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PAPER RULING, ASSEMBLING, AND STAPLING MACHINE

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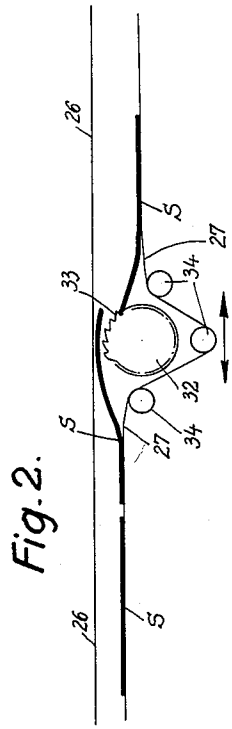


Fig. 2.

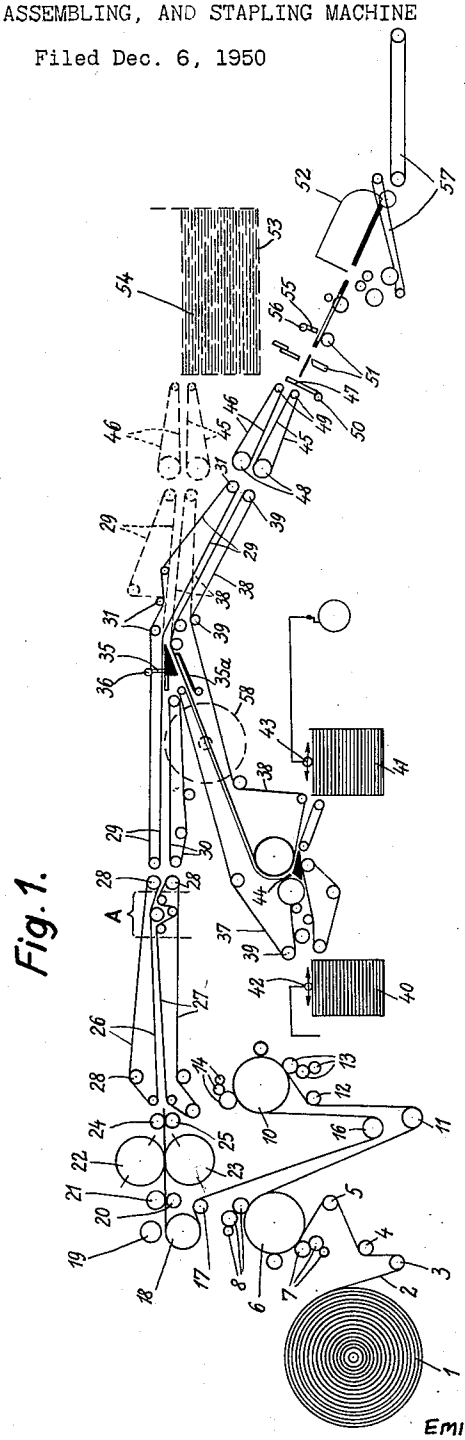


Fig. 1.

INVENTOR:
EMIL KARL ERNST
MEFFERT
BY:

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PAPER RULING, ASSEMBLING, AND STAPLING MACHINE

Emil Karl Ernst Meffert, Schmalenbek, near Hamburg, Germany, assignor to E. C. H. Will Liniermaschinenfabrik, Hamburg, Germany, a firm

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This invention relates to new and useful improvements in paper ruling, paper assembling and stapling machines and more particularly to that class of machines which are designed to rule, cut, assemble, fold and tie together a plurality of sheets constituting writing-books, exercise-books, copy-books, blank-books or the like.

Frequently it is desirable to associate with the sheets previously ruled and assembled in a stack other sheets, such as a blotting-paper, a cover or the like.

Mechanisms heretofore known and used for ruling, cutting, assembling, folding and tying paper-sheets in the aforesaid way have various disadvantages, as, for instance, a limited range in varying the positioning or number of the inserts with the ruled and assembled sheets; furthermore, various combinations of ruled papers and inserts could not be produced, and the machines had an unsatisfactory output because assembly of the combination of sheets was not synchronized regarding the delivery and the capacity of the various units cooperating with each other.

It is an object of the present invention to remove the disadvantages aforesaid and more particularly to provide a mechanism which is a complete unit and will deliver from a web mounted on a roll of paper in the front of the machine, a complete book of ruled sheets with various inserts at discretion of the operator at the other end of the machine.

The invention consisting in certain novel parts, arrangements and combinations will be described in connection with the annexed drawings, in which Fig. 1 is a schematic side view of the aggregate comprising a plurality of units realising the various services afore described.

Fig. 2 is an enlarged side view of a detail of the papersheet-overlapping mechanism.

Referring now to the drawing and first to Fig. 1 it may be assumed that the product which is to be produced by the aggregate according to the invention, shown by way of an example, is a writing-book with a cover, and a blotting-paper.

In a framing, not shown, diverse rolls of paper are mounted of which only one paper-roll 1 is shown, from which the web 2 is drawn by a driving-gear 18, 19, later on to be described, and is led by suitable guide-rolls 3, 4, 5 to a printing-cylinder 6. On its way around this cylinder the web passes under a ruling-mechanism 7 by which it is ruled longitudinally, and then it passes under a ruling-mechanism 8 by which it is ruled transversely; these mechanisms are hereafter named: longitudinal-ruler and transverse-ruler, respectively. The web 2 is then led to a second printing-cylinder 10 thereby passing guide-rolls 11, 12. Associated with the printing-cylinder 10 are a longitudinal-ruler 13 and a transverse-ruler 14 similar to the aforesaid rulers 7 and 8 respectively. By means of the longitudinal-ruler 7 and the transverse-ruler 8 the web is ruled on its front side and by means of the longitudinal-ruler 13 and the transverse-ruler 14 the web is ruled on its rear side.

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16 means a device for registering the transverse lines on the front side and the rear side of the web. The web then passes around a guide-roll 17, by which it is led and smoothly pressed against a driving-gear 18, 19 of a prime-mover, not illustrated, as being not object of the invention and unnecessary for its understanding. By means of this prime-mover the web 2 is constantly drawn from the paper-roll 1 and passed under the mechanism 7, 8 and 13, 14 for printing the web aforesaid. After leaving the drive-rolls 18, 19 the web 2 gets between two series of rolls 20, 21, by which the web is cut amidst or perforated at discretion. The web is then fed between two cutter-rolls 22, 23, by which the web is cut transversely into sheets, the size of which may be regulated at discretion. Behind these cutter-rolls a pair of feeding-rolls 24, 25 is arranged, which receiving the sheet cut by the cutter-device 22, 23 at the time being, feeds the sheet into intimate contact with the tapes 26, 27 of a guiding-device, by which the sheets lying in a line one behind the other are carried along. Behind the tapes 26, 27 is arranged another sheet-guiding-mechanism consisting of tapes 29, 30. The speed of the sheet-carrying-device 29, 30 is lower than the speed of the tapes 26, 27. Therefore the sheets fed by the tapes 26, 27 between the tapes 29, 30 are no longer carried along lying in line one behind the other, but are now overlapping each other. The degree of such overlapping may be controlled by regulating the speeds of the tapes 26, 27 and 29, 30 respectively. In the following the tapes 26, 27 and 29, 30 are named: overlapping-device. In order to secure an exact overlapping of the sheets there is provided an overlapping controller A the details of which are to be seen in an enlarged scale in Fig. 2.

The machine of the present invention is intended for high production. The sheets will be sent therethrough at fairly high speed. The overlapping device therefore has to handle many sheets in a short period of time and has to operate rapidly and without danger of crowding of the sheets. Provision has to be made to prevent

jamming of the trailing edge of a sheet against the leading edge of the subsequent, following sheet. In order to provide such a device, applicant employs the overlapping controller A which is constructed as follows:

A ratchet-like wheel 32 is provided adjacent the discharge end of the guide tapes 26, 27 (see Fig. 1). This wheel is provided with teeth 33. It is being rotated by any suitable mechanism, not shown, in clockwise direction. Guide rollers 34 conduct the lower guide tapes around the ratchet-like wheel 32, and separate the lower guide tapes 27 from the upper guide tapes 26. The operation of this device is as follows:

When a sheet *s* passes over the device, it will slow down a little, since the guide tapes 29, 30 operate at a slightly slower speed than the guide tapes 26, 27. This sheet is being slowed down while a portion of it is still lying against, or over the wheel 33 (see the sheet on the right hand side in Fig. 2). The teeth 33 help in depressing the trailing edge of this sheet *s*. In the meanwhile and during rotation of the wheel, another sheet *s* (the center sheet in Fig. 2) is being fed over the wheel at a slightly higher speed than the right hand sheet in Fig. 2. Since this center sheet hits the wheel at the side thereof, where the circumferential motion of the wheel is upwardly, the teeth 33 will aid in lifting up the leading edge of the sheet and guide the sheet over the wheel 32. This center sheet is still moving at a slightly higher speed than the right hand sheet and a positive overlap will be obtained, since the sheet has to pass at least over a portion of its length, before it, in turn, will be engaged by the slower moving guide tapes, 29, 30.

Between the tapes 29, 30, the sheets go along in a constant overlapping succession till they get in front of a stopper-device 35 where they are assembled in a stack. The number of the sheets assembled in front of said stopper- and assembling-device may be controlled at discretion. In accordance with the timing of the stopper-device the stack of assembled sheets gets more or less piled up.

Underneath the tapes 30 there is positioned a device for associating inserts, e. g. a cover and a blotting-paper with the stack piled up in front of the stopper-device 35. This associating-device consists of tapes 37 and 38 carried by rolls 39. 40 denotes a stack of blotting-papers and 41 a stack of covers which are delivered by feeding-devices 42, 43, designed in a well-known manner and therefore schematically illustrated, between the tapes 37 and 38 at 44. By means of this associating-device 42 and 43 a blotting-paper overlying a cover is passed underneath the sheet stack. A stopper device 35*a* is provided near the end of the tapes 37 and 38. When the desired number of sheets is assembled in a stack, the stopper-device 35 and 35*a* is moved upwards, thus giving room to pass for the assembled unit: cover, blotting-paper and sheets, which now is guided by means of the tapes 29 and 38 between the tapes 45, 46 of a sheet-guiding-device, by which the stack-unit is fed into a stapling-device; this stapling-device is generally indicated by the numeral 51 and may be of any suitable construction. The stapling-device is provided with a stopper 55 pivotally mounted at 56 for period movement in and out in accordance with the delivery of the foregoing units. The stapling-device 51 is furthermore provided with an adjusting-mechanism having fingers 47. By means of said fingers 47 the whole stack-unit is properly adjusted and

after having been stapled or stitched it is delivered into said folder 52 and after having been folded it gets out of the unit. The tapes 45, 46 are carried and driven by rolls 48 and 49.

The folder-device, generally denoted by the numeral 52 may be of any suitable character; both devices 51 and 52 may be driven in any desired manner as from a driving-gear, not shown.

After having been properly folded the writing-book is delivered on a guiding-mechanism, generally denoted with the numeral 57, similar to the overlapping-device 26, 27 and 29, 30, by which the writing-books are assembled overlapping each other.

58 denotes a controlling- and counting-device, by which the working-rhythm of the units combined with each other is positively controlled and by which the ratio of the number of the sheets and inserts may be adjusted at discretion, for instance twenty sheets, a cover and a blotting-paper.

As is to be seen from Fig. 1 the end parts of the guiding-device 29 and 38 may be moved in an upwards position, as is indicated in dotted lines. This construction is adapted to be used when delivery of the stacked sheets is desired, without stapling or stitching and folding the stack-unit. The paper will then be stacked on a layboard 53. In such case the sheets *S* may be passed through the tapes 29 and 38 directly to the layboard 53, on which they are stacked in bunches 54.

It will be understood that the invention, shown and described in a preferred construction, is not restricted to this specific character but may be varied within the scope of the invention.

I claim:

1. In a machine for assembling a plurality of cut sheets together with an insert, in combination, a first endless belt having a discharge end; a second endless belt having a carrying surface adapted to carry sheets, a receiving end and a discharge end, the receiving end of said second belt being disposed substantially in line with and adjacent the discharge end of said first belt; an elongated ratchet-like wheel interposed and having a sector of the circumference of the wheel projecting over said surface and having its axis disposed in a plane parallel to the carrying surface of the belt between said first and said second belt, whereby when cut sheets or paper are fed over the surface of said first belt and over said ratchet wheel, and when said second belt is travelling at a slower speed than said first belt, the teeth of the ratchet wheel will engage the trailing ends of cut sheets of paper passing thereover and depress said sheets permitting the leading edge of subsequent sheets to overlap the preceding sheet moving slower over said second belt; a third belt adapted to carry inserts, and having a discharge end disposed adjacent said discharge end of said second belt and in a different plane and substantially parallel thereto; stop means located in the path of the discharge end of said second belt; and blocking means blocking the discharge end of said third belt, said belts, said stop means, and said blocking means being operatively connected and cooperating to release a number of sheets simultaneously from said second belt and said third belt whereby a number of cut sheets and inserts from said third belt will be assembled together.

2. In a machine for assembling a plurality of cut sheets together with an insert, in combination, a first endless belt having a discharge end; a second endless belt having a carrying surface

adapted to carry sheets, a receiving end and a discharge end, the receiving end of said second belt being disposed substantially in line with and adjacent the discharge end of said first belt; an elongated ratchet-like wheel interposed and having a sector of the circumference of the wheel projecting over said surface and having its axis disposed in a plane parallel to the carrying surface of the belt between said first and said second belt, whereby when cut sheets or paper are fed over the surface of said first belt and over said ratchet wheel, and when said second belt is travelling at a slower speed than said first belt, the teeth of the ratchet wheel will engage the trailing ends of cut sheets of paper passing thereover and depress said sheets permitting the leading edge of subsequent sheets to overlap the preceding sheet moving slower over said second belt; a third belt adapted to carry inserts, and having a discharge end disposed adjacent said discharge end of said second belt and in a different plane and substantially parallel thereto; pivotal stop means disposed adjacent the discharge end of said second belt and movable, from a lifted unblocking, inoperative position to a blocking, operative position in which said stop means is located in the path of the discharge end of said second belt; and blocking means blocking the discharge end of said third belt, said belts, said blocking means and said pivotal stop means being operatively connected and cooperating with said stop means in its movement from blocking to unblocking position, thereby releasing a number of sheets with the operation of said blocking means, whereby a selected number of sheets and inserts will be simultaneously released and assembled together.

3. In a machine for assembling a plurality of cut sheets together with an insert, in combination, a first endless belt having a discharge end; a second endless belt having a carrying surface adapted to carry sheets, a receiving end and a discharge end, the receiving end of said second belt being disposed substantially in line with and adjacent the discharge end of said first belt; an elongated ratchet-like wheel interposed and having a sector of the circumference of the wheel projecting over said surface and having its axis disposed in a plane parallel to the carrying surface of the belt, between said first and said second belt, whereby when cut sheets or paper are fed over the surface of said first belt and over said ratchet wheel, and when said second belt is travelling at a slower speed than said first belt, the teeth of the ratchet wheel will engage the trailing ends of cut sheets of paper passing thereover and depress said sheets permitting the leading edge of subsequent sheets to overlap the preceding sheet moving slower over said second belt; a third belt adapted to carry inserts, and having a discharge end disposed adjacent said discharge end of said second belt and in a different plane and substantially parallel thereto; stop means located in the path of the discharge end of said second belt; and movable blocking means movable from an inoperative unblocking position to an operative blocking position and disposed adjacent the discharge end of said third belt, said belts and said stop means being operatively connected and cooperating with the movement of said blocking means from blocking to unblocking position thereby releasing a selected number of inserts simultaneously with the operation of said stop means.

4. In a machine for assembling a plurality of

cut sheets together with an insert, in combination, a first endless belt having a discharge end; a second endless belt having a carrying surface adapted to carry sheets, a receiving end and a discharge end, the receiving end of said second belt being disposed substantially in line with and adjacent the discharge end of said first belt; an elongated ratchet-like wheel interposed and having a sector of the circumference of the wheel projecting over said surface and having its axis disposed in a plane parallel to the carrying surface of the belt between said first and said second belt, whereby when cut sheets or paper are fed over the surface of said first belt and over said ratchet wheel, and when said second belt is travelling at a slower speed than said first belt, the teeth of the ratchet wheel will engage the trailing ends of cut sheets of paper passing thereover and depress said sheets permitting the leading edge of subsequent sheets to overlap the preceding sheet moving slower over said second belt; a third belt adapted to carry inserts, and having a discharge end disposed adjacent said discharge end of said second belt and in a different plane and substantially parallel thereto; pivotal stop means disposed adjacent the discharge end of said second belt and movable, from a lifted unblocking, inoperative position to a blocking, operative position in which said stop means is located in the path of the discharge end of said second belt; and movable blocking means movable from an inoperative, unblocking position to an operative, blocking position and disposed adjacent the discharge end of said third belt, said belts and said stop means being operatively connected and cooperating in their movements with the movement of said blocking means from blocking to unblocking position thereby releasing a selected number of inserts simultaneously with the operation of said stop means.

5. A machine for automatically printing a paper web, cutting said web and assembling said cut web together with inserts including a cover, comprising, in combination, paper rolls having a paper web rolled thereon; printing cylinders having printing devices disposed thereon adapted to print the paper web on both sides thereof; a cutting mechanism adapted to cut the web into sheets; a registering mechanism associated with said printing cylinders and said cutting mechanism for aligning the cut edges with the printed matter on the web; a sheet-lapping mechanism including an endless first belt having a receiving end disposed adjacent said cutting mechanism and adapted to receive the cut sheet from the cutting mechanism and to transport the same along the length thereof and having a discharge end, an endless second belt located in longitudinal alignment with the discharge end of said first belt, a sheet-lapping wheel disposed intermediate of said first and said second belts, said sheet-lapping wheel having projecting means adapted to alternatively lift the front ends of sheets and to depress the rear ends of the sheets as they pass thereover, whereby succeeding sheets will have their front ends overlapping the rear end of the next adjacent sheet and whereby, when said second belt is moved at a slower speed than said first belt, said cut sheets will be carried in overlapping relation; movable stop means disposed transverse of said second belt, adapted to block the travel of the sheets; an endless third belt having a terminus adjacent the terminus of said second belt; blocking means

disposed transverse of said third belt, said stop means, said blocking means, and said cutting means being operatively connected to release, at predetermined, timed intervals simultaneously a number of sheets disposed on said second belt and said third belt; a stapling device; a folding device, said stop means, said folding device and said stapling device being operatively connected for folding and connecting together a number of assembled sheets and inserts; and a stacking device receiving said assembled, stapled and folded sheets.

EMIL KARL ERNST MEFFERT.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
195,115	Ford	Sept. 11, 1877
269,186	Crowell	Dec. 19, 1882
415,321	Firm	Nov. 19, 1889
897,333	Wood	Sept. 1, 1908
1,165,911	Seymour	Dec. 28, 1915
1,789,965	Christman	Jan. 27, 1931
2,328,859	Taylor	Sept. 7, 1943