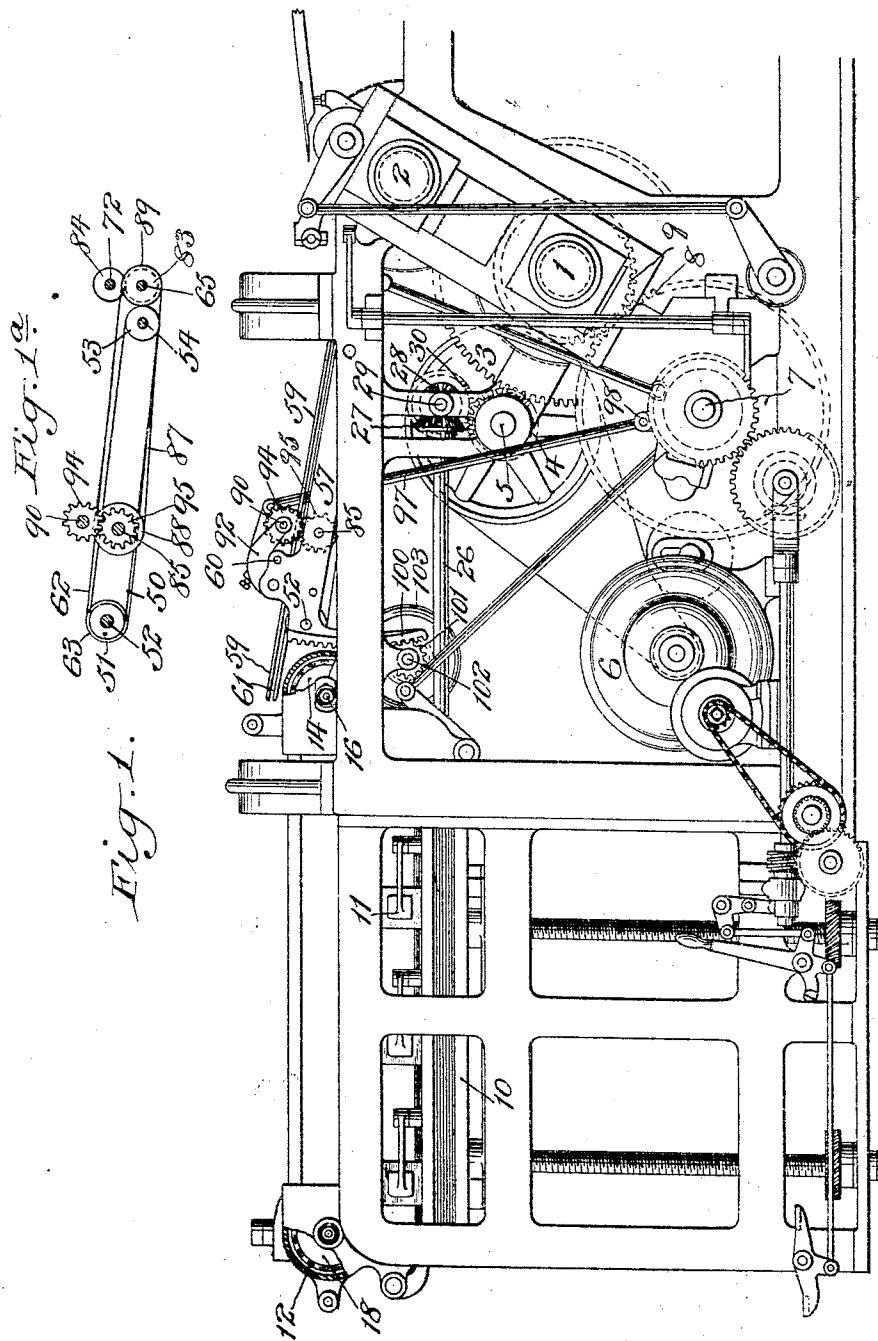


H. M. BARBER.
SHEET DELIVERY APPARATUS FOR PRINTING MACHINES.
APPLICATION FILED JUNE 9, 1909.

1,159,638.

Patented Nov. 9, 1915.
4 SHEETS—SHEET 1.



Witnesses:
J. George Barry.
Henry D. Kime.

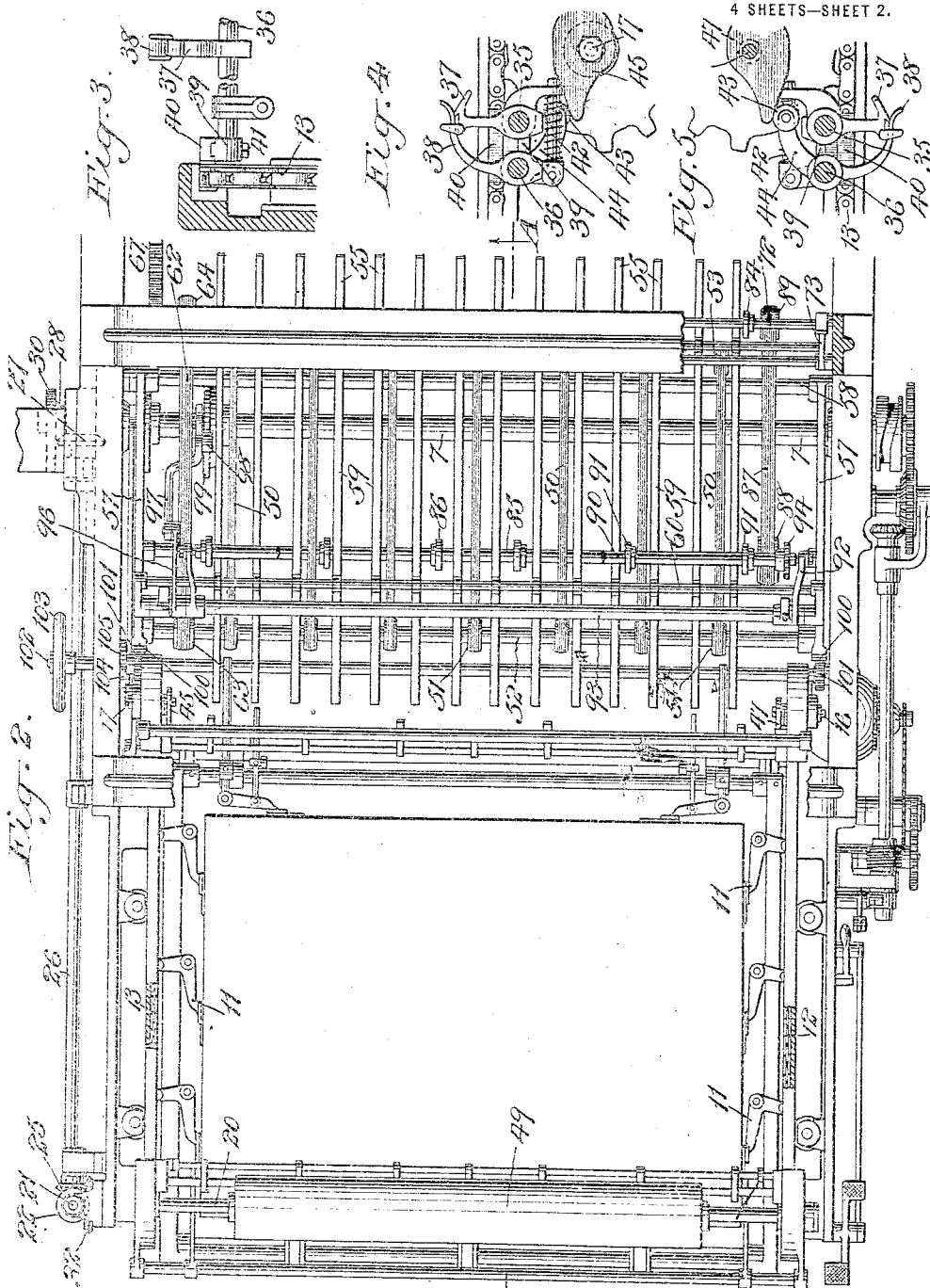
Inventor:
Howard M. Barber
by his attorneys
Merrill Sward

H. M. BARBER.
SHEET DELIVERY APPARATUS FOR PRINTING MACHINES.
APPLICATION FILED JUNE 9, 1909.

1,159,688.

Patented Nov. 9, 1915.

4 SHEETS—SHEET 2.

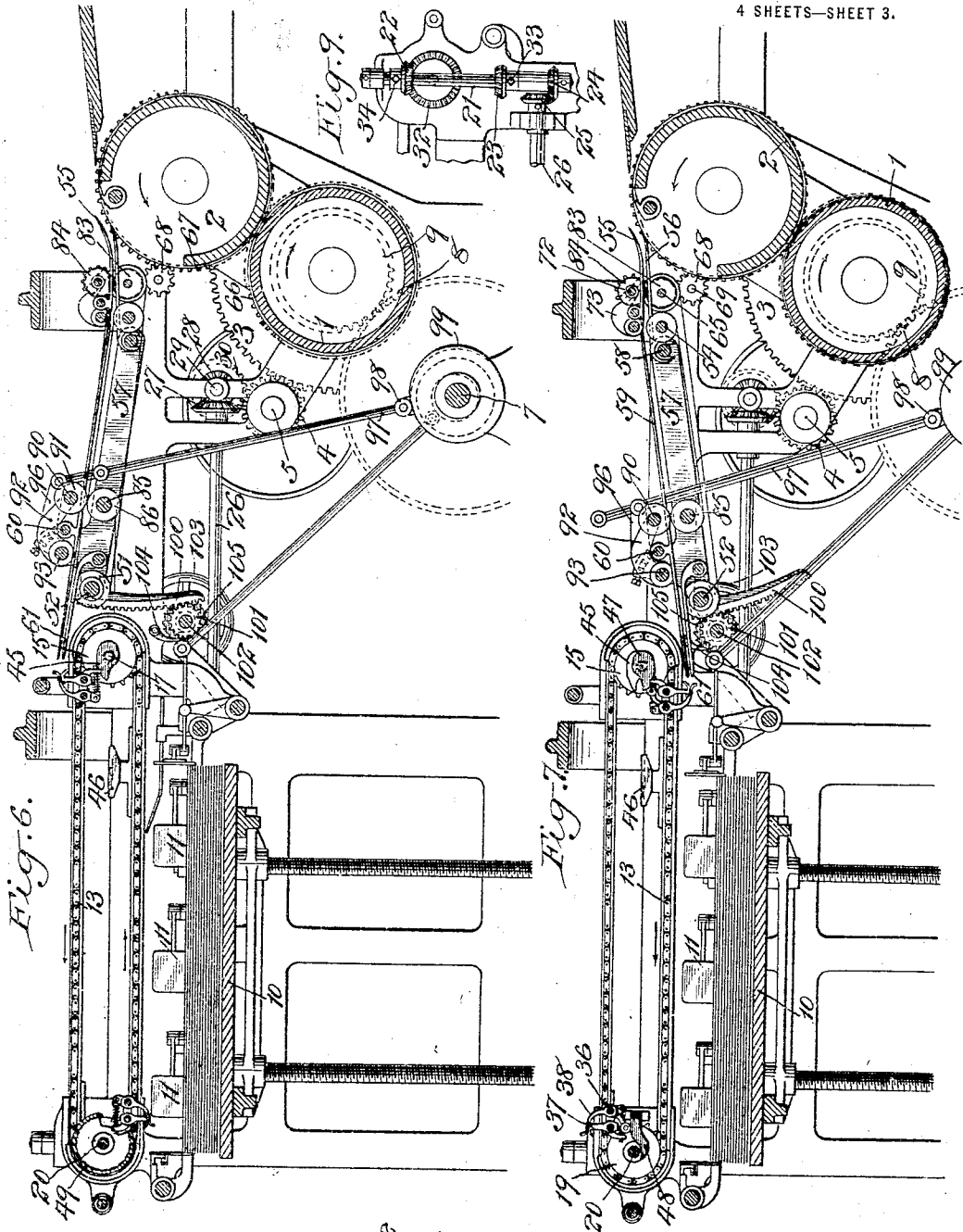


H. M. BARBER.
SHEET DELIVERY APPARATUS FOR PRINTING MACHINES.
APPLICATION FILED JUNE 9, 1909.

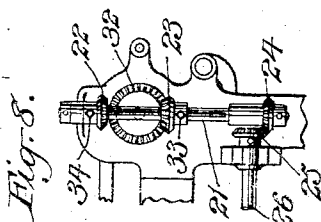
1,159,638.

Patented Nov. 9, 1915.

4 SHEETS—SHEET 3.



Witnesses:
F. George Barry
Henry Thime.

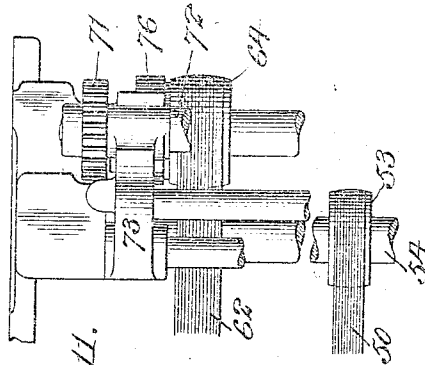
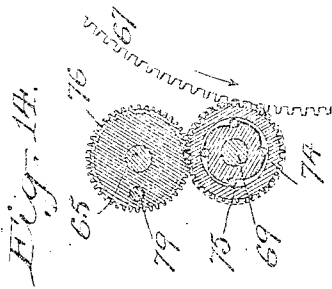
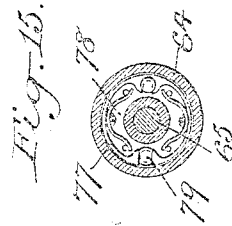
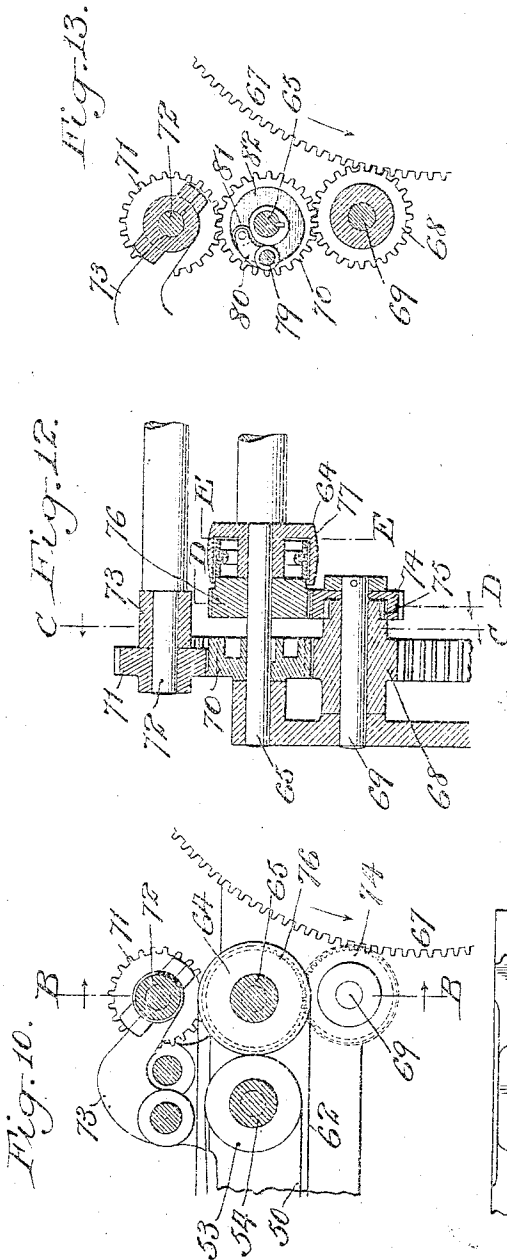


Inventor:
Howard M. Barber
by his attorneys
Thompson & Ward

H. M. BARBER.
SHEET DELIVERY APPARATUS FOR PRINTING MACHINES.
APPLICATION FILED JUNE 9, 1909.

1,159,638.

Patented Nov. 9, 1915.
4 SHEETS—SHEET 4.



Witnesses:
J. George Barry,
Henry Thorne.

Inventor:
Howard M. Barber
by his attorneys
H. M. Barber

UNITED STATES PATENT OFFICE.

HOWARD M. BARBER, OF STONINGTON, CONNECTICUT, ASSIGNOR, BY MESNE ASSIGNMENTS, TO C. B. COTTRELL & SONS COMPANY, OF NEW YORK, N. Y., A CORPORATION OF DELAWARE.

SHEET-DELIVERY APPARATUS FOR PRINTING-MACHINES.

1,159,638.

Specification of Letters Patent.

Patented Nov. 9, 1915.

Application filed June 9, 1909. Serial No. 501,093.

To all whom it may concern:

Be it known that I, HOWARD M. BARBER, a citizen of the United States, and resident of Stonington, in the county of New London and State of Connecticut, have invented new and useful Improvements in Sheet-Delivery Apparatus for Printing-Machines; of which the following is a specification.

The object of this invention is to provide certain improvements in the construction, form and arrangement of the several parts of a sheet delivery apparatus for printing machines whereby the sheets may be delivered either with their freshly printed sides up or with their freshly printed sides down, as may be desired, without requiring the use of a fly and its operating mechanism.

This invention comprises a sheet delivery apparatus which includes an endless delivery carrier arranged to receive the sheets one side up and deliver them the same side up or the other side up as may be desired.

This invention further comprises means for driving the endless delivery carrier in either direction and means for feeding the sheets to the under side of the carrier when it is caused to travel outwardly, for depositing the sheets printed side up or for feeding the sheets to the upper side of the carrier when it is caused to travel outwardly, for depositing the sheets printed side down; the carrier grippers being made readily reversible and their operating cams being suitably arranged to insure the proper action of the grippers for receiving, conveying and depositing the sheets.

In the embodiment of the invention shown herein, the outer end of the endless tape carrier which comprises the means for feeding the sheets to the endless sheet delivery carrier, is raised and lowered for feeding the sheets to the under or upper side of the delivery carrier, means being provided for driving the endless delivery carrier in either direction.

The means for feeding the sheets to the endless delivery carrier of the sheet delivery apparatus shown herein comprises an intermittently driven endless tape carrier, the top side of which runs ahead

when receiving the sheets from the press for presenting the sheets to the carrier grippers. As the carrier grippers close down upon the sheet, the tape carrier ceases to travel and it remains at rest while the sheet is being drawn outwardly by the carrier grippers.

The endless delivery carrier is herein shown as endless chains, which chains carry the bars of the carrier grippers, which gripper bars may be reversed so as to present the grippers properly as the movement of the carrier is reversed.

In the accompanying drawings, the invention is shown in connection with a two-revolution rotary cylinder printing machine, but it is to be understood that it may be applied to printing machines of any type.

Figure 1 is a side view of portions of a two-revolution cylinder printing machine, having applied thereto the improved sheet delivery apparatus, the parts being in the position which they assume when the endless tape carrier is arranged in position to feed the sheets to the upper side of the endless delivery carrier whereby the sheets may be received by the endless delivery carrier one side up, as, for instance, the printed side up and deposited the other side up, as, for instance, the printed side down. Fig. 1^a is a detail section showing more clearly the tapes of the endless tape carrier and its driving mechanism, Fig. 2 is a top plan view of the parts shown in Fig. 1, Fig. 3 is an enlarged detail view in end elevation partially in section showing the connection of the gripper bars to one of the delivery carrier chains, Fig. 4 is an enlarged detail view showing one of the sets of grippers and the stationary cam for opening the grippers to receive the advance edge of the sheet on the upper side of the delivery carrier, Fig. 5 is a similar view showing the grippers reversed and the cam for opening the same to receive the advance edge of the sheet when fed to the under side of the delivery carrier, Fig. 6 is a section taken in the plane of the line A—A of Fig. 2, Fig. 7 is a similar section, the grippers and their operating cams on the near side of the machine being left in position, the endless tape carrier being in its lowered position for feeding the sheets to the underside of the

delivery carrier, the delivery carrier grippers being reversed from the position shown in Fig. 6, and the delivery carrier being connected to be driven in the reverse direction from that shown in Fig. 6, Fig. 8 is a detail view in side elevation showing the driving gears for the endless delivery carrier arranged for moving the upper side of the carrier outwardly where the sheets are to be received one side up and delivered the other side up, Fig. 9 is a similar view showing the driving gears arranged for moving the under side of the delivery carrier outwardly where the sheet is to be received one side up and deposited the same side up, Fig. 10 is a detail side view showing the gearing for imparting the intermittent movement to the endless tape carriers, Fig. 11 is a top plan view of the same, Fig. 12 is a section taken in the plane of the line B—B of Fig. 10, Fig. 13 is a section taken in the plane of the line C—C of Fig. 12, Fig. 14 is a section taken in the plane of the line D—D of Fig. 12, and Fig. 15 is a section taken in the plane of the line E—E of Fig. 12.

In the portion of the printing press herein shown, the form cylinder is denoted by 1 and its impression cylinder by 2. The form cylinder gear 3 is driven from a gear 4 on the drive shaft 5, which shaft is driven from a suitable motor 6. The cam shaft 7 is driven from the form cylinder 1 through the gears 8, 9.

The sheet receiving table is denoted by 10 and the sheet joggers by 11.

The table may be adjusted vertically and the joggers operated by any well known or approved mechanism, which mechanism forms no part of the present invention.

The side chains 12, 13, of the endless sheet delivery carrier pass around sprockets 14, 15, mounted on stud shafts 16, 17, at the inner end of the carrier and around sprocket wheels 18, 19, mounted on a cross shaft 20, at the outer end of the carrier. This carrier is driven in either direction by the following means:—A vertical shaft is mounted on the side framing of the machine, which shaft has slidably keyed thereon oppositely arranged upper and lower bevel gears 22, 23. This vertical shaft 21 is further provided with a bevel gear connection 24, 25, with a horizontal shaft 26, which, in turn, has a bevel gear connection 27, 28, with a stud shaft 29 driven from the drive shaft 5 through spur gears 30, 34.

The front endless delivery carrier shaft is provided with a bevel gear 32. When the delivery carrier is to be driven in a direction to move its upper side outwardly, the bevel gear 23, on the shaft 21, is brought into mesh with the bevel gear 32 and is locked in such position by the set screw 33. When the delivery carrier is to be driven in

the reverse direction for moving its under side outwardly, the bevel gear 23 is disconnected from the bevel gear 32 and the bevel gear 22 is brought into mesh with the bevel gear 32 and locked in such position by the set screw 34.

The endless delivery carrier may be provided with one or more sets of sheet grippers, in the present instance two of these sets of grippers are shown. Each set of grippers may be made reversible by turning their bars 35, 36, end for end, so as to present the jaws 37, 38, of the grippers in the proper direction for receiving the sheets as they are fed to the delivery carrier.

When the carrier is to be used for receiving the sheets one side up and delivering them the other side up, the grippers are arranged to receive the sheets as they are fed to the upper side of the carrier at the inner end and when the carrier is to be used for receiving the sheets one side up and deliver them the same side up, the grippers are arranged to receive the sheets as they are fed to the under side of the carrier at the inner end thereof. These gripper supporting bars 35, 36, are provided at their ends with blocks 39 which are removably attached to blocks 40 carried by the chains 12, 13, the fastening devices in the present instance being bolts 41. The jaw 37 of each set of grippers is stationary and the jaw 38 is movable and is held yieldingly closed by a spring 42.

A cam roller 43 is carried by an arm 44 fixed to the bar 36 at one end thereof, which cam roller is arranged to engage either of two sets of stationary cams according to the direction of travel of the delivery carrier.

When the set of grippers is arranged to receive the sheets at the upper side of the delivery carrier at its inner end, the cam roller 43 is fitted to engage a stationary cam 45 on the stud shaft 17 for causing the grippers to open to receive the advance edge of the sheet being fed thereto. After the grippers have passed around the outer end of the carrier and are traveling inwardly along the under side thereof, the gripper cam roller 43 will be engaged by a stationary cam 46 for opening the grippers to permit the deposit of the sheet on the table 10, the reverse side up from the way the sheet was received by the delivery carrier.

When the set of grippers is arranged for receiving the sheets on the under side of the carrier at the inner end thereof, the gripper cam roller 43 will be engaged by a stationary cam 47 for opening the grippers to receive the advance edge of the sheet being fed thereto. As the grippers near the outer end of the carrier, the roller 43 will be engaged by the stationary cam 48 for opening the grippers to deposit the sheet upon the receiving table 10, the same side up as the sheet was fed to the delivery carrier.

A removable cylinder 49 is secured upon the outer delivery carrier shaft 20 around which the sheets are caused to pass when they are fed to the upper side of the delivery carrier.

It is to be understood that suitable stops and sheet guides may be employed for insuring the accurate deposit of the sheets upon the table 10.

The means for conveying the sheets from the impression cylinder of the printing machine to the sheet delivery carrier is constructed, arranged and operated as follows:—The intermittently driven tape carrier

comprises the tapes 50 which pass around pulleys 51 on the rotary shaft 52 at their outer end and around pulleys 53 on the shaft 54 at their inner ends. The sheets as they leave the impression cylinder pass

between the sheet guide fingers 55 and the stripper fingers 56 onto the tapes 50. The outer tape carrier shaft 52 is mounted in the outer end of a swinging frame 57, the inner end of which is pivoted on a cross bar

58 adjacent to the inner tape carrying shaft 54. A sheet guide 59 is located over the tapes 50 and extends to the point of delivery of the carrier, which sheet guide is supported upon a cross bar 60 carried by the swinging

frame 57. As the sheets leave the outer end of the tape carrier they pass between the sheet guide 59 and another sheet guide 61. The tape carrier is driven intermittently for conveying the sheet from the impression

cylinder to the delivery carrier grippers. The travel of the tape then ceases as the grippers close upon the leading edge of the sheet thus permitting the sheets to be drawn from the tapes at a much less surface

speed than the normal speed of the tapes without compelling the sheet being fed ahead to cause the middle or rear end of the sheet to drag upon the sheet previously deposited upon the receiving table.

This intermittent travel is imparted to the tape carrier by any well known or approved mechanism, such, for instance, as that shown, described and claimed in applicant's

United States Letters Patent No. 757248, dated April 12, 1904, a brief description of which follows:—An endless belt 62 passes around a pulley 63 on the shaft 52 and around a pulley 64 loosely mounted on the

shaft 65. The form cylinder gear 66 drives the impression cylinder gear 67 which, in turn, drives the gear 68 on the stud axle 69. This gear 68 meshes with a gear 70 fixed to the shaft 65, which, in turn, meshes with a gear 71 fixed to the shaft

72 mounted in the bracket 73. A gear 74 is loosely mounted on the stud axle 69 and a roller clutch 75 is interposed between this gear 74 and the hub of the gear 68 so that the gear 74 is driven with the gear 68.

This gear 74 meshes with a gear 76 loosely

mounted on the shaft 65. The gears 68 and 70 have an equal number of teeth but the gear 74 has a lesser number of teeth than the gear 76. The gear 76 carries on its outer face a clutch 77 in the form of a divided elastic ring, which clutch is received in an annular groove 78 in the driving pulley 64. For expanding the clutch ring 77 to couple the pulley 64 to the gear 76, there is inserted through the gear 76 a pin 79 which has a flattened head located between the ends of the divided clutch ring as clearly shown in Fig. 15. This pin 79 is rocked by providing it with an arm 80 having a stud 81 located in a cam groove 82 in the gear 70. The shape of this cam groove 82 is such that the pulley 64 will be clutched to the gear 76 at the desired intervals for obtaining an intermittent movement of the endless tape carrier. This pulley 64, when clutched to the gear 76, is driven at a slower speed than the gears 68, 70, because of the gear 74 having a lesser number of teeth than the gear 76.

The driving mechanism of the several parts is so arranged that the endless tape carrier travels at the surface speed of the impression cylinder and at a speed one and one-half times faster than the endless delivery carrier.

Coacting feeding rollers 83, 84, are mounted on the shafts 65, 72; for feeding the sheets from the impression cylinder onto the tape carrier.

A positive sheet forwarding device is provided for engaging the sheet on the endless tape carrier before it is released by the feeding rollers 83, 84, which sheet forwarding device comprises rollers driven at the speed of the impression cylinder and endless tape carrier, arranged to engage the opposite sides of the sheet for feeding the sheet to the grippers, on the delivery carrier, at the speed of the endless tape carrier. This sheet forwarding device is constructed, arranged and operated as follows:—The cross shaft 85 which carries the lower set of rollers 86 is mounted in the swinging frame 57 and is driven from the shaft 65 through a belt and pulley connection 87, 88, 89, the relative sizes of the pulleys 88 and 89 being such that the rollers 86 will be driven at the same surface speed as the impression cylinder and endless tape carrier. The upper cross shaft 90, which bears the drop rollers 91, is carried by the arms 92 of a rock shaft 93. The shaft 90 is provided with a spur gear 94 which is in mesh at all times with a spur gear 95 on the shaft 85, as the shaft 90 is lowered and raised.

The sheet forwarding device is operated to release the sheet as the advance edge of the sheet reaches and is grasped by the delivery carrier grippers, by the following means:—The arm 96 of the rock shaft 93 is attached

to the upper end of a rod 97, the lower end of which rod is provided with a stud roller 98 engaged by a cam 99 on the cam shaft 7.

The mechanism for raising and lowering the endless tape carrier for feeding the sheets therefrom to the upper or under side of the delivery carrier is constructed, arranged and operated as follows: The free end of the swinging frame 57 is provided with sector racks 100 which mesh with pinions 101 on a shaft 102, which shaft may be manually rotated by the use of a hand wheel 103. A pawl 104 engages a ratchet 105 for holding the frame 57 in its raised and lowered positions. When the frame 57 is in its lowered position for feeding the sheets to the under side of the delivery carrier, the arm 96 of the drop roller mechanism is attached to the rod 97 at one point and when the frame 57 is raised for delivering the sheets to the upper side of the delivery carrier the arm 96 is attached to another point on the rod 97.

In operation, when the sheets are to be received by the delivery carrier printed side up and deposited upon the table 10 printed side up, the tape carrier frame 57 is lowered to bring its outer end into position to deliver the advance edges of the sheets to a point where they may be grasped by the delivery carrier grippers on the under side of the delivery carrier at the inner end thereof.

The delivery carrier driving mechanism is connected to drive the under side of the carrier outwardly. The cams 47 and 48 will open the grippers for receiving the sheet and again open the grippers for depositing the sheet.

When the sheets are to be fed to the delivery carrier printed side up and deposited upon the table 10 printed side down, the tape carrier frame 57 is raised to bring the sheets into position to be grasped by the grippers on the upper side of the carrier at the inner end thereof, the said grippers being first reversed on the delivery carrier chains. The delivery carrier chain driving mechanism is then connected for driving the upper side of the same outwardly. The gripper cam roller is then in position to be engaged first by the cam 45 for opening the grippers to receive the sheet and then by the cam 46 for opening the grippers to deposit the sheet after it has passed around the outer end of the delivery carrier. In this form, the outer delivery carrier shaft 20 has the cylinder 49 secured thereon around which the sheet is caused to pass. In both of the above operations, the endless tape carrier is so operated that it will be

moved forwardly to bring the advance edges of a sheet into position to be engaged by the rollers of the sheet forwarding device. The sheet forwarding device will then be caused to feed the sheets forward into position to be engaged by the delivery carrier grippers. The movement of the tape carrier is then stopped and the rollers of the sheet forwarding device are released as the delivery carrier grippers close on the sheet for conveying the same into position to be deposited upon the receiving table.

What I claim is:—

1. In a sheet delivery apparatus for printing machines, an endless delivery carrier, means for reversing the direction of travel of the same, a sheet feeding endless tape carrier, a positive sheet forwarding device arranged to engage and release the sheet and means for raising and lowering the tape carrier and sheet forwarding device whereby the sheets are fed to the upper or under side of the delivery carrier.

2. In a sheet delivery apparatus for printing machines, an endless delivery carrier driven at a certain speed, means for reversing the direction of travel of the carrier, a sheet feeding endless tape carrier driven at a greater speed, a positive sheet forwarding device arranged to engage the sheet for feeding it into position to be engaged by the delivery carrier and means for raising and lowering the tape carrier and sheet forwarding device whereby the sheets are fed to the upper or under side of the delivery carrier.

3. In a sheet delivery apparatus for printing machines, an endless delivery carrier, means for reversing the direction of travel of the carrier, a sheet feeding endless tape carrier, a positive sheet forwarding device arranged to engage the sheet for feeding it into position to be engaged by the delivery carrier, means for stopping the movement of the tape carrier and disengaging the sheet forwarding device from the sheet as the sheet is engaged by the delivery carrier, and means for raising and lowering the tape carrier and sheet forwarding device whereby the sheets are fed to the upper or under side of the delivery carrier.

In testimony, that I claim the foregoing as my invention, I have signed my name in presence of two witnesses, this twenty eighth day of May, 1909.

HOWARD M. BARBER.

Witnesses:

F. GEORGE BARRY,
C. S. SUNDGREN.