bending into an inclined position the lateral edges of the sheets by means of conically shaped rollers—as seen in U. S. Patent 236,205 to Kneeland, or by rollers adapted to curve upwardly the edges of the sheets—as seen in U. S. Patent 281,150 to Smith et al.

My experiments however have shown that there is a great risk of seriously creasing, tearing and damaging otherwise the paper sheets by passing them at a higher rate of speed than usual through rigidifying rollers of the type indicated, because the lateral edges of the sheets will be folded all too abruptly and at two limited sections only. Moreover the rigidifying effect of rollers of the kind concerned would be wholly inadequate in the case of sheets of the larger sizes as used now-a-days and of thin, highly pliable paper. Sheets of this kind on proceeding forward and away from the said rigidifying rollers will spontaneously return into their original flat shape and prematurely loose their rigid condition.

My invention aims at overcoming the said difficulties by providing improved means for effectively rigidifying and keeping rigidified the paper sheets in their rapid transit to the receiving table.

Other objects and advantages of the invention will incidentally appear hereinafter.

The nature and scope of the invention are briefly outlined in the appended claims and will be more fully understood from the following specification in which

Fig. 1 is a side elevation showing diagrammatically by way of an example the whole sheet delivering and piling apparatus,

Fig. 2 is a plan view of the same,

Fig. 3 is a front elevation showing the elements for curving the edges and stretching flat the body of the sheets in the delivering operation.

Fig. 4 is a side elevation showing the sheet piling table and its accessorial parts.

Figs. 5 and 6 are plans of said table, showing the lateral pile controlling stops in their operative and inoperative positions respectively.

The sheets of paper 1, on leaving, e. g. a ruling machine by passing through a pair of rollers 2, 3, are carried forward into and through the delivering apparatus by a set of rotating rollers 4, 5*a*, 5*b*, 5*c*, and another set of rollers 8, 9*a*, 9*b*.

As seen in Figs. 2 and 3 the rollers 9*a*, 9*b* are, obliquely arranged viz. having their axles mounted at an angle relatively to the longitudinal axis of symmetry of the delivering apparatus, so as to positively stretch flat the body of the sheets as they pass along underneath said rollers 9*a*, 9*b*.

On entering the delivering apparatus the sheets 1 pass into a pair of funnels of peculiar design viz. being made of pairs of curved guide members 6*a*, 6*b*, 7*a*, 7*b* by which the lateral edges of the sheets are positively bent upwardly viz. gradually as the sheets pass towards the delivery and to the said funnels.

In contradistinction to delivery apparatus of known design having rigidifying rollers referred to above the said funnels, each of which having two curved walls cooperating with each other, will safely and accurately curl and forcibly bend around the edges of the sheets without entailing the risk of damaging the sheets—no matter whether thin and well pliable or thick and less pliable sheets of paper—are handled and independently of the ratio of speed at which they are to be delivered.

My experiments have shown that by the combined action of funnels of the specific design indicated, by which the lateral edges of the sheets in transit are gradually bent up, i. e. relatively slowly for practically their total length, and of the stretching rollers 9*a*, 9*b*, keeping under constant tension the middle section of the sheets, even sheets of the largest sizes and of thin paper are kept in their rigidified state during the whole time of transit, viz. until they are fully advanced over the receiving table.

The convex shape of the sheets in transit also enhances their speedy settlement upon each other inasmuch as the air cushioning the sheets from underneath is free to escape from the centre to both sides as the sheets drop down.

Upright arms or stops 12*a*—*d* for laterally determining the position of the sheets to be deposited are adjustably fixed on the receiving table 10. Swinging blades 13*a*, 13*b*, 13*c*, 13*d* are pivotally attached to said arms which engage the lateral edges of the delivered sheets controlling their accurate assemblage and the correct formation of the pile.

The actuating mechanism of said swinging blades comprises a pair of flexible members such as strings 14*a*, 14*b*, adapted to swing the arms 26 of the blades around their pivots against the counteraction of weights, springs or the like, as indicated in Figs. 1 and 2.

Both said strings 14*a*, 14*b* may be conveniently connected with levers 15*a*, 15*b* of a rocking shaft by the fingers 15 of which the sheets are pushed home at the rear end of the receiving table 10 in a manner known per se in the printing art and allied fields.

At the forward end of the receiving table 10 an abutment member or stop 20 is mounted for controlling the accurate formation of the pile of paper sheets at their frontal edges.

At an upper bracket 22 of the said abutment member 20 an auxiliary pile-controlling device is attached comprising a flexible blade 11, which is pivotally mounted on a pin 23 and is yieldingly held by a torsion spring 18. The latter may be adjustable as to its tension and its actuating force upon the flexible blade 11 so as to regulate the frictional contact of the latter with the pile of paper sheets and incidently the more or less curved shape of the blade 11 viz. its angle of slope relatively to the upper surface of the pile according to varying specific requirements.

By the action of the said yielding flexible blade 11 thin sheets of paper are gently guided home and guarded against the risk of their frontal edges being damaged by abrupt contact with the abutment member 20,—while thicker sheets which often show a tendency of recoiling from the abutment member are safely arrested in their correct final position.

Various changes and modifications may be made in the design, assemblage and cooperation of the principal component parts of sheet delivering and piling apparatus described hereinbefore, without substantially departing from the scope of the appended claims and deviating from the spirit and the fundamental ideas of the invention.

E. g. in order to prevent the sheets from bending downward in their middle section a support or bridge 21 may be provided, as indicated in Figs. 1 and 2.

The swinging blades 13*a*, *b*, *c*, *d* may be actuated from below the table 10 by a separate rotating or rocking shaft through a system of cranks, excentric disks, cams or the like and suitable connecting members such as flexible wire ropes, chains, or strings 33 as seen in Figs. 4–6.

In the latter a structurally modified mechanism is shown for accurately piling up the delivered sheets on the receiving table which mechanism permits of the piles of paper sheets being more easily removed from the table than with the piling mechanism,—described above.

As a matter of fact piling mechanisms and

attachments such as stops, corner pieces, abutments, swinging blades, etc. usually obstruct the passage required for withdrawing the pile of sheets from the receiving table viz. causing additional work and loss of time by having to temporarily remove the obstructing elements and to reset them subsequently; an equally serious disadvantage consists in having to lift the heavy pile of paper to be withdrawn over the obstructing piling elements protruding upwardly from the table, a manipulation which tends to cause mischief to the piles,—viz. to interrupt their settled state and to throw the sheets into disorder.

The said drawbacks are eliminated in and by the structurally modified receiving table described hereinafter with reference to Figs. 4–6 of the drawings:—

A guide bar 28 is fixed on top of the receiving table 10 and another guide 26 underneath the latter, on which bars pairs of brackets 27 and 29 are slidably arranged. Upright pins 31, 32 are fixed on said brackets, representing the pivots for pile controlling stops 12*a*—*d*. The latter can be swung around through an angle of about 90° in the direction of the arrows, *x*, *x*1 and are adapted to be locked in their operative position, shown in Fig. 5, by means of conical locking pins 24, 25 engaging corresponding holes in the brackets 27, 29 and in the stops 12*a*—*d* respectively.

By lifting said pins 24, 25 the stops 12*a*—*d* and the swinging blades 13*a*—*d* attached thereto may be swung around into their inoperative position, shown in Fig. 6, so as to open a free passage for the pile of paper sheets 30 to be withdrawn.

In this modified construction the swinging blades 13*b* and 13*d* next to the forward end of the table 10 are actuated preferably by a pair of strings 33 running underneath the table 10 and over guide pulleys 34.

What I claim is:—

1. In an apparatus for collecting sheets of paper issuing from printing, ruling and like machines the combination with conveying means adapted to carry forward the sheets in transit at a relatively high speed exceeding 160 feet per minute of rigidifying means adapted to gradually curl up the lateral edges of the sheets in transit for their full length, stretching means cooperatively associated with the said rigidifying means so as to keep flat and under tension the middle section of the sheets, intermediate their curled edges, and piling means controlling the final position of the sheets as they drop upon each other and being adapted to produce a strictly straight edged pile.

2. Apparatus for the purpose set forth and having the features outlined in claim 1, in which the said rigidifying means comprise a pair of funnels, each of which having two curved walls spaced from each other.

3. Apparatus for the purpose set forth and having the features outlined in claim 1, in which the said stretching means comprise a pair of guide rollers arranged closely to the rigidifying means at their inner side and being angularly displaced relatively to the conveying direction of the paper sheets.

4. Apparatus for the purpose set forth and having the features outlined in claim 1, in which the said piling means comprise upright guiding arms adjustably mounted in opposed position to each other, oscillatory blades hinged to said arms, and means for swinging said blades about a vertical axis.

5. Apparatus for the purpose set forth and having the features outlined in claim 1, in which the said piling means comprise upright guiding arms adjustably mounted in opposed position to each other, oscillatory blades, hinged to said arms and means for swinging said blades about a vertical axis, the said guiding arms being pivotally attached and being adapted to be swung back into an inoperative position so as to open lateral passages for the pile of paper sheets to be withdrawn.

In testimony whereof I have signed my name to this specification.

HEINRICH MIERSCH.