March 5, 1929. W. MAILAENDER 1,704,618

APPLICATION OF SHEETS TO PRINTING MACHINES

Filed Feb. 16, 1927 4 Sheets-Sheet 1

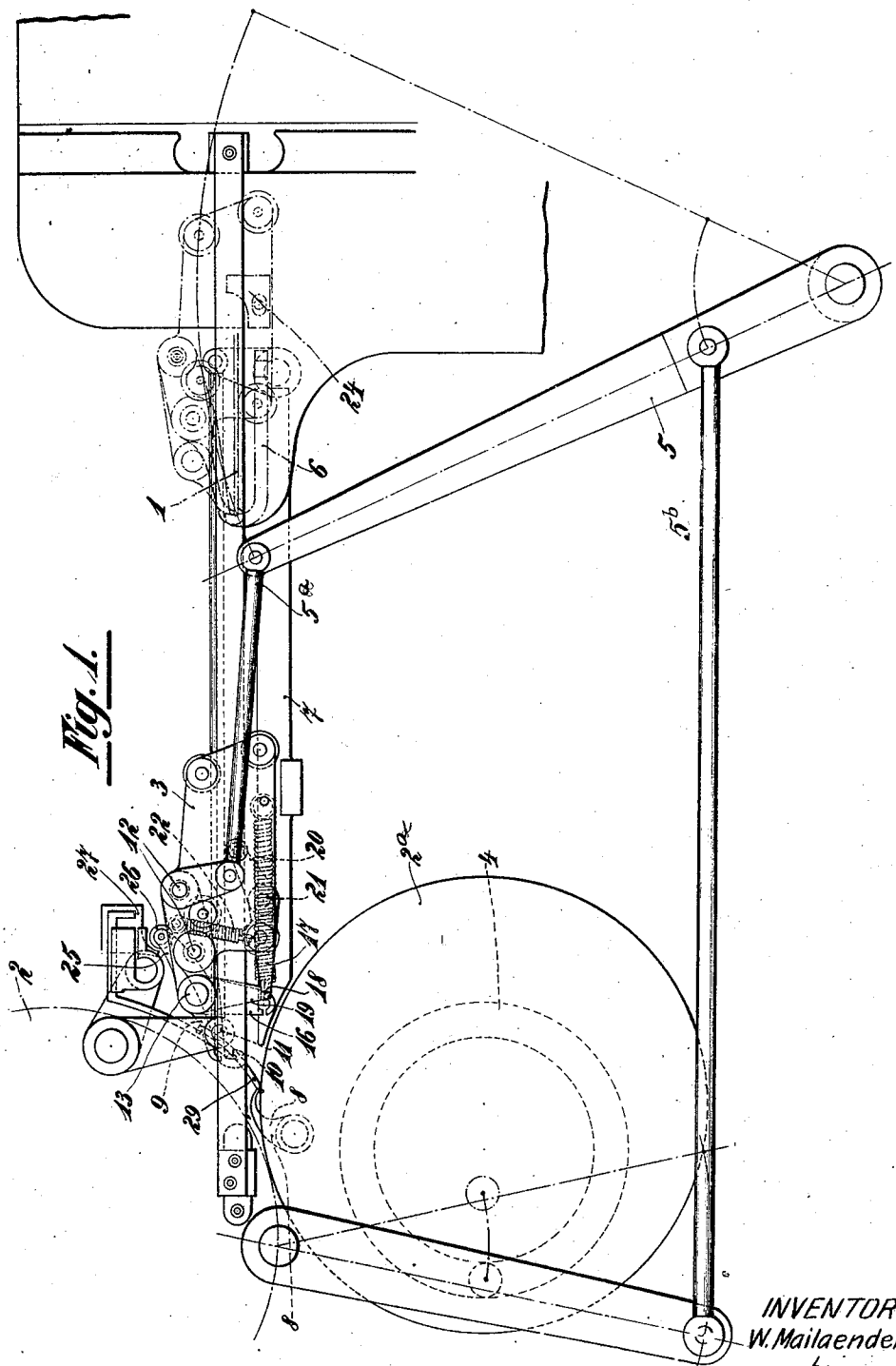


Fig. 1.

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APPLICATION OF SHEETS TO PRINTING MACHINES

Filed Feb. 16, 1927 4 Sheets-Sheet 2

Fig. 2.

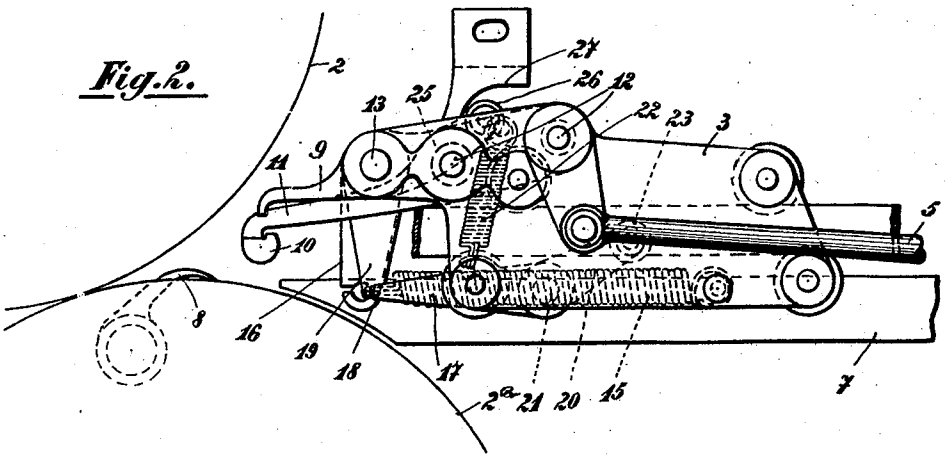


Fig. 3.

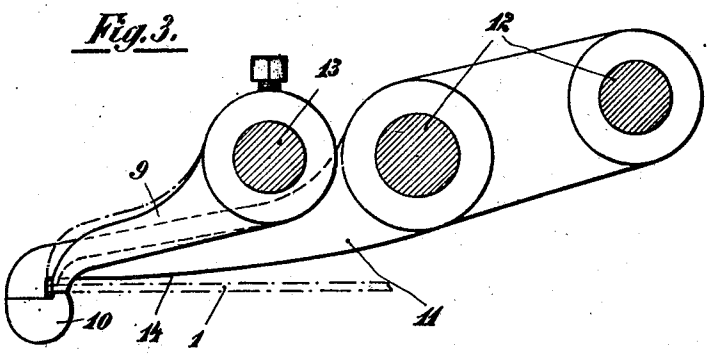
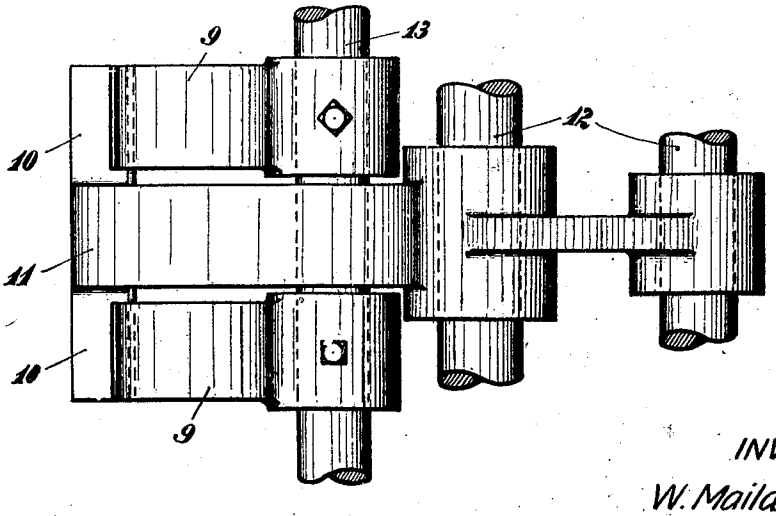


Fig. 4.



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APPLICATION OF SHEETS TO PRINTING MACHINES

Filed Feb. 16, 1927 4 Sheets-Sheet 3

Fig. 7.

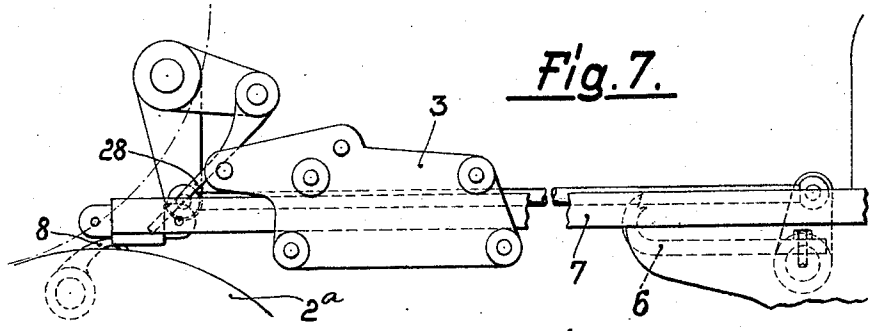


Fig. 8.

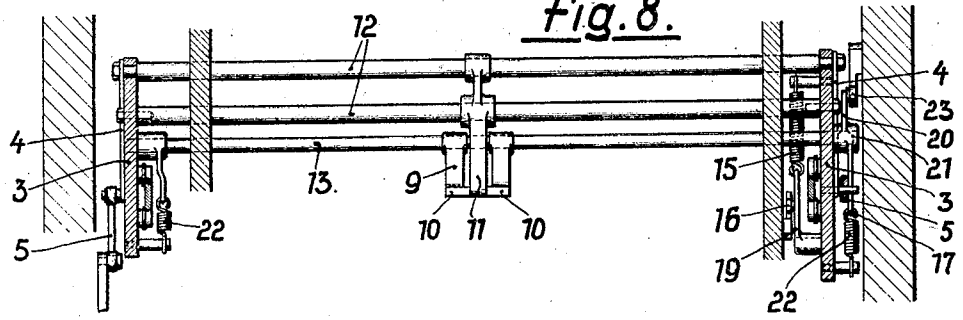


Fig. 5.

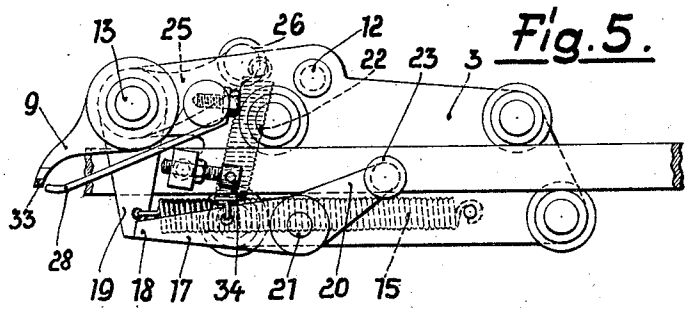
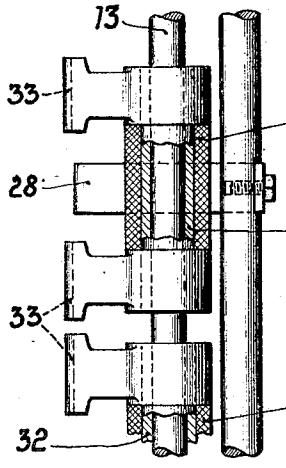


Fig. 6.



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APPLICATION OF SHEETS TO PRINTING MACHINES

Filed Feb. 16, 1927 4 Sheets-Sheet 4

Fig. 9.

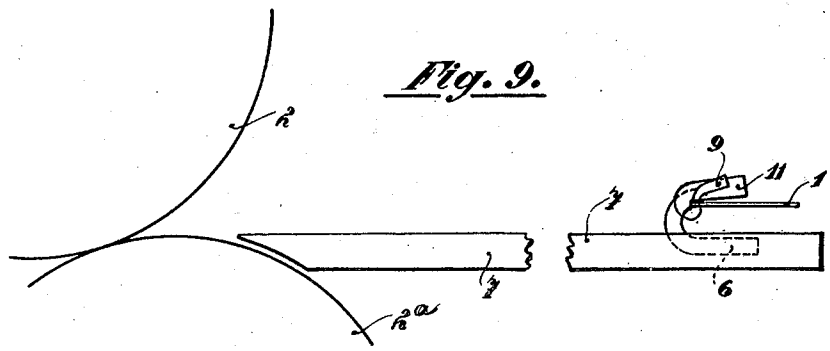


Fig. 10.

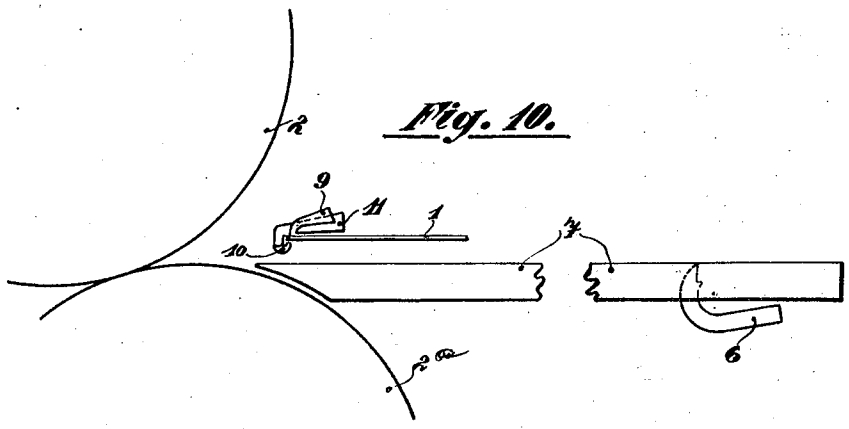
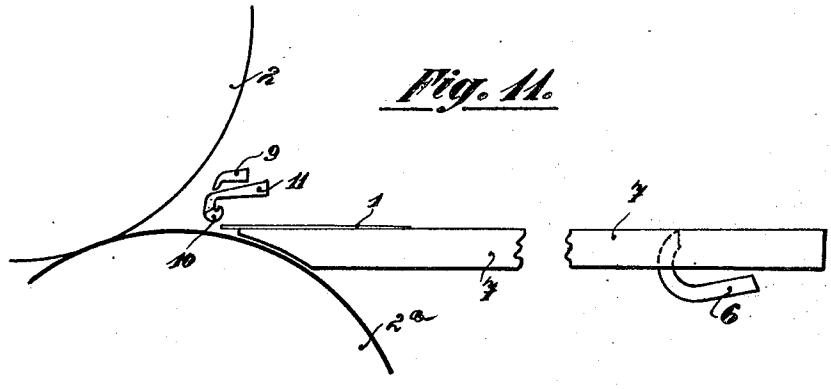


Fig. 11.



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UNITED STATES PATENT OFFICE.

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APPLICATION OF SHEETS TO PRINTING MACHINES.

Application filed February 16, 1927, Serial No. 168,722, and in Germany December 18, 1926.

This invention relates to apparatus for use in applying metal sheets to printing machines which apparatus automatically engages the individually advanced sheets and automatically leads them to the grippers of the printing machine.

In contradistinction to apparatus heretofore known for use in applying metal sheets a considerable increase in efficiency is obtained by the apparatus of the present invention. Further the printing is effected by the apparatus of the present invention independent of the operator and his care or attention. This is of considerable importance because it has a bearing on the product of the whole plant more particularly in the case of multi-colour work where it is necessary should the operator be changed to secure perfect accuracy in fit.

According to the present invention a carriage is arranged to reciprocate continuously between the printing machine and the support the said carriage having grippers which automatically engage the uppermost printing sheet removed from the support and introduce it to the printing machine where it is again automatically freed by the grippers and precautions taken in order to release the sheet positively.

The gripping arrangement may be provided with mechanical grippers or the gripping arrangement may be of an electromagnetic nature the latter resulting in a more simple arrangement in so far as the strippers necessitated by mechanical grippers and their improvement can be omitted. Further the sheet table can be brought nearer to the positioning devices or marks of the printing machine.

In order that the invention may be clearly understood and readily carried into effect, reference is made to the accompanying drawings which show diagrammatically and by way of example, apparatus in accordance with the present invention.

Figure 1 is a side elevation of the applying apparatus such parts as are irrelevant to the invention being omitted.

Figure 2 is a side elevation of the gripping carriage in its end position in the printing machine, and a gripping arrangement in the open position.

Figures 3 and 4 are a side elevation and a plan respectively of the gripping arrangement itself.

Figures 5 and 6 are a side elevation and a plan respectively of a modified form of gripping arrangement which in this arrangement is of a magnetic nature.

Figure 7 shows in side view the arrangement of the positioning or applying marks.

Figure 8 is a plan.

Figures 9 to 11, show diagrammatically successive stages of the method of working.

A metallic printing sheet 1 lies in a known manner which is unillustrated on a support, right hand side of Figure 1, and by this is mechanically removed from the uppermost sheet and led to a cylinder 2 of the printing machine.

This transference of the sheet 1 is now undertaken by means of a gripper carriage 3, which constantly reciprocates between the printing machine and the aforesaid support. The aforesaid gripper carriage carries the gripping devices which engage and take with them the uppermost metallic sheet from the support. The gripper carriage 3 is so formed that its extreme width is greater than that of the support but smaller than that of the printing machine. The gripper carriage 3 is reciprocated in a horizontal path by an eccentric 4 for example by means of levers 5 and rods 5^a, and 5^b respectively, and according to the invention in such manner that the carriage 3 remains momentarily stationary at both end points of its travel, viz at the support and at the printing machine. At the support the carriage 3 remains stationary until positioning devices 6, which limit the advance of the uppermost sheet 1 in the removal from the support and fix its advance, have completely cleared the path for the travel of the sheet 1, whereby they become swung downwardly according to the invention, Figure 1. Stoppage near the printing machine endures until the delivered metal sheet 1 has been freed from the gripping arrangement and fallen whereafter it lies on the applying table 7 of the printing machine, so that the path for the return movement of the carriage 3 to the support is again free. The sheet 1 lying on the table is then pushed at the proper time and in known manner onto the positioning device marks 29 by the lifting movement of side and rearwardly arranged thrust rollers as well as side devices whereon it can be seized by the impact grippers 8 and brought between the printing cylinders 2.

The construction of the carriage 3 is such that it is momentarily retained a short distance say about 8 millimetres from its end position at the printing machine. The object of this is to take up the sheet and to absorb the centrifugal force inherent to its rapid forward velocity so that it remains lying in the openings of the gripping arrangement immediately following, and does not move with this into the end position, Figures 10 and 11.

The gripping arrangement of the carriage 3 uses grippers 9 which are applied from above onto the printing sheet 1 to be introduced into the printing machine. In the construction of a mechanical working gripper arrangement illustrated in Figures 1 to 4 the sheet 1 lies on an upper support 10 which forms the head of an arm 11 rigidly supported on the carriage 3 both sides of which are provided with grippers 9. These press the sheet 1 onto the front edge of the support 10 so that they are taken up by the carriage 3.

The arm 11 Figure 8, is thrust off by devices mounted on two cross members 12 extending over the applying table 7 which connect the side parts of the carriage 3 and lie over the applying table 7.

The axis 13 of the gripper 9 is supported before these cross members 12 in the carriage 3 so that a very simple low construction results. The arms 11 on the under side 14 adjacent to the sheet 1 diminish toward the support 10. A certain unobjectionable engagement of the sheet 1 is thus ensured in so far that they embrace undulatory arched sheets in the return movement of the carriage 3 to the support. By the special formation of the under supporting arm 11 the sheet tables 1 are pressed independently of their form against the sheet applying support so that the gripping arrangement need only open a few millimetres to embrace the sheet which can therefore in an arched position be positioned on the support 10 without injury.

The closure of the gripper arrangement, that is the positioning of the gripper 9 on the sheet 1 lying on the support 10, is effected by a helical spring 15 which is fixed at one end of the carriage 3 and at the other end to a lever 16 mounted on the gripper axis 13. The spring 15 constantly tends to draw the lever 16 towards itself, that is to say to close the gripper 9. This is prevented in the opened gripping arrangement by a locking device which consists of a finger 17 which abuts against the projection 18 of an arm 19 mounted on the gripper axis 13, so as to hold the gripper arrangement open. In order to release the locking device the finger 17 is formed as a double-armed or bell crank lever 20 which is loosely rotatable on a bolt 21 and is constantly drawn upward into engagement with the projection 18 by a spring 22. The release is effected in such manner that the upwardly inclined free arm of the lever 20 which carries a roller 23 at the end moves therewith against a fixed stop 24 on the support. It is thus forced upwardly and the lever 20 is so positively swung that the ratchet finger 17 is released from the projection 18 by the action of the thereby tensioned spring 22. The spring 15 now acts and positions the gripper 9 on the sheet 1 lying on the support 10. This closure of the gripping arrangement occurs by reason of the preengagement of the aforesaid devices.

The release of the engaged sheet introduced to the printing machine, that is the preopening of the gripper arrangement is effected by an arm 25 having a roller 26 mounted on the gripper axis 9. This roller 26 runs against a fixed stop 27. The arm 25 is therefore pressed downwardly and the axis 13 swung so that the gripper 9 is raised. Further the lever 19 is also swung and in such manner that the finger 17 falls into the projection 18. The parts are thus disposed in the open position of the gripper arrangement, until the carriage 3 again returns to the support.

In order to ensure that the sheet 1 becomes disengaged from the gripper arrangement, a separate stripper 28 can be provided which is mounted on the axis of the usual positioning or marking axis 29 of the machine, Figure 7, or the positioning marks 29 of Figure 1 can be used therefor. In the construction illustrated in Figures 5 and 6 the supports 10 are replaced by magnetic grippers 9. For this purpose they form the cores or pole pieces of an electric magnet 31. They are constructed proportionately wide in order that they may have an area sufficiently large to pick up and retain the sheet with certainty. The gripper 9 in the present arrangement is mounted on an axis 13 of bronze or like non-magnetic material respectively on a steel bush 32 which serves for transmission of the magnetic flux between two adjacent gripper magnets.

The grippers 8 are energized before the end of the travel of the carriage 3 toward the support and are de-energized at the end point of the printing machine by rupture of the electric circuit, so that in that position they take up and retain the sheet 1.

The bottom 33 of the gripper 9 is conveniently made out of brass or non-magnetic material in order to prevent with certainty adherence of the sheet 1 to the gripper 9 after rupture of the electric current. Further a separate stripper 28 may be again provided as before.

The movement of the gripper 9 is here limited by an adjustable screw stop 34 which

is arranged on the carriage 3 and serves in the engagement of the gripper 9 as a stop for the lever 16.

There may be any number of the co-operating gripper arrangements as found most convenient.

What I claim is:—

1. Apparatus for transferring printing sheets from a table to a printing machine comprising a carriage, grippers on said carriage, said grippers including means for embracing the forward edge of a sheet as it lies upon the table, said means being constructed to hold said sheet, means for automatically causing said grippers to release the sheet at a determined position of the latter relative to the cylinder of the printing machine, and means for causing the carriage to remain momentarily stationary at a point just prior to its reaching the extreme end positions of its range of travel.

2. Apparatus for transferring printing sheets from a table to a printing machine comprising a carriage, grippers on said carriage, said grippers including means for embracing the forward edge of a sheet as it lies upon the table, said means being constructed to hold said sheet, means for automatically causing said grippers to release the sheet at a determined position of the latter relative to the cylinder of the printing machine, means for causing the carriage to remain momentarily stationary at a point just prior to its reaching the extreme end positions of its range of travel and a support for said gripper mechanism including an upwardly extending arm, cross pieces upon which said support bears, said grippers being formed by a lever whose fulcrum lies in front of said cross pieces.

3. Apparatus for transferring printing sheets from a table to a printing machine comprising a carriage, grippers on said carriage, said grippers including means for embracing the forward edge of a sheet as it lies upon the table, said means being constructed to hold said sheet, means for automatically causing said grippers to release the sheet at a determined position of the latter relative to the cylinder of the printing machine, means for causing the carriage to remain momentarily stationary at a point just prior to the reaching the extreme end positions of its range of travel and a support for said gripper mechanism including an upwardly extending arm, cross pieces upon which said support bears, said grippers being formed by a lever whose fulcrum lies in front of said cross pieces, the underside of said support diminishing in a direction toward the grippers, and being formed so as to function as an introducing hook for receiving the sheet from the table and transferring it to said carriage.

4. Apparatus for transferring printing sheets from a table to a printing machine comprising a carriage, grippers on said carriage, said grippers including means for embracing the forward edge of a sheet as it lies upon the table, said means being constructed to hold said sheet, means for automatically causing said grippers to release the sheet at a determined position of the latter relative to the cylinder of the printing machine, means for causing the carriage to remain momentarily stationary at a point just prior to the reaching the extreme end positions of its range of travel and a support for said gripper mechanism including an upwardly extending arm, cross pieces upon which said support bears, said grippers being formed by a lever whose fulcrum lies in front of said cross pieces, the underside of said support diminishing in a direction toward the grippers, and being formed so as to function as an introducing hook for receiving the sheet from the table and transferring it to said carriage, and strippers provided on the printing machine for removing the sheet from the carriage.

5. Apparatus for transferring printing sheets from a table to a printing machine comprising a carriage, grippers on said carriage, said grippers including means for embracing the forward edge of a sheet as it lies upon the table, said means being constructed to hold said sheet, means for automatically causing said grippers to release the sheet at a determined position of the latter relative to the cylinder of the printing machine, means for causing the carriage to remain momentarily stationary at a point just prior to the reaching the extreme end positions of its range of travel and a support for said gripper mechanism including an upwardly extending arm, cross pieces upon which said support bears, said grippers being formed by a lever whose fulcrum lies in front of said cross pieces, the underside of said support diminishing in a direction toward the grippers, and being formed so as to function as an introducing hook for receiving the sheet from the table and transferring it to said carriage, and strippers provided on the printing machine for removing the sheet from the carriage, said support being provided with positioning marks, adapted to swing downwardly with said support and similar marks on the printing machine by which the swing of said support is controlled.

In testimony whereof I affix my signature.

WILHELM MAILAENDER.