R. MIEHLE.

SHEET DELIVERY MECHANISM FOR PRINTING PRESSES AND OTHER MACHINES.

APPLICATION FILED JAN. 25, 1918.

1,292,000.

Patented Jan. 21, 1919.

2 SHEETS—SHEET 1.

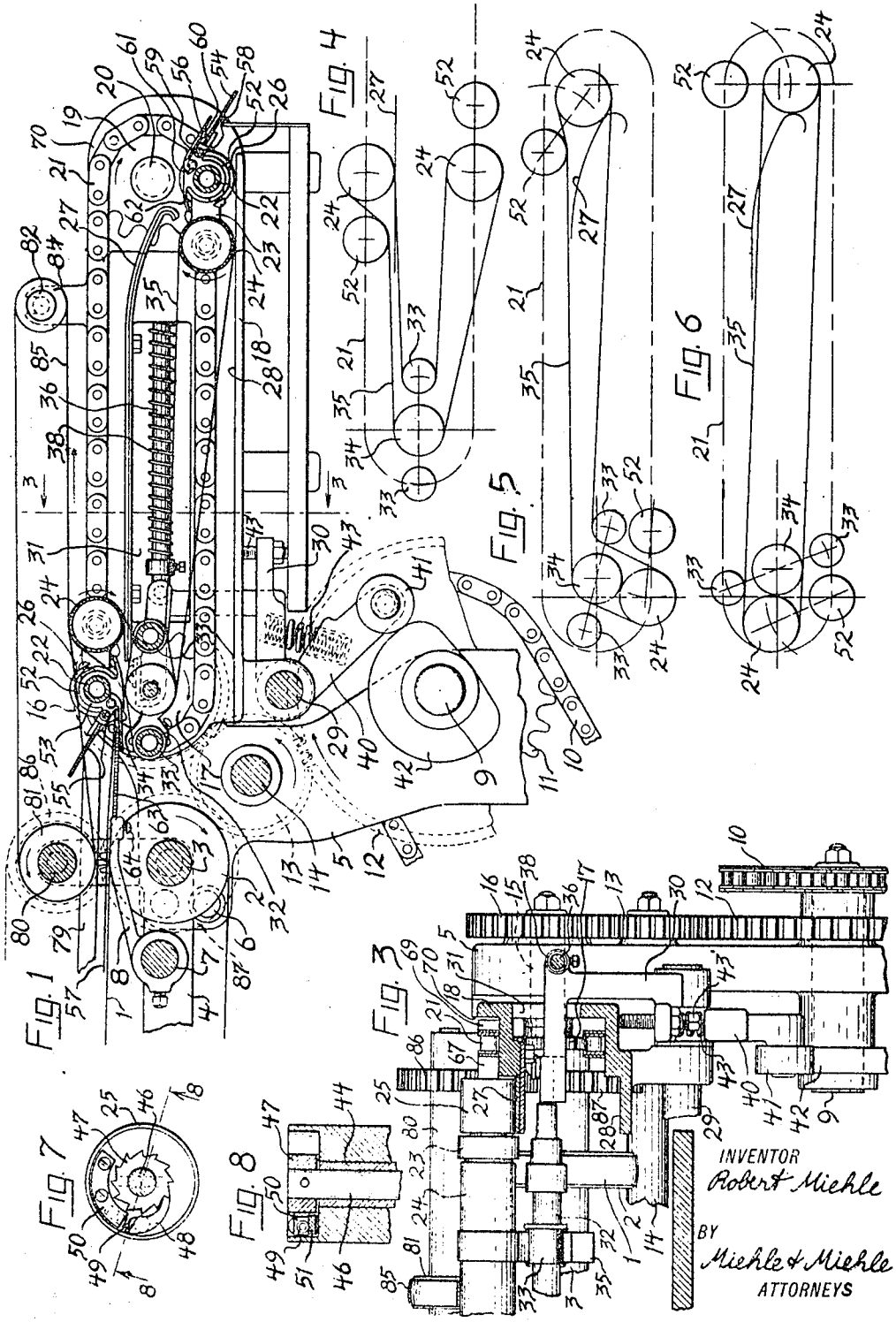


FIG. 1

FIG. 3

FIG. 4

FIG. 5

FIG. 6

FIG. 7

FIG. 8

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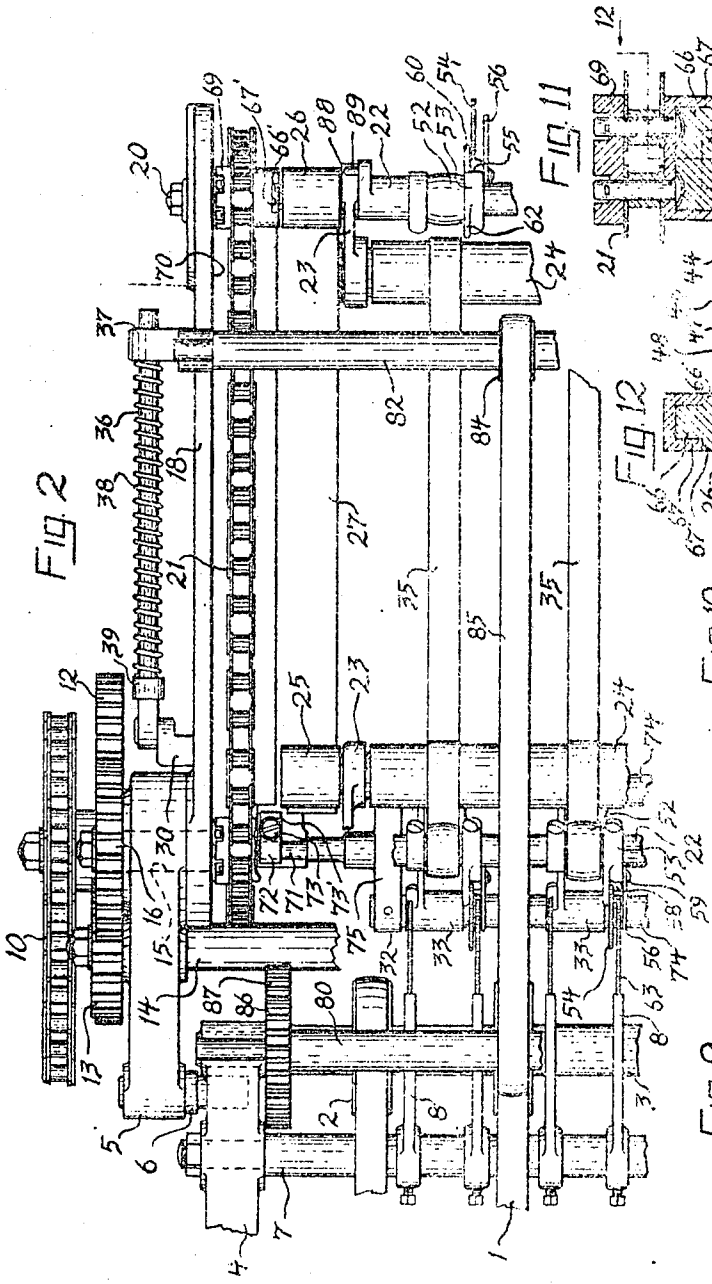


FIG. 2

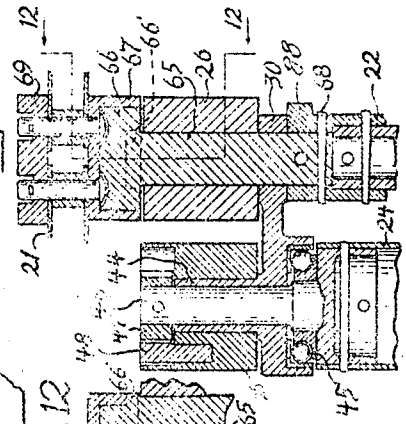


FIG. 11

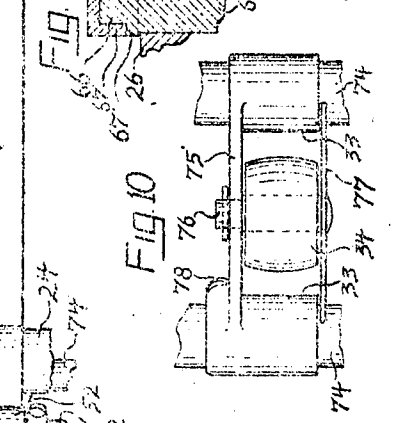


FIG. 12

FIG. 10

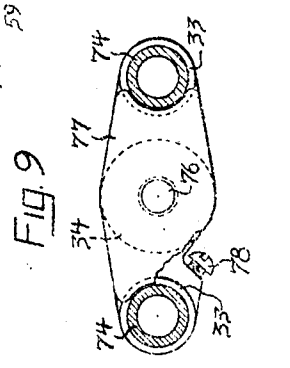


FIG. 9

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UNITED STATES PATENT OFFICE.

ROBERT MIEHLE, OF CHICAGO, ILLINOIS.

SHEET-DELIVERY MECHANISM FOR PRINTING-PRESSES AND OTHER MACHINES.

1,292,000. Specification of Letters Patent. Patented Jan. 21, 1919.

Application filed January 25, 1918. Serial No. 213,638.

To all whom it may concern:

Be it known that I, ROBERT MIEHLE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Sheet-Delivery Mechanism for Printing-Presses and other Machines, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to sheet delivery mechanism for this and other machines.

In my U. S. Patent No. 1,111,667 I have disclosed a sheet delivery mechanism embodying an endless elastic belt element, two bight forming elements over which said belt element moves, means for causing each of said bight forming elements to travel bodily in an elongated closed path, and both substantially in a uniform direction, means interposed between the sides of the belt element and engaging that side of the belt element having the stretch that serves to carry the sheet and with respect to which said stretch travels to form a third bight in the belt element, and means for holding the remaining side of the belt element to form a fourth bight therein. The use of an elastic belt element in the above stated combination has certain minor ulterior disadvantages, and it is the main object of this invention to dispense with the use of an elastic belt element in this form of delivery.

Another object resides in providing a novel structure whereby each controlling and supporting element of the mechanism may be quickly and easily removed to permit the use of the fly delivery to deliver the sheets printed side down.

Another object resides in providing a novel construction whereby the friction of the mechanism is reduced to a minimum and whereby the parts occupy a minimum amount of space.

In my pending U. S. application, Serial No. 53,752, filed October 2, 1915, I have disclosed a deflecting pulley structure in combination with the above stated form of delivery, which engage the sheet bearing stretch of the belt element as it moves outwardly to reduce the amount of stretch required in the belt element and to decrease the distance between the sheet carrying level and the delivery level of the sheet carrying stretch of the belt element. In the above mentioned copending application I have also disclosed a sheet stop mechanism in combination with the above stated form of delivery.

Another object of the present invention resides in utilizing these elements for the same purposes by a novel construction as hereinafter fully described.

A further object resides in providing a top tape mechanism adapted to aid in controlling the sheet as it is carried outwardly preparatory to delivering the same.

With these and other objects in view which will be hereinafter fully described and particularly pointed out in the claims, the invention resides in the mechanism illustrated in the accompanying drawings forming a part of this specification and disclosing the preferred embodiment thereof, in which:

Figure 1 is a partial sectional side elevation of my improved sheet delivery mechanism.

Fig. 2 is a partial top plan view of the same.

Fig. 3 is a partial sectional end elevation on the line 3—3 of Fig. 1.

Figs. 4, 5, and 6 are diagrammatical views showing the elements of the mechanism in different positions in the cycle of operation.

Figs. 7, 8, 9, 10, 11 and 12 are enlarged detailed views of portions of the mechanism.

Like parts are indicated by similar characters of reference throughout the different figures.

The sheets are initially carried from the press upon the carrying tapes 1.

The outward ends of said tapes 1 are supported upon pulleys 2 which are secured upon a shaft 3, which shaft is journaled in frames 4 disposed one on either side of the mechanism.

The main frames 5 are disposed one upon either side of the machine and studs 6 are mounted therein which support the outer ends of the frames 4.

The inner ends of the frame 4 are supported in the usual manner, and inasmuch as the invention does not relate to the carrying tapes 1 or the mechanism for driving or supporting the same, it is unnecessary to describe the same in detail. A shaft 7 is carried by the frame 4 and is disposed inwardly of the shaft 3, and sheet guides 8 are mounted thereon at intervals between the tapes 1 and extend outwardly of the pulleys

2 to guide the sheet into the delivery mechanism of my invention.

A stud shaft 9 is mounted for rotation in the right hand frame 5 and is driven in a clockwise direction, as indicated by arrows, by means of a chain 10 which is trained over a sprocket 11 fixedly mounted upon said stud shaft. A spur gear 12 is fixedly mounted upon said stud shaft and meshes with a gear 13 which is also fixedly mounted upon a shaft 14 which is mounted for rotation in the frames 5 and extends across the space between the same. The sprocket 11, spur gear 12 and gears 13 are disposed on the outside of the right hand frame 5, and a gear similar to gear 13 is fixedly mounted upon the shaft 14 on the outside of the other frame 5. The driving mechanism for the sheet delivery mechanism proper of my invention is driven from the gear 13 and its corresponding gear upon the opposite side of the machine. This driving mechanism is exactly the same upon either side of the machine, and for that reason only one side of the sheet delivery mechanism has been shown, as an illustration and description of the other side of the machine would bring out no new features or render the exposition of the same more clear. Mounted for rotation in the frame 5 is a stud shaft 15 which has a spur gear 16 fixedly mounted thereon exteriorly of the frame 5 and meshing with the gear 13. The stud shaft 15 extends through the frame 5 and has a sprocket 17 fixedly mounted thereon on the inside of said frame 5 and closely adjacent thereto. The frame 5 has an extension 18 projecting outwardly therefrom, and a sprocket 19 is mounted for rotation upon a stud 20 at the outer end of said extension, said sprocket being in line with the sprocket 17 and having its axis parallel to that of the sprocket 17. An endless chain 21 is trained over the sprockets 17 and 19, the same defining the orbit of said chain. As above noted the gear 12 rotates in a clockwise direction and drives the sprocket 17 through the gears 13 and 16 in a clockwise direction whereby the upper stretch of the chain 21 moves outwardly and the lower stretch thereof moves inwardly.

The driving mechanism upon the opposite side of the machine embraces a chain similar to chain 21 and having the same orbit of travel and disposed in a plane parallel thereto. Extending across the space between the driving chains and having their respective ends carried by said chains at such corresponding points are a pair of rod structures 22. These rod structures divide the driving chains into two equal parts and are moved by said chains in a closed path outwardly, turning back, and moving inwardly as do said driving chains. Pivoted at each end of the rod structures 22 are arms 23, the pivotal axis of said arms being disposed parallel to the axis of said rod structures. A roller 24 is disposed between each pair of arms and has its ends mounted for rotation at the free ends of said arms. Each rod structure 22 and the roller 24 are disposed parallelly to each other and a supporting roller 25 is rotatably mounted upon the outside of each arm 23 on an axis parallel to the rod structures 22 and preferably coincident with the axis of the respective rollers 24. Supporting rollers 26 are mounted for rotation upon the rod structures 22 and are disposed in line with the supporting rollers 25 disposed on the same side of the machine. The arms 23 allow movement of the rollers 24 transversely of the path of the driving chain 21 parallel to the plane of the inclosure of said path. In the operation of this device the rollers 24 are positioned in front of the respective rod structures 22 relatively to the direction of movement, and by reason of the fact that the axis of the arms 23 are positioned behind their respective rollers, said rollers may have an arcual movement transversely of the path of the driving chain as above described and inclining rearwardly relatively to the direction of travel. The supporting rollers 25 are supported by a bearer 27, which is formed upon the extension 18, while moving outwardly, and are supported by a bearer 28, which is formed upon the extension 18 while moving inwardly. These bearers define the path of the rollers 24 while moving outwardly, turning back, and moving inwardly. The path of the rollers 24 is generally similar to that of the rod structure 22 and the chain 21, but differs therefrom during certain periods in the cycle as hereinafter to be described.

Shaft 29 is journaled in the extensions 18 and is disposed below the chain 21. An arm 30 is fixedly mounted upon either end of said shaft 29 and extends outwardly from its pivotal point and has an upwardly extending portion formed at the outer end of said outwardly extending portion, both of which are disposed on the outside of the adjacent extension 18. The upwardly extending portion of each arm 30 has its upper end disposed at a point between the level of the upper and lower stretches of the chain 21, and a laterally extending portion is formed at the upper end of said upwardly extending portion which projects through an opening 31, formed in the adjacent extension 18, and through the plane of the inclosure of the path of the adjacent chain 21. This laterally extending portion of each arm 30 has an inwardly extending portion formed thereon which is disposed at that side of the plane of the chain 21, opposite to the side at which the upwardly extending portion of said arm is disposed. It will be

noted that the inner end of the inwardly extending portions of said arms 30 is disposed within the closed path of the rollers 24 and the rod structures 22 and is movable within the inclosure of the path to and away from the adjacent portion thereof. Mounted for rotation at the inner end of said inwardly extending portion of the arm 30 is a yoke structure or bight forming means 32, the details of construction of which will be hereinafter described, and which has a pair of non-rotatable bight forming elements 33 formed thereon and a rotatable bight forming element 34 disposed between said element 33. An endless sheet carrying belt or tape element 35 is trained over the rollers 24 and each of the stretches thereof passes between one of the elements 33 and the element 34 whereby said bight forming means 32 alternately engages the opposite side of each tape or belt stretch between the supported ends thereof to form a bight therein. A slide rod 36 has its inner end pivotally connected to one arm 30 at the upper end of the upwardly extending portion thereof and has its outer end supported in a slide bearing 37 formed on the adjacent extension 18. A compression spring 38 encircles said slide rod 36 and is disposed inwardly of the slide bearing 37, and a collar 39 secured upon said slide rod inwardly of the frame renders the spring operative to exert its influence upon the rod 36 and the arm 30 to move the same inwardly, whereby the bight forming means 32 is moved toward the adjacent portion of the path of the roller 24 to exert a tension upon the belt or tape element 35.

Pivotally mounted upon the shaft 29 and disposed between the arm 30 on the right hand side of the machine and the respective extension 18 is a cam arm 40 which extends outwardly. A roller 41 is mounted for rotation at the free end of the cam arm 40 and engages a cam 42, which cam is fixedly mounted upon the stud shaft 9 and disposed adjacent the right hand frame 5. The cam arm 40 is operatively connected with the adjacent arm 30 by means of a compression spring 43, which is retained in position by means of recesses formed in the arms 30 and 40 and engaging the opposite ends of said spring 43. By means of this connection the cam 42 moves the bight forming means 32 inwardly and toward the adjacent portion of the path of the roller 24 to maintain the belt or tape element uniformly taut, said cam being formed to move said bight forming means at the proper time for this purpose.

It will be noted in this connection that the spring 38 and the cam 42 are complemental in their function, and that either may be used independently of the other. A set screw 43' is mounted upon an extension of the outwardly extending portion of arm 30 and abuts the extension 18 to limit the inward movement of the bight forming means 32.

It will be noted that as the roller 24 moves along the upper and lower stretches of chain 21 the upper stretches of the belt or tape element, which are supported by the roller 24 moving along the upper stretch of the chains 21, increase in substantially the same proportion as the lower stretches thereof, which are supported by the roller 24 moving along the lower stretch of the chain 21, and that, if the roller 24 moves in a path coincident with that of chain 21 as disclosed in my U. S. Patent No. 1,111,667, above referred to, the lower stretches of said tape element do not decrease in the same proportion as the upper stretches increase when the roller 24 moving along the lower stretch of chain 21 nears the bight forming element 32. I dispense with the necessity of the use of elastic belt or tape element in this form of delivery by providing means whereby said rollers may travel in a closed path, and both substantially in a uniform direction, together with means whereby the speed of the rollers relatively to each other is changed whereby the upper stretches of the belt or tape element are increased in substantially the same proportion as the lower stretches of said belt or tape element are decreased at all times in the cycle of operation.

In conjunction with this improved form of delivery I have provided a movable bight forming element 32 inclusive of fixed tape holders 33 and tape pulleys 34, movable to and away from one portion of the closed path of said rollers, when said rollers 24 are moving along the upper and lower stretches of the chain 21, which is positioned to maintain the tape stretches taut, and which, when said rollers 24 are turning back from movement along one stretch of chain 21 into the other stretch thereof, is moved to allow said rollers to pass through the adjacent portion of their path whereby a belt or tape element of greater effective length may be used. In addition to this the provision of a movable bight forming element 32 affords advantages in structure which decrease the amount of space required for the proper operation of the device and renders the same more compact.

While either of the above mentioned features may be used independently of the other in this form of delivery for the purpose of dispending with the use of elastic tapes in this form of delivery, their use in conjunction with one another allows a larger sheet to be delivered in the same size of delivery than would be the case if only one of these mechanisms were used for the purpose above described.

The path of the rollers 24 is defined by

the bearers 28, the bearers 27, and the bight forming element 32 and its coacting parts, the bearers 27 and 28 defining the path of said roller by moving outwardly and inwardly and while turning back at the outer end of their inclosed path, and the bight forming element 32 defining the path of said rollers as they move from that portion of their path upon which they travel inwardly to that portion of their path upon which they travel outwardly at the inner end of the path. Said bight forming means 32 defines the path of said rollers as they turn about the inner end of their path by reason of the fact that, each roller 24 engages said bight forming element during its travel through that portion of its path whereby the influence of the spring 38 and the cam 42 is exerted upon said roller to maintain the belt or tape element taut while the other roller 24 is passing through the outer turn back portion of the path as defined by the outer bearers 27. See Figs. 5 and 6.

It will be noticed that by reason of the shape and disposition of the outer end of the bearer 27 relatively to the path of the chain 21 the turn back portion of the path of the rollers 24 at the outer end of the path thereof is non-coincident with the corresponding portion of the path of the chain 21 whereby the rollers 24 as they pass through said portion of their path descend from the upper or outgoing level of the path thereof to the ingoing or lower level of the path thereof at a relatively slow rate of speed thereby giving the supported sheet plenty of time to descend with the supporting stretch of the belt or tape element 35. In the preferred embodiment of the invention this portion of the path of the rollers 24 is disposed within the inclosure of the path of the chain 21. See Figs. 1, 5, and 6.

As the rollers 24 travel outwardly upon the upper level of their path they are assisted in rotating in a clockwise direction by the respective supporting rollers 25 by means of a ratchet mechanism, now to be described. See Figs. 7, 8 and 11. As above stated each roller 24 is mounted for rotation between each pair of arms 30. A lateral extension 44 is formed on the outer side of each arm and the respective supporting roller 25 is journaled thereon. Ball bearings 45 are provided for supporting the rollers 24. Each end of the rollers 24 is provided with a reduced end 46 which is journaled in and extends through a hole formed in the arm 30 and its extension 44. A ratchet wheel 47 is fixedly mounted at the outer end of the reduced end 46 and has the lateral face thereof adapted to engage the adjacent end of said extension and said supporting roller to coöperate with said arm to limit the longitudinal movement of both of said rollers. A pawl 48 is pivotally mounted at the end of said roller 25 and is adapted to engage the ratchet wheel 47 to establish a driving connection between the supporting roller 25 and the rollers 24. A spring 49 is mounted upon a socket 50, secured upon the roller 25, and serves to maintain said pawl in engagement with the ratchet wheel. The pawl 48 is pivoted upon said roller 25 by means of a laterally extending pin portion thereof engaging a hole in said roller, and the laterally extending pivot pin portion of said pawl is retained within said hole by means of a lip 51 formed on said pawl, which underlies the portion of the spring 49 adjacent the pawl. A peripheral lip or ring is formed upon the outer end of the supporting roller 25 and the ratchet mechanism is disposed within the recess thereof so that said roller may have a maximum amount of tractive area in engagement with the bearers. The ratchet mechanism is so disposed as to enable the roller 25 to drive the respective rollers 24 in a clockwise direction. Inasmuch as the supporting rollers 25 rotate in a clockwise direction while in engagement with the bearers 27 they drive their respective rollers 24 in a clockwise direction while the same are moving outwardly. However, when the rollers 25 roll upon the bearers 28 they rotate in a counter clockwise direction, and do not drive the rollers 24 as they move inwardly on their path. As is fully set forth in the above mentioned Patent No. 1,111,667 the delivery or lower sheet bearing stretch of the belt or tape element 35 remains stationary due to the gripping effect of the engaged tape holder or bight forming element 33 and the rollers 24 as they move inwardly continue to rotate in a clockwise direction to wind said lower or delivery stretch of the tapes out from under the sheet to effect the discharge of the same. The rod structure 22 carries deflecting rollers 52 mounted for rotation thereon and adapted to engage respective belt or tape element 35 while moving outwardly, whereby the distance that the sheet bearing stretch moves from one level to the other is materially reduced.

The rod structure 22 carries sheet stops 53 which are adapted to engage the leading edge of the sheet as it moves outwardly upon the belt or tape element 35 to control the same. As the rod structures 22 turn about the sprocket 19 said sheet stops move into a disengaging position relative to the sheet to allow the same to be discharged over them, as fully set forth in my copending U. S. application Serial Number 119,346, filed September 11, 1916. These sheet stops are disposed at intervals along the lateral extent of the rod structures 22 between the belt or tape elements 35, each sheet stop comprising a flexible sheet guard element 54, formed of a

closely coiled wire, secured in a socket of the main sheet stop structure, a sheet stop surface 55, formed on the main sheet stop structure, and a pivoted guard element 56 pivoted upon the main sheet stop structure. The stop surface 55 is disposed to face inwardly when the supporting rod structures 22 are positioned upon the outgoing portion of their path and to be engaged by the leading edge of a sheet 57 as it moves outwardly over the sheet guides 8. See Fig. 1. The guard elements 54 and 56 are disposed to coöperate with the sheet stop surface 55 to form a closure having an open end and facing rearwardly as the rod structures travel outwardly to receive the sheet 57 from the sheet guide 8 and control the same during its entire outward travel. The flexible guard element 54 is secured within the recess of a boss 58 on the main sheet guard structure by means of a set screw 59, and a deflecting element 60 is formed integrally with said boss to prevent the sheet from catching upon the outer surface of the boss. As above stated the pivoted guard element 56 is pivoted to the main sheet stop structure, and has a projection 61 which is adapted to abut the rod structure 22 to position said pivoted guard element during the travel of the rod structure outwardly. When the rod structures 22 turn about and travel inwardly at the outward end of their path the gravital tendency of the pivoted sheet guard element 56 moves the same downwardly until it rests upon the set screw 59 to allow the discharge of the sheet thereover without interference. In order that the sheet, as it is discharged from the belt or tape element 35, cannot get caught between the roller 24 and the rod structures 22 the main sheet stop structure is formed with an extension 62 which obstructs the space between said rollers and said rod structures as illustrated in Figs. 1 and 2.

The sheet guides 8 are provided with flexible element 63, formed on closely coiled wire, which are secured in sockets in the main sheet guide structure thereof by means of set screws 64. These flexible elements 63 and 64 have sufficient strength to guide the sheet and may flex to prevent injury when struck by any portion of the mechanism.

The rod structures 22 are provided with removable ends 65, said ends being provided with an enlarged end 66 which is rectangular in cross section and adapted to be received in a recess of corresponding laterally extending chain blocks 67 of the chains 21. The remaining portions of the ends 65 are cylindrical and of uniform diameter and the supporting rollers 26 are mounted for rotation thereon and the arms 30 are pivoted thereon, and the extreme inner ends thereof are secured within the hollow formation of the main portion of said rod structures 22 by means of tapered pins 68, the roller 26 and arms 30 being limited as to lateral movement between the enlarged ends 66 and the main portion of the rod structure. The enlarged ends 66 are provided with transverse formations 66′ disposed adjacent the cylindrical portion of said ends 66 which engage corresponding transverse slots 67′ in the respective chain blocks 67 to strengthen said ends at that point and to provide additional lateral bearing surface for the rollers 26.

The corresponding chain blocks of the chains 21 which are disposed on said chains opposite to the chain blocks 67 are also extended, as designated at 69, and bear against lateral restraining bearers 70 formed on the extensions 18 to prevent said chains from spreading in the stretches of the same and allowing the ends 66 to become disengaged from the recessed chain blocks 67. However, the rod structures 22 may be removed from the mechanism, while on the upper stretch of chains 21 by raising said stretch of the chains above the bearers 70 and then moving said stretch of the chains away from the rod structures 22 to disengage said ends 66 from the chain blocks 67. Said rod structures 22 may be installed by reversing the above noted operation. It will be noted that, by reason of the fact that the rollers 24 and the rod structures 22, on which are mounted the tape deflecting pulleys 52 and the sheet stops 53, are coupled with the chains 21 by means of one coupling mechanism, each roller and its related rod structure 22 may be removed and installed as a single unit.

The yoke structure or bight forming means 32 is also easily removed from or installed in the mechanism. Lateral extending grooves are formed in the inwardly extending portions of the arms 30, and reduced ends 71 of the yoke structure engage respective of said grooves and are supported therein for rotation. Elongated plates 72 are secured upon respective of the inwardly extending ends of said arms 30, by means of headed screws 73, the inner ends of said plates being disposed to engage said reduced ends 71 to retain the same within the respective grooves. By swinging the plates 72 upon the screws 73 to a disengaging position relatively to said reduced ends 71 the yoke structure may be removed from the mechanism and installed therein as a unit. Lock washers 73′ are disposed between the heads of respective screws 73 and plates 72 to prevent said screws from loosening and allowing said plates from moving into a disengaged position during the operation of the device.

The main portion of the yoke structure 32 comprises a pair of rods 74 spaced apart in parallel relation with each other and secured in such relation by means of spacing elements 75 secured at the ends of said rods,

and from which the reduced ends 71 extend, the rods 74 carrying the bight forming elements 33 and 34. Each belt or tape element 35 engages a set of bight forming elements comprising two non-rotatable elements 33 and a rotatable element 34, each set of bight forming elements being adjustable longitudinally of said rods 74 as a unit. The bight forming elements 33 of each set embrace hollow cylindrical formations encircling a respective rod 74 and disposed in alinement with each other. Each pair of bight forming elements 33 is connected by a connecting member 75′ disposed at one side of the tape engaging portion of said bight forming elements.

The connecting element 75 carries a stud 76 disposed between the bight forming elements 33 and in line therewith and spaced equidistant therefrom. The rotatable bight forming elements 34 or roller is mounted upon said stud for rotation and a retaining plate 77 is secured to said stud adjacent the opposite side of said roller relatively to said connecting element. Said retaining plate 77 has inwardly curved formations which embrace the respective rods 74 and the belt or tape element 35 is restricted between the connecting element 75 and the retaining plate 77. Each set of bight forming elements 33 and 34 is movable along the rods 74 and may be secured in any position thereon by means of a set screw 78 mounted on an extension boss of one of the bight forming elements 33 and adapted to clamp said bight forming elements upon its respective rods 74.

As is usual guide sticks 79 are disposed above the sheet carrying stretch of the tapes 1 to restrict the upward movement of the sheet as it is carried by said tapes. In order that the sheet may be fully controlled as it is carried outwardly upon the sheet delivery mechanism proper I have provided a top guard structure adapted to coöperate with said sheet delivery mechanism proper as now will be described. A shaft 80 is mounted for rotation in the frame 4 above the tapes 1, and carries a number of pulleys 81, fixedly mounted thereon, and disposed at intervals along the longitudinal extent of the same. A second shaft 82 is mounted for rotation in upwardly extending portions of the extensions 18 near the outer end of the same, and a number of pulleys 84 are fixed thereon and disposed at intervals along the longitudinal extent of the same to correspond with the disposition of the respective pulleys 81 upon the shaft 80. The shaft 82 is disposed so that the rollers 24 and the deflecting pulleys 52 may pass under the pulleys 84 without interference. Top tapes 85 are trained over respective pairs of said pulleys 81 and 84. The shaft 80 is driven in a counter clockwise direction by means of a gear 86 fixedly mounted at the right hand end thereof and meshing with a gear 87 fixedly mounted upon the shaft 3. By means of this driving mechanism the under or sheet engaging stretch of the tapes 85 moves outwardly with the sheet, as indicated by the arrow in Fig. 1. In order that the sheet engaging stretch of tapes 85 may be disposed as near as possible to the upper sheet carrying stretch of the belt or tape element 35 the pulleys 81 are disposed to position the rear end of the sheet engaging stretch of the tapes 85 below the plane of the top of the rollers 24 as they move outwardly in their path. As said rollers 24 move outwardly in their path the tops thereof engage the sheet engaging stretch of the tapes 85 and move the same upwardly to allow said rollers and rod structures 22 to pass thereunder without interference, as indicated in Fig. 1. This engagement of the tapes 85 with the rollers 24 causes no interference for the reason that the engaged portion of the rollers 24 and the tapes 85 move in the same direction, and, if any variation in the speed of these engaging elements is present, the tractive engagement thereof is not sufficient to cause interference.

By reason of the fact that the sheet carrying stretch of the tape or belt elements 35 descend to a lower level preparatory to delivering the sheet, the sheet is moved away from the top tape sheet guides and no interference is caused in the event that the tail end of the sheet is curled upwardly which would otherwise obtain, if said top tape guides remained in the same close relation with the sheet when it is delivered or discharged as it is when the sheet is carried outwardly.

It is not necessary for the proper operation of the device that the delivery mechanism be timed to receive the sheet at the beginning of the outward travel of rollers 24, as shown in Fig. 1, as it may be timed to engage the sheet stops some time after said rollers 24 have started to move outwardly.

It will be noted that as the supporting rollers 25 engage a downwardly extending portion of the bearers 27 at the outer end thereof, not only is the bodily movement of the rollers 24 diminished but the rotation thereof is also diminished whereby the sheet bearing stretch, which carries the sheet outwardly, diminishes its movement also. During this movement of the rollers 24 the corresponding rod structures 22, upon which are mounted the sheet stops 53, continue to move outwardly at the same rate of speed, and this rate of speed of the sheet stops 53 does not start to diminish until the corresponding roller 24 reaches the limit of its

outward movement, at which point the movement of the sheet carrying stretch of the belt or tape element 35 has practically stopped. See Fig. 6. Thus, as the sheet is carried outwardly and nears the limit of its outward travel the speed of the supporting stretch of the belt or tape element 35 gradually diminishes. This sheet supporting stretch of the belt or tape element 35, it will be noted moves at twice the speed of the sheet stops 53, said sheet supporting stretch sliding under the sheet and holding the same against the stops 53. As the speed of the sheet supporting stretch of said belt or tape element 35 diminishes below that of the sheet stop 53, said sheet stops move outwardly out of engagement with the sheet and leave the same entirely controlled and supported upon the now practically stationary sheet supporting stretch of said belt or tape element 35. Subsequently said rod structures 22 turn about the sprocket 19 and assume a position below the sheet to allow the discharge thereof over the same upon the piling table 87, the sheet supporting stretch of the belt or tape element 35 being wound from out from under the sheet as is fully described in the above mentioned Patent No. 1,111,667.

In order that the rollers 24 cannot under any condition assume a position to the rear of their respective rod structures 22, relatively to the movement of the same, each arm 23 is provided with a stop extension 88 which coöperates with a stop pin 89, mounted on the adjacent portions of the respective rod structures 22 and disposed in alinement with the respective stop extension 88, to limit the pivotal movement of said arms 23 in a counter clockwise direction.

The above described mechanism which is illustrated in the accompanying drawings embodies the preferred structure of my invention, and I do not wish to be limited to the precise details thereof as many changes in the construction are conceivable without departing from the scope of the invention.

What I claim as new and desire to secure by Letters Patent are:

1. A sheet carrier including a tape stretch; two elements engaging the respective ends of said tape stretch to support the same; means for causing said elements to travel in a closed path and both substantially in a uniform direction; means adapted to alternately engage the opposite sides of said tape stretch between the ends thereof to form a bight therein; and means adapted to move said bight forming means in a path to maintain said tape stretch taut.

2. A sheet carrier including a tape stretch: two elements engaging the respective ends of said tape stretch to support the same; means for causing said elements to travel in a closed path and both substantially in a uniform direction; means adapted to alternately engage the opposite sides of said tape stretch between the ends thereof to form a bight therein; and, resilient means adapted to move said bight forming means in a path to maintain said tape stretch taut.

3. A sheet carrier including a tape stretch; two elements engaging the respective ends of said tape stretch to support the same; means for causing said elements to move in a closed path and both substantially in a uniform direction; means adapted to alternately engage the opposite sides of said tape stretch between the ends thereof to form a bight therein and disposed adjacent one portion of said path and around which said supporting elements pass, said bight forming means being movable to and away from that portion of said path; and resilient means adapted to move said bight forming means toward said portion of the path, each supporting element being adapted, when passing through said portion of the path, to hold said bight forming means against the influence of said resilient means.

4. A sheet carrier including a tape stretch; two elements engaging the respective ends of said tape stretch to support the same; means for causing said elements to move in a closed path and both substantially in a uniform direction; means adapted to alternately engage the opposite sides of said tape stretch between the ends thereof to form a bight therein and disposed adjacent one portion of said path and around which said supporting elements pass, said bight forming means being movable to and away from said portion of said path; and resilient means adapted to move said bight forming means toward said portion of the path, each supporting element being adapted, when passing through said portion of the path, to move said bight forming means against the influence of said resilient means.

5. A sheet carrier including a tape stretch; two elements engaging the respective ends of said tape stretch to support the same; means for causing said elements to travel in a closed path and both substantially in a uniform direction; means adapted to alternately engage the opposite sides of said tape stretch between the ends thereof to form a bight therein and disposed within said closed path and adjacent one portion thereof, said bight forming means being movable to and away from the adjacent portion of said path; and resilient means adapted to move said bight forming means toward the adjacent portion of said path, each of said elements being adapted, when it passes through said adjacent portion of the path, to engage said bight forming means to hold the same against the influence of said resilient means.

6. A sheet carrier including a tape stretch; two elements engaging the respective ends of said tape stretch to support the same; means for causing said elements to travel in a closed path and both substantially in a uniform direction; means adapted to alternately engage the opposite sides of said tape stretch between the ends thereof to form a bight therein and disposed within said closed path and adjacent one portion thereof, said bight forming means being movable to and away from the adjacent portion of said path; and resilient means adapted to move said bight forming means toward the adjacent portion of said path, each of said elements being adapted, when it passes through said adjacent portion of the path, to engage said bight forming means to move the same against the influence of said resilient means.

7. A sheet carrier including a supporting element: a driving means moving during a portion of its cycle in a defined path outwardly and reversing and moving inwardly: a connecting element between said first mentioned element and said driving means for moving the same substantially in unison with said driving means and adapted to allow said supporting element to move transversely of said path: and means defining the path of said first mentioned element and adapted to allow said supporting element to reverse its movement inwardly of the reversing portion of the path of said driving means.

8. A sheet carrier including a supporting element; a driving means moving during a portion of its cycle in a defined path outwardly and turning back and moving inwardly: a connecting element between said first mentioned element and said driving means for moving the same substantially in unison with said driving means and adapted to allow said supporting element to move transversely of said path; and means defining the path of said first mentioned element and adapted to allow said supporting element to turn back inwardly of the turn back portion of the path of said driving means.

9. A sheet carrier including a supporting element: a driving means moving during a portion of its cycle in a defined path outwardly on one level and turning about and moving inwardly upon another level and defining an inclosure: a connecting element between said supporting element and said driving means for moving the same substantially in unison with said means and adapted to allow said first mentioned element to move transversely of said path parallel to the plane of said inclosure; and means defining the path of said supporting element and adapted to allow the same to turn back from its outgoing path to its ingoing path in a different turn back path than the turn back portion of the path of said driving means and inwardly thereof.

10. A sheet carrier including a supporting element; a driving means moving during a portion of its cycle in a defined path outwardly on one level and turning back and moving inwardly upon another level and defining an inclosure; a connecting element between said supporting element and said driving means for moving the same substantially in unison with said means and adapted to allow said supporting element to move transversely of said path parallel to the plane of said inclosure and within said inclosure; and means defining the path of said supporting element and adapted to allow the same to turn back from its outgoing path to its ingoing path in a separate path within said inclosure.

11. A sheet carrier including a supporting element; a driving means moving during a portion of its cycle in a defined path outwardly on one level and turning back and moving inwardly upon another level and defining an inclosure: a connecting element between said supporting element and said driving means for moving the same substantially in unison with said means and adapted to allow a real movement of said first mentioned element transversely of the path of said means and parallel to the plane of said inclosure and within said inclosure; and means defining the path of said supporting element and adapted to allow the same to turn back from its outgoing path to its ingoing path in a separate path within said inclosure.

12. A sheet carrier including a supporting element: a driving means moving during a portion of its cycle in a defined path outwardly on one level and turning back and moving inwardly upon another level and defining an inclosure: a connecting element between said supporting element and said driving means for moving the same substantially in unison with said means and adapted to allow arcual movement of said first mentioned element transversely of the path of said means and parallel to the plane of said inclosure and within said inclosure, the axis of the arcual path of said first mentioned element being disposed behind said first mentioned element relatively to the movement thereof: and means defining the path of said supporting element and adapted to allow the same to turn back from its outgoing path to its ingoing path in a separate path within said inclosure.

13. A sheet carrier including a tape supporting element moving in a defined path outwardly and reversing and moving inwardly; and a tape deflecting element moving in a similar path and timed to follow said supporting element and having the re-

versing portion of its path disposed outwardly of the reversing portion of the path of said supporting element.

14. A sheet carrier including a tape supporting element moving in a defined path outwardly on one level and turning back and moving inwardly on another level; a tape deflecting element moving in a similar path and timed to follow said supporting element and having the turn back portion of its path disposed outwardly of the turn back portion of the path of said supporting element.

15. A sheet carrier including a tape supporting element; driving means moving in a defined path; a connecting element between said supporting element and said driving means adapted to allow limited movement of said supporting element relatively to said driving means; a tape deflecting element carried by said driving means and moving in unison therewith and following said supporting element; and means defining the path of said supporting element.

16. A sheet carrier including a tape supporting element; a driving means moving during a portion of its cycle in a defined path outwardly and reversing and moving inwardly a connecting element between said first mentioned element and said driving means for moving the same substantially in unison with said driving means and adapted to allow said supporting element to move transversely of said path; a tape deflecting element carried by said driving means and moving in unison therewith and following said supporting element; and means defining the path of said supporting element.

17. A sheet carrier including a tape supporting element; a driving means moving during a portion of its cycle in a defined path outwardly and turning back and moving inwardly; a connecting element between said first mentioned element and said driving means for moving the same substantially in unison with said driving means and adapted to allow said supporting element to move transversely of said path; a tape deflecting element carried by said driving means and moving in unison therewith and following said supporting element; and means defining the path of said supporting element.

18. A sheet carrier including a tape supporting element; a driving means moving during a portion of its cycle in a defined path outwardly on one level and turning about and moving inwardly on another level and defining an inclosure; a connecting element between said driving means for moving the same substantially in unison with said means and adapted to allow said first mentioned element to move transversely of said path parallel to the plane of said inclosure; a tape deflecting element carried by said driving means and following said supporting element; and means defining the path of said first supporting element and adapted to allow the same to turn back from its outgoing path to its ingoing path in a different turn back path than the turn back portion of the path of said driving means.

19. A sheet carrier including a tape supporting element; driving means moving during a portion of its cycle in a defined path outwardly on one level and turning back and moving inwardly upon another level and defining an inclosure; a connecting element between said supporting element and said driving means for moving the same substantially in unison with said means and adapted to allow said supporting element to move transversely of said path parallel to the plane of the inclosure of the same and within said inclosure; a tape deflecting element carried by said driving means and following said supporting element; and means defining the path of said supporting element and adapted to allow the same to turn back from its outgoing path to its ingoing path in a separate path within the limits of said inclosure.

20. A sheet carrier including a tape supporting element; driving means moving during a portion of its cycle in a defined path outwardly on one level and turning back and moving inwardly upon another level and defining an inclosure; a connecting element between said supporting element and said driving means for moving the same substantially in unison with said means and adapted to allow arcual movement of said supporting element transversely of said path parallel to the plane of the inclosure of the same and within said inclosure; a tape deflecting element carried by said driving means and following said supporting element, the focal point of said arcual movement being substantially coincident with said tape deflecting element; and means defining the path of said supporting element and adapted to allow the same to turn back from its outgoing path to its ingoing path in a separate path within the limits of said inclosure.

21. A sheet carrier including a tape stretch; an element supporting one end of said tape stretch; means for supporting the other end of said stretch and adapted to cooperate with said supporting element to maintain said tape stretch taut; driving means moving during a portion of its cycle in a defined path outwardly and turning back and moving inwardly and forming an inclosure; a connecting element between said supporting element and said driving means for moving said supporting element sub-

stantially in unison with said driving means and adapted to allow movement of said supporting element transversely of said path parallel to the plane of the inclosure; a tape deflecting element carried by said driving means and disposed to deflect said tape stretch as it is moved outwardly with said driving means; and means defining the path of said supporting element.

22. A sheet carrier including a tape stretch; an element supporting one end of said tape stretch; driving means moving during a portion of its cycle in a defined path outwardly and turning back and moving inwardly; means for supporting the other end of said tape stretch and disposed inwardly of the turn back portion of said path; a connecting element between said supporting element and said driving means for moving said supporting element substantially in unison with said driving means and adapted to allow movement of said supporting element transversely of said path parallel to the plane of the inclosure; a tape deflecting element carried by said driving means and disposed to deflect said tape stretch as it is moved outwardly with said driving means; and means defining the path of said supporting element.

23. A sheet carrier including a tape stretch; an element supporting one end of said tape stretch; means for supporting the other end of said tape stretch and adapted to coöperate with said supporting element to maintain said tape stretch taut; means for moving said supporting element in an elongated path outwardly in a direction substantially parallel to said stretch and reversing its movement and moving inwardly in a direction substantially parallel to said tape stretch, said tape stretch extending inwardly from said supporting element; a tape deflecting element disposed to engage said tape stretch to deflect the same while said supporting element is moving outwardly; and means for moving said tape deflecting element in unison with said supporting element in a defined path similar to said first mentioned path outwardly and reversing and turning back, the reversing portion of the path of said tape deflecting element being disposed outwardly of the reversing portion of the path of said supporting element.

24. A sheet carrier including a tape stretch; an element supporting one end of said tape stretch; means for supporting the other end of said tape stretch and adapted to coöperate with said supporting element to maintain said tape stretch taut; means for moving said supporting element in an elongated path outwardly in a direction substantially parallel to said stretch and reversing its movement and moving inwardly on a different level in a direction substantially parallel to said tape stretch, said tape stretch extending inwardly from said supporting element; a tape deflecting element disposed to engage said tape stretch to deflect the same while said supporting element is moving outwardly; and means for moving said tape deflecting element in unison with said supporting element in a defined path similar to said first mentioned path outwardly and reversing and turning back, the reversing portion of the path of said tape deflecting element being disposed outwardly of the reversing portion of the path of said supporting element.

25. A sheet carrier including a tape stretch; two elements engaging the respective ends of said tape stretch to support the same; means for causing said elements to move in a closed path and both substantially in a uniform direction; means adapted to alternately engage the opposite sides of said tape stretch between the ends thereof to form a bight therein, said first mentioned means being adapted to vary the speed of each supporting element relatively to the speed of the other supporting element at certain periods.

26. A sheet carrier including a tape stretch; two elements engaging the respective ends of said tape stretch to support the same; means for causing said elements to move in a closed path and both substantially in a uniform direction; means adapted to alternately engage the opposite sides of said tape stretch between the ends thereof to form a bight therein, said first mentioned means being adapted to vary the speed of each supporting element relatively to the speed of the other supporting element when said bight forming means is disengaging from one side of said tape stretch to engage the other to form a bight.

27. A sheet carrier including a tape stretch; two elements engaging the respective ends of said tape stretch to support the same; means for causing said elements to travel in a closed path and both substantially in a uniform direction, said means including connecting elements engaging respective of said supporting elements to allow movement of the same relatively to said means; means adapted to alternately engage the opposite sides of said tape stretch between the ends thereof to form a bight therein; and means for limiting the movement of said supporting elements relatively to said first mentioned means to maintain said tape stretch uniformly taut.

28. A sheet carrier including a tape stretch; two elements engaging the respective ends of said stretch to support the same; means for causing said elements to travel in a closed path and both substan-

tially in a uniform direction, said means including connecting elements engaging respective of said first mentioned elements to allow movement of said elements transversely of the path of said supporting elements parallel to the plane of the inclosure of said path; means adapted to alternately engage the opposite sides of said tape stretch between the ends thereof to form a bight therein; and means for limiting the transverse movement of said first mentioned elements to maintain said tape stretch uniformly taut.

29. A sheet carrier including a tape stretch; two elements engaging the respective ends of said stretch to support the same; means for causing said elements to travel in a closed path and both substantially in a uniform direction, said means including connecting elements engaging respective of said first mentioned elements to allow arcual movement of said elements transversely of the path of said supporting elements parallel to the plane of the inclosure of the path of the same; means adapted to alternately engage the opposite sides of said tape stretch between the ends thereof to form a bight therein; and means for limiting the transverse movement of said first mentioned elements to maintain said tape stretch uniformly taut.

30. A sheet carrier including a tape stretch; two elements engaging the respective ends of said tape stretch to support the same; means for causing said elements to travel in an elongated closed path and both substantially in a uniform direction; means adapted to alternately engage the opposite sides of said tape stretch between the ends thereof to form a bight therein, said first mentioned means including connecting elements engaging respective elements adapted to allow arcual movement of said supporting elements transversely of said path parallel to the plane of the inclosure thereof and in a direction toward said bight forming means as said elements are passing through one stretch of said elongated path; and means for limiting the transverse arcual movement of said supporting elements to maintain said tape stretch uniformly taut during all periods in the cycle of operations.

31. A sheet carrier including a tape stretch; two elements engaging the respective ends of said tape stretch to support the same; means for causing said elements to move in a closed path and both substantially in a uniform direction; means adapted to alternately engage the opposite sides of said tape stretch between the ends thereof to form a bight therein; means adapted to move said bight forming means in a path to maintain said tape stretch uniformly taut, said first mentioned means being adapted to vary the speed of each supporting element relatively to the speed of the other supporting element when said bight forming means is disengaging from one side of said tape stretch to engage the other to form a bight.

32. A sheet carrier including a tape stretch; two elements engaging the respective ends of said tape stretch to support the same; means for causing said elements to move in a closed path and both substantially in a uniform direction; means adapted to alternately engage the opposite sides of said tape stretch between the ends thereof to form a bight therein; resilient means adapted to move said bight forming means in a path to maintain said tape stretch uniformly taut, said first mentioned means being adapted to vary the speed of each supporting element relatively to the speed of the other supporting element when said bight forming means is disengaging from one side of said tape stretch to engage the other to form a bight.

33. A sheet carrier including a tape stretch; two elements engaging the respective ends of said tape stretch to support the same; means for causing said elements to move in a closed path and both substantially in a uniform direction; means adapted to alternately engage the opposite sides of said tape stretch between the ends thereof to form a bight therein and disposed adjacent one portion of said path and around which said supporting elements pass, said bight forming means being movable to and away from one portion of said path; resilient means adapted to move said bight forming means toward said portion of the path, each of said supporting elements being adapted, as it passes said portion of the path, to hold said bight forming means against the influence of said resilient means, said first mentioned means being adapted to vary the speed of said supporting elements relatively to each other as each supporting element passes through said portion of said path.

34. A sheet carrier including a tape stretch; two elements engaging the respective ends of said tape stretch to support the same; means for causing said elements to move in a closed path and both substantially in a uniform direction; means adapted to alternately engage the opposite sides of said tape stretch between the ends thereof to form a bight therein and disposed adjacent one portion of said path and around which said supporting elements pass and within said closed path, said bight forming means being movable to and away from one portion of said path; resilient means adapted to move said bight forming means toward said portion of the path, each of said supporting elements being adapted, as it passes

said portion of the path, to hold said bight forming means against the influence of said resilient means, said first mentioned means being adapted to vary the speed of said supporting elements relatively to each other as each supporting element passes through said portion of said path.

35. A sheet carrier including a tape stretch; two elements engaging the respective ends of said tape stretch to support the same: means for causing said elements to travel in a closed path and both substantially in a uniform direction. said means including connecting elements engaging respective of said supporting elements to allow movement of the same relatively to said means; means adapted to alternately engage the opposite sides of said tape stretch to form a bight therein; means adapted to move said bight forming means in a path to maintain said tape stretch taut; and means for limiting the movement of said supporting elements relatively to said first mentioned means to coöperate with said last mentioned means to maintain said tape stretch uniformly taut.

36. A sheet carrier including a tape stretch; two elements engaging the respective ends of said tape stretch to support the same; means for causing said elements to travel in a closed path and both substantially in a uniform direction, said means including connecting elements engaging respective of said supporting elements to allow movement of the same relatively to said means; means adapted to alternately engage the opposite sides of said tape stretch to from a bight therein; resilient means adapted to move said bight forming means in a path to maintain said tape stretch taut: and means for limiting the movement of said supporting elements relatively to said first mentioned means to coöperate with said last mentioned means to maintain said tape stretch uniformly taut.

37. A sheet carrier including a tape stretch; two elements engaging the respective ends of said tape stretch to support the same; means for causing said elements to travel in a closed path and both substantially in a uniform direction; means adapted to alternately engage the opposite sides of said tape stretch between the ends thereof to from a bight therein and disposed adjacent one portion of said path and around which said supporting elements are adapted to pass, said bight forming means being movable to and away from one portion of said path; resilient means adapted to move said bight forming means toward said portion of the path; each supporting element being adapted, when passing through said portion of the path, to hold said bight forming means against the influence of said resilient means, said first mentioned means including connecting elements engaging respective of said supporting elements to allow movement of the same relatively of said means: and means limiting the movement of said supporting elements and adapted to allow movement of each supporting element relatively to said first mentioned means when the other supporting element is passing through said portion of the path.

38. A sheet carrier including a tape stretch; two elements engaging the respective ends of said tape stretch to support the same; means for causing said elements to travel in a closed path and both substantially in a uniform direction; means adapted to alternately engage the opposite sides of said tape stretch between the ends thereof to form a bight therein and disposed adjacent one portion of said path and disposed within said closed path, said bight forming means being movable to and away from one portion of said path; resilient means adapted to move said bight forming means toward said portion of the path, each supporting element being adapted, when passing through said portion of the path, to hold said bight forming means against the influence of said resilient means, said first mentioned means including connecting elements engaging respective of said supporting elements to allow movement of the same relatively of said means; and means limiting the movement of said supporting elements and adapted to allow movement of each supporting element relatively to said first mentioned means when the other supporting element is passing through said portion of the path.

39. In a sheet carrier, a supported rod structure; an arm having pivotal connection with said rod structure on an axis parallel to that of said rod structure; a supporting roller disposed parallel to said rod structure and mounted for rotation at the free end of said arm; and a second roller disposed coaxially with said first mentioned roller and mounted for rotation on said arm; and a ratchet mechanism having connection with both of said rollers and adapted to establish a driving connection therebetween in one direction.

40. In a sheet carrier, a supported rod structure; an arm having pivotal connection with said rod structure on an axis parallel to that of said rod structure; a supporting roller disposed parallel to said rod structure and mounted for rotation at the free end of said arm; a second roller disposed coaxially with said first mentioned roller and mounted for rotation on said arm; and a ratchet mechanism having connection with both of said rollers and adapted to establish a driving connection therebetween in one direction.

41. In a sheet carrier, an arm; a supporting roller mounted for rotation upon said arm and disposed at one side thereof; a second roller mounted for rotation on said arm on an axis coaxial with said supporting roller and disposed on the other side of said arm; and a ratchet mechanism having connection with both of said rollers to establish a driving connection therebetween in one direction.

42. In a sheet carrier, an arm having a lateral extension formed thereon and having a laterally disposed hole formed therein and extending through said extension; a supporting roller mounted for rotation on said extension on an axis coaxial with that of said hole; a second roller having a reduced end journaled in said hole; and a ratchet mechanism having connection with both of said rollers to establish a driving connection therebetween in one direction.

43. In a sheet carrier, an arm having a lateral extension formed on one side thereof and having a laterally disposed hole formed therein and extending through said extension; a supporting roller mounted for rotation on said extension; a second roller disposed coaxially with said supporting roller on the opposite side of said arm and mounted thereon for rotation and having a reduced end extending through said hole; and a ratchet mechanism having connection with said supporting roller and said reduced end to establish a driving connection therebetween in one direction.

44. In a sheet carrier, an arm having a lateral extension formed on one side thereof and having a laterally disposed hole formed therein and extending through said extension; a supporting roller mounted for rotation on said extension; a second roller disposed coaxially with said supporting roller on the opposite side of said arm and mounted thereon for rotation and having a reduced end extending through said hole and journaled therein; and a ratchet mechanism having connection with said supporting roller and said reduced end to establish a driving connection therebetween in one direction.

45. In a sheet carrier, an arm having a lateral extension formed on one side thereof and having a laterally disposed hole formed therein and extending through said extension; a supporting roller mounted for rotation on said extension; a second roller disposed coaxially with said supporting roller on the opposite side of said arm and mounted thereon for rotation and having a reduced end extending through said hole; and an element secured on said end outwardly of said supporting roller and having the lateral face thereof adapted to engage the adjacent end of said extension and said supporting roller to coöperate with said arm to limit the longitudinal movement of both of said rollers.

46. In a sheet carrier, an arm having a lateral extension formed on one side thereof and having a laterally disposed hole formed therein and extending through said extension; a supporting roller mounted for rotation on said extension; a second roller disposed coaxially with said supporting roller on the opposite side of said arm and mounted thereon for rotation and having a reduced end extending through said hole; a ratchet wheel secured on said end outwardly of said supporting roller and having the lateral face thereof adapted to engage the adjacent end of said extension and said supporting roller to coöperate with said arm to limit the longitudinal movement of both of said rollers; and a spring actuated pawl mounted on said supporting roller and adapted for engagement with said ratchet wheel to establish a driving connection between said rollers in one direction.

47. In a sheet carrier, a rod structure; a supporting roller mounted for rotation on said rod structure; an arm having pivotal connection with said rod structure on an axis parallel to that of the rod structure; a second supporting roller mounted for rotation at the free end of said arm on an axis parallel to that of said rod structure; and a tape engaging element mounted at the free end of said arm.

48. In a sheet carrier, a supporting structure comprising two rods spaced apart and parallel to each other; and a yoke structure engaging both of said rods and adapted for adjustment longitudinally of said rods.

49. In a sheet carrier, two spaced apart bight forming element; a connecting element between said bight forming elements disposed at one side of said bight forming elements; and a third bight forming element mounted on said connecting element between said first mentioned bight forming elements.

50. In a sheet carrier, two spaced apart bight forming element; a connecting element between said bight forming elements; a stud mounted on said connecting element and disposed in line with said bight forming elements; a roller rotatably mounted on said stud; and a retaining plate mounted on said stud and disposed adjacent the opposite side of said roller relatively to said connecting element.

51. In a sheet carrier, a driving chain moving in a path forming an inclosure; an arm having one end thereof mounted for pivotal movement said arm being formed to extend through said inclosure and having the free end thereof disposed upon one side of the plane of said inclosure and having a portion thereof adjacent its pivotal point disposed on the opposite side of said plane.

52. In a sheet carrier, the combination of a sheet supporting element moving outwardly and inwardly; two relatively stationary spaced apart pulley structures mounted for rotation; and tapes supported by said pulley structures, said tapes being disposed to have one of the stretches thereof restrict the upward movement of the sheet as it moves outwardly upon said supporting element and adapted for movement in the direction of travel of the sheet.

53. In a sheet carrier, the combination of a sheet supporting element moving outwardly on one level and descending to a lower level and moving inwardly thereon; and a relatively stationary sheet guide structure disposed above the carried sheet and adapted to restrict the upward movement thereof during its travel outwardly upon said supporting element.

54. In a sheet carrier, the combination of a sheet supporting element moving outwardly on one level and descending to a lower level and moving inwardly thereon, and a sheet guide structure disposed above the sheet supporting element and adapted to restrict the upward movement of the sheet during its travel outwardly, said sheet guide structure being adapted to be engaged by said sheet supporting element as it moves outwardly to properly position said guide structure.

55. In a sheet carrier, the combination of a sheet supporting element moving outwardly on one level and descending to a lower level and moving inwardly thereon; and supported top tapes disposed above said sheet supporting element and extending inwardly of said sheet supporting element and adapted to be engaged by said sheet supporting element to properly position said top tapes as said sheet supporting element moves outwardly.

In witness whereof I have hereunto affixed my signature this 23rd day of January, A. D. 1918.

ROBERT MIEHLE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."