

C. A. McCAIN.
SHEET DELIVERY MECHANISM.
APPLICATION FILED MAY 11, 1911.

Patented Dec. 3, 1912.

5 SHEETS—SHEET 1.

1,046,095.

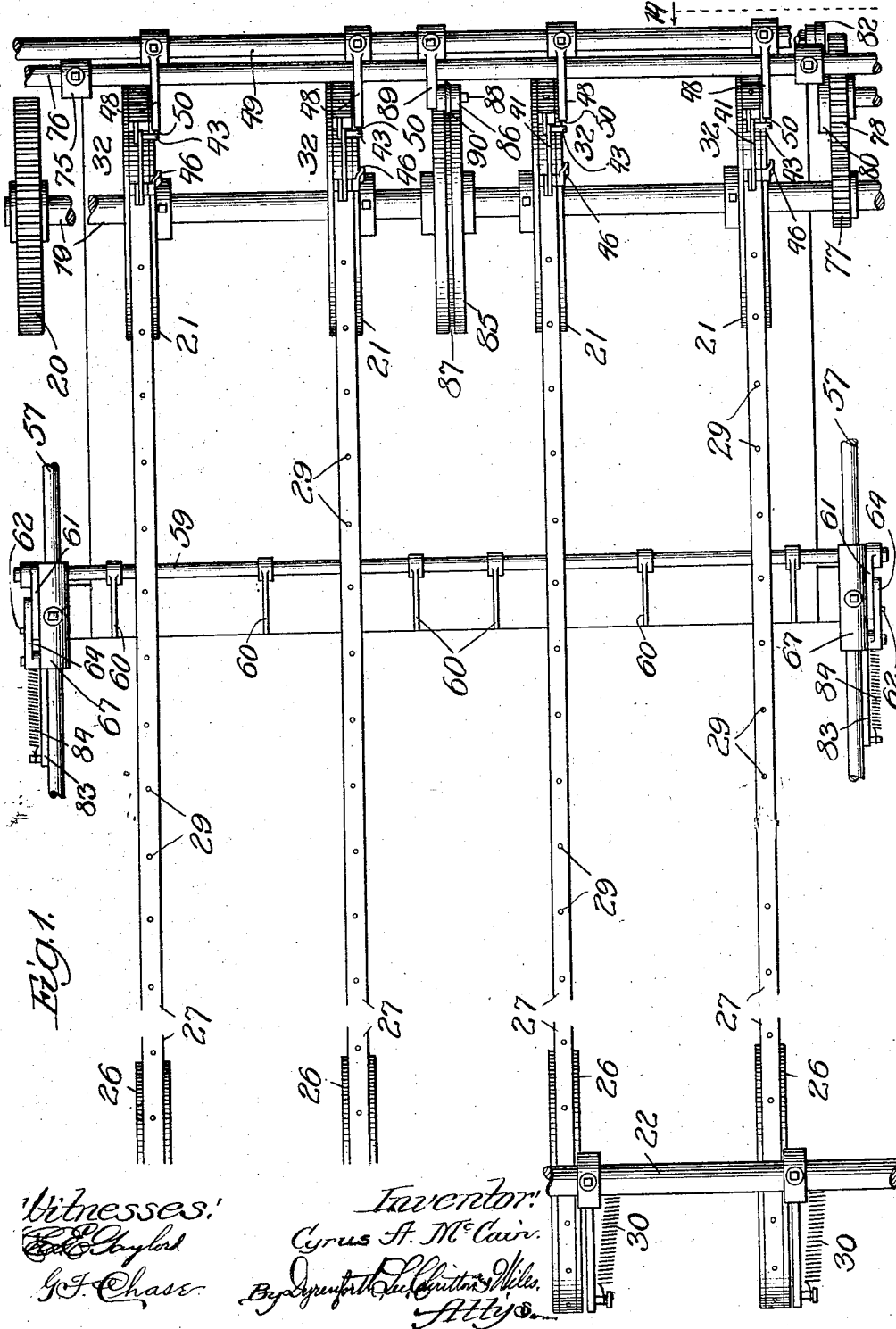


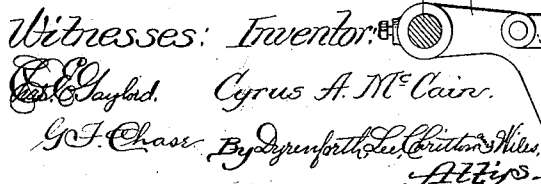
Fig. 1.

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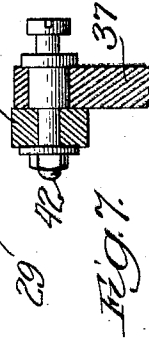
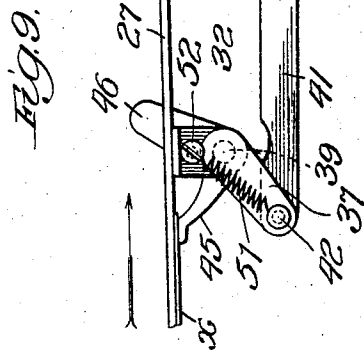
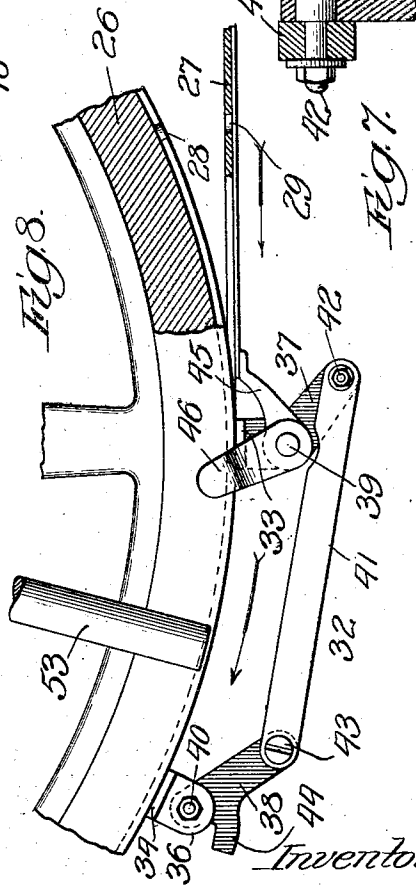
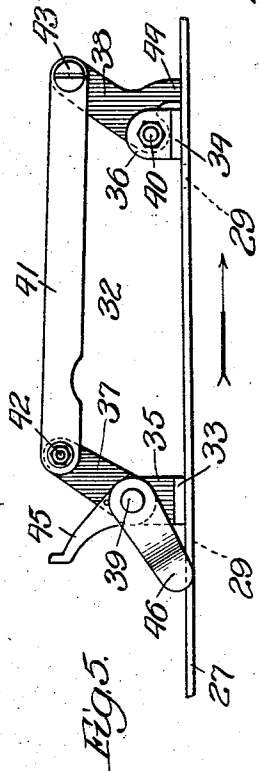
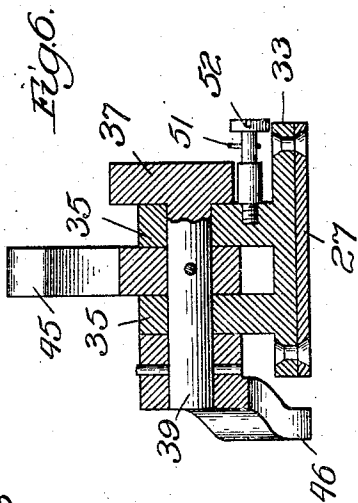
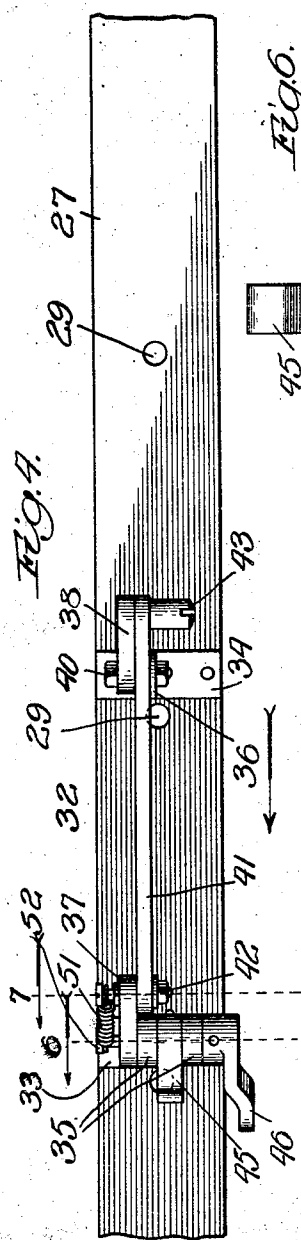
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1,046,095.

6 SHEETS—SHEET 2.



1,046,095.



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5 SHEETS-SHEET 4.

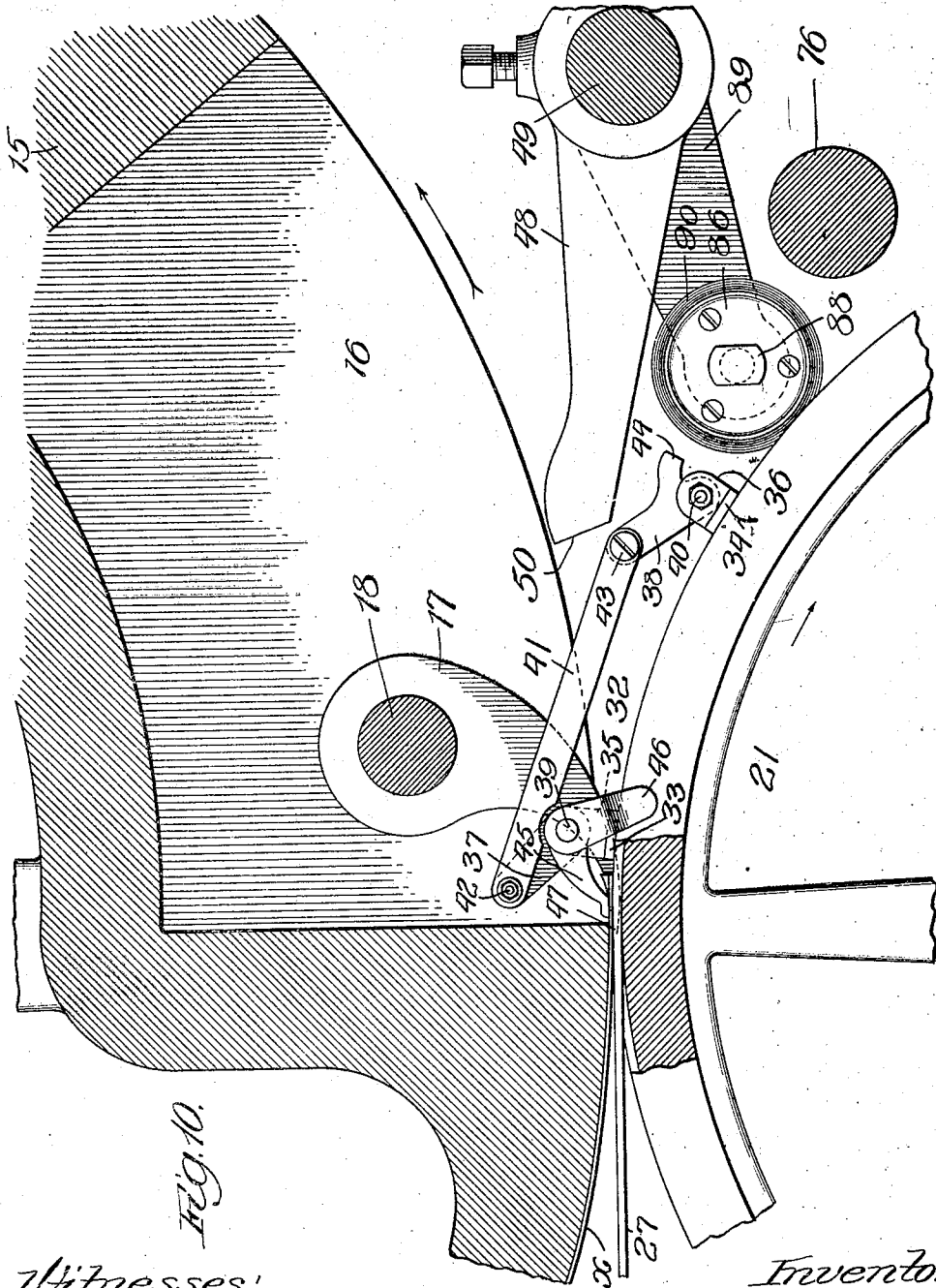


Fig. 10.

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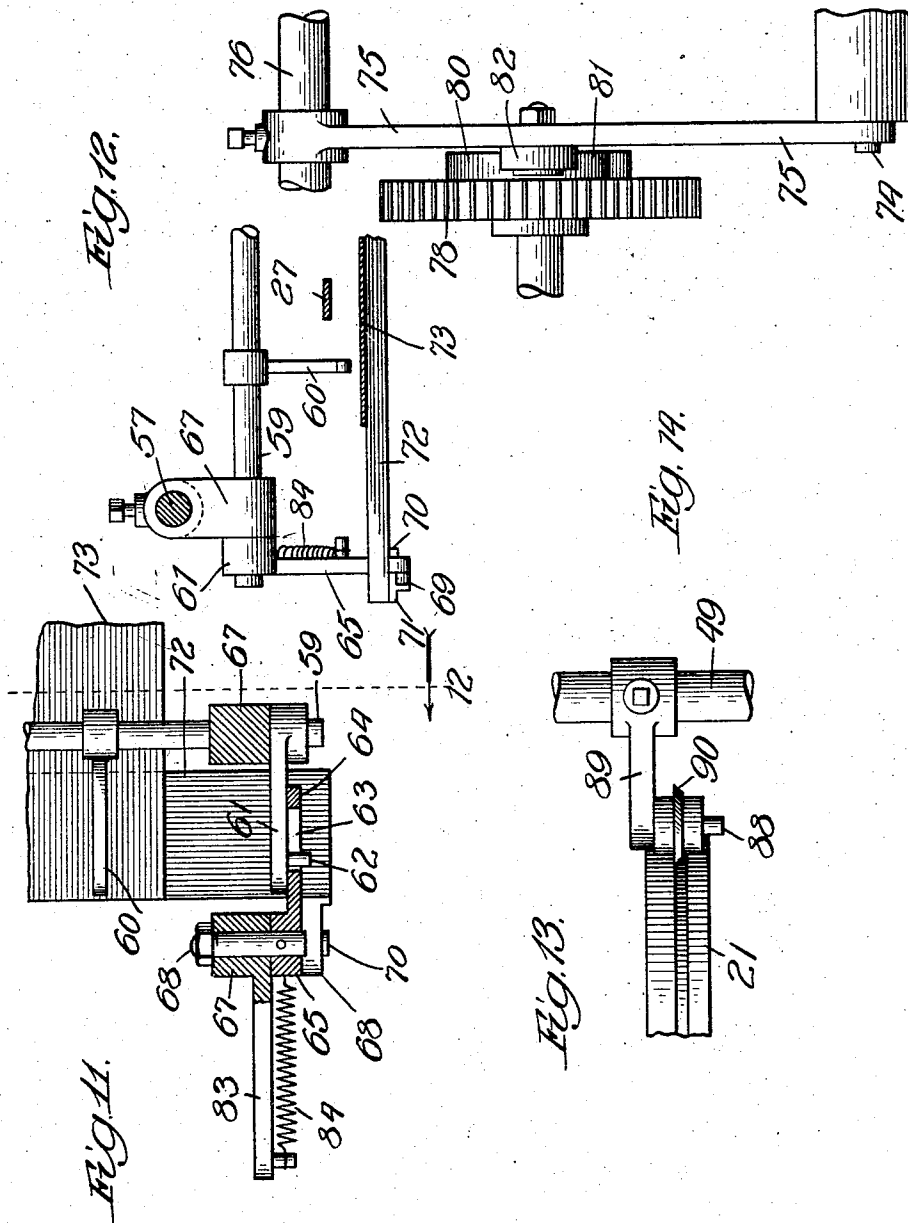
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5 SHEETS—SHEET 5.



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UNITED STATES PATENT OFFICE.

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SHEET-DELIVERY MECHANISM.

1,046,095.

Specification of Letters Patent.

Patented Dec. 3, 1912.

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To all whom it may concern:

Be it known that I, CYRUS A. McCAIN, a citizen of the United States, residing at Oak Park, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Sheet-Delivery Mechanism, of which the following is a specification.

I have devised my invention for use, more particularly, in connection with rotary printing-presses for carrying the printed sheets away from the presses, though it will be understood that it is not limited to this particular use; and my objects, generally stated, are to provide improvements in mechanisms of the character stated, whereby they will be better adapted to perform the functions for which they are provided; and, specifically, to provide novel and simple sheet-delivery mechanism which will be positive in operation regardless of the speed at which the press in connection with which it is employed, is operated; to provide improved means for arresting the impetus of the sheet when released from the delivery-mechanism; to provide in mechanisms of the character stated carrier-elements of a construction which will permit slitting of the sheets if desired, after their discharge from the press; and to provide novel and simple gripping-mechanism for engagement with the sheets.

My invention is illustrated in the accompanying drawings, in which—

Figure 1 is a broken view in plan of my improved sheet-delivery mechanism. Fig. 2 is a broken view in side elevation of the mechanism of Fig. 1 shown in connection with a printing-press and operating to receive the sheets of paper delivered from the press after the printing operation. Fig. 3 is a section taken at the line 3 on Fig. 2 and viewed in the direction of the arrow. Fig. 4 is an enlarged plan view of a portion of the sheet-carrying tapes equipped with grippers, one of which is shown. Fig. 5 is a view in side elevation of the construction illustrated in Fig. 4. Fig. 6 is an enlarged section taken at the line 6 on Fig. 4 and viewed in the direction of the arrow. Fig. 7 is a similar view taken at the line 7 on Fig. 4 and viewed in the direction of the arrow. Fig. 8 is a broken view in side elevation of one of the tape-carrying wheels showing a section of the tape carried thereby and one of the grippers on the latter, this view showing the means for actuating the grippers to

disengage the sheets from the delivery mechanism. Fig. 9 is a broken view in side elevation of the portion of the gripper shown at the right-hand side of Fig. 8, this view being taken from the opposite side. Fig. 10 is a view in elevation, partly sectional, of portions of the impression-roller, one of the wheels for supporting the sheet-carrying tapes, certain of the sheet-gripping mechanisms, and a slitter, the parts illustrated being shown in the positions they assume immediately preceding the release of the sheets from the impression-roller grippers. Fig. 11 is an enlarged section taken at the line 11 on Fig. 2 and viewed in the direction of the arrow. Fig. 12 is a section taken at the line 12 on Fig. 11 and viewed in the direction of the arrow. Fig. 13 is a plan view of the slitter-mechanism for slitting the sheets; and Fig. 14, an elevational view taken at the line 14 on Fig. 1 and viewed in the direction of the arrow.

As I have devised my invention for use more particularly in connection with rotary printing-presses as stated, I have illustrated it in this connection in the drawings, but as printing-presses of the rotary type are well known in the art, I have deemed it sufficient to illustrate only the impression-roller thereof, this roller being represented at 15 and containing a peripheral recess 16 extending from end to end thereof in which grippers 17, as is usual in printing-press constructions, are supported on a rock-shaft 18, to extend beyond the periphery of the roller 15 and clamp the paper against the latter, this rock-shaft being operatively connected with mechanism (not shown) but which is commonly provided for actuating the grippers 17 to alternately grip and release the paper operated on by the press for carrying it to and releasing it at a predetermined point of discharge.

Journaled in any suitable manner to extend parallel with and immediately below the roller 15, is a shaft 19 adapted to be driven, for the purpose hereinafter described, from the driving mechanism (not shown) of the press, which would mesh with a gear 20 on this shaft. The shaft 19 carries a plurality of peripherally flanged wheels 21 which are spaced apart as represented and the peripheries of which extend closely adjacent to the periphery of the roller 15. Extending parallel with the shaft 19 and spaced therefrom, is a non-

rotary shaft 22 which may be supported in any suitable manner and carries depending bell-cranks 23 spaced apart along this shaft and rigid therewith and of a number corresponding to the number of wheels 21. Piv-
 5 otally connected at the angle-section of each bell-crank is a depending link 24, in the lower ends of which stub-shafts 25 are se-
 10 cures, these stub-shafts affording journal supports for peripherally grooved wheels 26 which are of the same size as the wheels 21, correspond in number thereto, and are lined up with the wheels 21 as illustrated in Fig. 1. Extending about the wheels 21 and 26
 15 are endless tapes 27 preferably of flexible sheet-metal, which serve as supports for the sheets to be delivered from the roller 15, as hereinafter described, these tapes being adapted to be driven by the wheels 21 and in
 20 turn drive the wheels 26, the tapes 27 extending into the grooves in the peripheries of these wheels which latter are preferably provided with radially-extending pins 28 spaced apart an equal distance about their
 25 peripheries and cooperating with openings 29 in the tapes for insuring the positive drive of the latter, it being preferred that the tapes 27 be maintained in taut condition by means of springs 30 connected with the
 30 outer ends of the bell-cranks 23 and the links 24, these springs tending to swing the links 24, and consequently the wheels 26, to the left in Fig. 2.

In the operation of the machine, the sheets
 35 are received by the tapes 27 from the roller 15 and carried about the wheels 21 in the direction of the arrow in Fig. 2 to a position in which they extend over a jogger-board illustrated diagrammatically at 31, at which
 40 point they are released from the tapes to permit them to fall upon this board. To deliver the sheets from the roller 15 to the board 31, I provide grippers 32 which are mounted upon the tapes 27 and serve to re-
 45 leasably clamp the sheets at their forward edges to the tapes. The grippers for this purpose may be of any desirable construction, but I prefer to employ those shown, each of which comprises a pair of spaced
 50 plates 33 and 34 secured to the outer surface of the tapes 27 and provided with outwardly-extending lugs 35 and 36 respectively, to which levers 37 and 38 are pivoted as through the medium of a shaft 39 and a bolt
 55 40, respectively, the levers 37 and 38 being pivoted at their outer ends to the ends of a link 41, as represented at 42 and 43, the lever 38 being provided with a stop 44 adapted to engage with the outer surface of the
 60 tape when the gripper is open. Rigidly connected with the shaft 39 are fingers 45 and 46, the finger 45 being a sheet-gripping finger, and the finger 46 means through the medium of which the gripper is released as
 65 hereinafter described. In the construction

illustrated, each tape 27 is of a length equal to twice the periphery of the roller 15 and two of the grippers 32 are provided on each tape, the grippers on each tape being spaced apart from center to center a distance equal to one-half of the length of the tapes as
 70 illustrated in Fig. 2, the positions assumed by the grippers, when in closed and open condition, being those represented in Figs. 10 and 5 respectively. It will be noted that in
 75 both the open and closed positions, the levers 37 and 38 of the grippers extend to one side of their pivots 39 and 40, respectively, and that when the grippers are in open condition the fingers 45 are raised from the tapes (Fig. 5), whereas, when the grippers are in closed position, the fingers 45 bear against these
 80 tapes (Fig. 10).

The grippers 17 and 32 on the roller 15 and tapes 27, respectively, are so arranged as to
 85 cause one of the grippers 32 on each tape to be carried to points closely adjacent to the grippers 17 when the latter are at the lowermost point in their travel, viz. in the position at which they release the sheet, the
 90 grippers 17 and 32 being offset with relation to each other, in order to prevent the grippers from interfering with each other, the grippers 32 as they are moved to the position stated registering with the recess 16 into
 95 which they extend during a portion of their travel.

In the operation of the construction illustrated, each gripper 17, in clamping engagement with the forward edge of a sheet of
 100 paper represented at X, is caused to release its grip on the sheet by mechanism (not shown), but which is commonly provided in presses of this type, when the grippers 17
 105 are moved to a position in which their sheet-engaging portions 47 are at substantially the lowermost point of their travel; in other words, the sheet X is released from engagement with the grippers 17 immediately after
 110 moving to the right in Fig. 10 from the position therein shown. A moment before the grippers 17 have become released from the sheet 46, the fingers 45 of the grippers 32 adjacent to the grippers 17 are operated to
 115 cause them to clamp the forward edge of the sheet between the fingers 45 and the upper surface of the cooperating tapes 27 for transferring the sheets from the roller 15 to these tapes for delivery to the jogger-board 31. The preferred means for actuating the
 120 grippers 32 to cause them to clamp the sheet X, as stated, consist of arms 48 fixed on a stationary shaft 49 supported in any suitable manner, and presenting inclined surfaces 50. The arms 48 are spaced apart to
 125 cause them, when the grippers 32 are in open condition, as represented in Fig. 3, to extend into the path of movement of the pins 43 which extends laterally, as illustrated in Fig. 4, these arms 48, when engaged by 130

the pins 43, operating to swing the levers 37 and 38 and links 41 to the position illustrated in Fig. 10 for moving the fingers 45 into gripping engagement with the sheet X as therein illustrated, springs 51 connected with studs 52 on the lugs 35 intermediate the shafts 39 and the tapes 27, and with the pins 42, serving to force the fingers 45 against the sheet X with sufficient pressure to hold the latter firmly clamped between these fingers and the tapes 27, whereby, under the rotation of the wheels 21 and 26 and the travel of the tapes carried thereby as described, the sheet X is carried about the wheels 21 to a position in which it extends immediately above the jogger-board 31. At this point, it is designed that the sheet be released from engagement with the grippers 32 for permitting the sheet to drop to the board, the means illustrated for effecting such release being as follows: Each of the links 24 is provided with a depending rod 53 having extensions 54 on their upper ends containing arc-shaped slots 55 through which the bolts 56 for rigidly securing these rods to the links, extend, the lower ends of the rods 53 terminating at the peripheries of the adjacent wheels 26. The bars 53, which are provided of a number corresponding to the number of tapes 27, extend at their lower ends into the path of the trip-fingers 46 of the grippers 32, when the latter are in gripping position, as represented in Fig. 2, and thus, when these grippers, while in closed condition with a sheet gripped thereby as before stated, reach a point in their travel in which the fingers 46 engage with the bars 53, the grippers 32 are automatically swung from the gripping position represented in Fig. 2 to the open condition represented in Fig. 5, the springs 51 serving to releasably hold the grippers 32 open, with the stops 44 bearing against the outer surface of the tapes 27 carrying them. The sheet X is thus carried by the grippers 32 to a position immediately above the board 31, and thereupon released to permit it to fall.

As the tapes 27 travel at relatively great speed, means should be provided for arresting the impetus of the sheets when released from the grippers 32 as described, in order that they may become stacked on the board substantially uniformly. The means which I prefer to employ for this purpose are those illustrated, a description of which is as follows: Extending lengthwise of the tapes 27, but beyond them, at opposite sides thereof, are stationary rods 57 which may be supported in any suitable manner, these rods carrying sleeves 58 longitudinally adjustable thereon which afford bearings for a rod 59 extending transversely of, and between the upper and lower stretches of, the tapes 27, this shaft carrying a plurality of presser-

fingers 60, which are located in the spaces between the tapes 27, as illustrated in Fig. 1. Secured to the shaft 59 at its opposite ends are horizontally-disposed arms 61 which carry outwardly-extending pins 62 lying within elongated slots 63 provided on the horizontally-disposed arms 64 of bell-cranks 65 fulcrumed, as indicated at 66, to depending lugs 67 on the sleeves 58. The depending arms 68 of the bell-cranks 65 carry bar-sections 69 pivotally connected thereto as indicated at 70, and extending in a plane below the lower sections of the tapes 27 as illustrated in Fig. 2, these bars containing recesses 71 in their upper surfaces which form seats for a slat 72 rigidly secured thereto in any suitable manner, and to which one end of an apron 73, which may be of any suitable flexible material, such as canvas, is secured to extend lengthwise of the tapes 27, as illustrated in Fig. 1, the other end of the apron being wound upon a take-up shaft 74 supported in the lower ends of levers 75 rigidly secured at their upper ends, at points adjacent to the lateral edges of the apron, to a rock-shaft 76 journaled in any suitable manner on the machine.

The shaft 19 carries at one end a pinion 77 which meshes with a gear 78 fixed on a shaft 79 journaled in any suitable manner, and rigid with the gear 78 is a disk 80 which contains in its periphery a recess 81 and forms a cam. One of the levers 75 overlaps the disk 80 and carries a roller 82, which bears against the periphery of the disk 80 under spring-tension as hereinafter described, whereby, when the recess 81 in the disk 80 registers with the roller 82, the latter will enter this recess and permit the levers 75 to swing to the left in Fig. 2, for a purpose hereinafter stated. The sleeves 68 are provided with extensions 83 which form supports for spiral springs 84, the latter being connected at their opposite ends with the depending arms 68 of the bell-cranks 64. The tendency of the springs 84 is to swing the bell-cranks 65 to the left in Fig. 4, thereby depressing the arms 64 of the latter and, by reason of the pin and slot connection between these arms and the arms 61, causing the shafts 59 to be rotated in a direction to cause the fingers 60 to be swung downwardly against the sheet X on the apron 73. The apron 73 is adjusted, however, to such a position, as illustrated, as will cause the parts just described to assume the position illustrated in Fig. 2, namely that in which the fingers 60 are raised from the apron 73, during the time that the roller 83 is in engagement with the unbroken portion of the periphery of the disk 80. Thus when the recess 81 is moved to a position in which it registers with the roller 82, the apron 73 is allowed to shift to the left in Fig. 2 under the action of the spring 84, thereby

using the bell-cranks to swing downwardly at their portions 64, with the result of causing the fingers 60 to momentarily press against the tail-end of the sheet under it. The mechanism for controlling the rocking of the levers 75 is preferably so timed that the recess 81 will be brought into registration with the roller 82 for causing the fingers 60 to be momentarily depressed toward the apron 73 for gripping the tail-end of the sheet of paper being carried by the grippers 32, each time that a series of the grippers 32, with sheets clamped thereby, are carried to a position in which they engage with the rods 53 for releasing the sheets, it being preferred that the mechanism described be so timed as to cause the fingers 60 to grip the tail-ends of the sheets simultaneously with the release of the head-ends thereof from the grippers 32.

In the operation of the machine described, a small margin of the tail-end of the sheet rests upon the sheet-stopping means when the latter are actuated and thus as soon as the last referred to means are returned to normal position, viz. to a position in which the roller 83 engages with the unbroken portion of the periphery of the disk 80, they will be withdrawn from beneath the sheet and the latter will fall.

The mechanism for gripping the tail-ends of the sheets thus operates to arrest the impetus of the latter and the sheets released from the grippers 32 drop vertically upon the jogger-board 31 and thereby become stacked thereon in substantially uniformly superposed condition.

The apron 73 in addition to performing the function of a connector between the levers 75 and the mechanism for engaging with the tail-ends of the sheets operates as a support for the tail-ends of the sheets until they are released for discharge upon the jogger-board 31.

By supporting the grippers 32 directly on the tapes 27 and eliminating direct connections with the different tapes, I am enabled to slit the sheets of paper longitudinally after they have been released from the roller 15, and for this purpose provide co-operating disk-shaped cutter-elements 85 and 86, the disk 85, which is of the same diameter as the wheels 21, containing a peripheral groove 87, and being secured on the shaft 19. The disk 86 is journaled on a stud 88 projecting laterally from an arm 89 fixed upon the shaft 49, and is provided with a peripheral flange 90 which extends into the groove 87 in the disk 85 and co-operates therewith for slitting the sheets as they are passed between these cutter-elements in the operation of the machine as hereinbefore described.

The provision of the adjustable sleeves 53 serves to permit the means for gripping the

end-portions of the sheets to be adjusted for accommodating the machine to different lengths of sheets.

While I have illustrated and described a specific form of machine, I do not wish to be understood as intending to limit my invention to its embodiment in such construction, as the same may be variously changed and altered without departing from the spirit of my invention.

What I claim as new, and desire to secure by Letters Patent, is—

1. In mechanism of the character described, the combination of two sets of aligning wheels spaced apart, endless tapes mounted on said wheels to travel in an endless path, grippers carried by said tapes, said sheet-grippers being arranged in a series extending transversely of the movement of said tapes and operating to grip a sheet at various points across its front end, gripper-actuating means in the path of movement of said grippers, and paper-slitting mechanism comprising a pair of cutter-disks one of which is operatively connected with the wheels of one set thereof to rotate with the wheels and extend on one side of the sheet advanced by the grippers, and the other of which is at the other side of the sheet, whereby as the sheet is advanced it travels between the members of said slitting means, for the purpose set forth.

2. In mechanism of the character set forth, the combination with means for moving the sheet, and a support upon which the sheet is to be deposited, of means for stopping the sheet comprising relatively movable co-operating members supported respectively above and below the path of movement of the sheet and above said support during the movement of the sheet to and between said members and arranged in a series extending transversely of said path to grip the sheet at various points between its edges at the tail end of the sheet, and spring-controlled operating means therefor.

3. In mechanism of the character set forth, the combination with means for moving a sheet, and a support upon which the sheet is to be deposited, of means for stopping the sheet comprising co-operating members supported respectively above and below the path of movement of the sheet and above said support during the movement of the sheet to and between said members and arranged in a series extending transversely of said path of movement for gripping the sheet at various points between its edges at the tail end of the sheet, certain of said members being movable toward and away from the others thereof, and spring-controlled means for actuating said movable members to perform the gripping function.

4. In mechanism of the character set forth, the combination with means for mov-

ing a sheet, and a support upon which the sheet is to be deposited, of means for stopping the sheet comprising cooperating members, supported respectively above and below the path of movement of the sheet and above said support during the movement of the sheet to and between said members and arranged in a series extending transversely of said path for gripping the sheet at various points between its edges at the tail end of the sheet, certain of said members being pivotally supported fingers movable toward and away from the other of said members, and spring-controlled means for moving said fingers toward the other of said members for performing the gripping function.

5. In a machine of the character set forth, the combination of a traveling endless sheet-gripper support equipped with gripper-mechanism for engaging with the sheet and advancing it, means for disengaging the gripper-mechanism from the sheet, a support upon which the sheet is to be deposited, and means for stopping the sheet when released from said gripper-mechanism comprising relatively-movable cooperating members supported respectively above and below the path of movement of the sheet and above said last-named support during the movement of the sheet to and between said members and arranged in a series extending transversely of said path to grip the sheet at various points between its edges at the tail end of the sheet, and spring-controlled operating means therefor.

6. In a machine of the character set forth, the combination of a traveling endless sheet-gripper support equipped with gripper mechanism for engaging with the sheet and advancing it, means for disengaging said gripper-mechanism from the sheet, a support upon which the sheet is to be deposited, and means for stopping the sheet when released from said gripper-mechanism comprising cooperating members supported respectively above and below the path of movement of the sheet and above said last-named support during the movement of the sheet to and between said members and arranged in a series extending transversely of said path of movement for gripping the sheet at various points between its edges at the tail end of the sheet, certain of said members being movable toward and away from the others thereof, and spring-controlled means for actuating said movable members to perform the gripping function.

7. In a machine of the character set forth, the combination of a traveling endless sheet-gripper support equipped with gripper-mechanism for engaging with the sheet and advancing it, means for disengaging the gripper mechanism from the sheet, a support upon which the sheet is to be de-

posited, and means for stopping the sheet comprising cooperating members supported respectively above and below the path of movement of the sheet and above said last-named support during the movement of the sheet to and between said members and arranged in a series extending transversely of said path for gripping the sheet at various points between its edges at the tail end of the sheet, certain of said members being pivotally supported fingers movable toward and away from the other of said members, and spring-controlled means for moving said fingers toward the other of said members for performing the gripping function.

8. In mechanism of the character set forth, the combination of means for moving a sheet, a shiftable apron below said means and serving to support the sheet, and means operatively connected with the apron and operated by shifting the latter for engaging with the tail-end of the sheet, for the purpose set forth.

9. In mechanism of the character set forth, the combination of means for moving the sheet, a shiftable apron below said means and serving to support the sheet, and means operatively connected with said apron and operated by shifting the latter for clamping the tail-end of the sheet to said apron, for the purpose set forth.

10. In mechanism of the character set forth, the combination of means for moving a sheet, a shiftable apron below said means and serving to support the sheet, means operatively connected with said apron and operated by shifting the latter for engaging with the sheet to stop it, and means for shifting said apron.

11. In mechanism of the character set forth, the combination of means for moving the sheet, a shiftable apron serving to support the sheet, means operatively connected with said apron and operated by shifting the latter for clamping the tail-end of the sheet to said apron to stop the sheet, and means for shifting said apron.

12. In mechanism of the character set forth, the combination of means for moving the sheet, and means for stopping the sheet comprising a movable member, an apron located below the path of movement of said sheet and said movable member, and means for operating said movable member to move it toward said apron for gripping the sheet between the latter and said movable member, for the purpose set forth.

13. In mechanism of the character set forth, the combination of means for moving a sheet, and means for stopping the sheet comprising a rock-finger, an apron located below the path of movement of said sheet and beneath said finger, means cooperating with said apron for normally holding said finger out of the path of movement of the

sheet, and means for rocking said finger toward the sheet to grip the latter between said finger and apron, for the purpose set forth.

14. In mechanism of the character set forth, the combination of means for moving sheets, and means for stopping the sheets comprising a gripper-device adapted to engage with the tail-ends of the sheets, means tending to move said device into the path of movement of the sheets, a shiftable apron located below the sheets and connected in operative relation to said device and operating, when shifted in one direction, to hold said gripper-device out of the path of movement of the sheets and against the resistance of said last-named means, and means operating intermittently to shift said apron to a position in which it will cause said gripper-device to extend out of the path of movement of the sheets, for the purpose set forth.

15. In mechanism of the character set forth, the combination of means for moving sheets, and means for stopping the sheets comprising a gripper-device adapted to engage with the tail-ends of the sheets, means tending to move said device into the path of movement of the sheets, a shiftable apron located below the sheets and connected in operative relation to said device and operating, when shifted in one direction, to hold said device out of the path of movement of the sheets and against the resistance of said last-named means, a shiftable lever connected with said apron for shifting the latter, and means for intermittently shifting said lever, for the purpose set forth.

16. In mechanism of the character set forth, the combination of means for moving sheets, and means for stopping the sheets comprising a gripper-device adapted to engage with the tail-ends of the sheets, means tending to move said device into the path of movement of the sheets, a shiftable apron located below the sheets and connected in operative relation with said device and operating, when shifted in one direction, to hold said device out of the path of movement of the sheets against the resistance of said last-named means, a shiftable device connected with said apron for shifting the latter, and cam-mechanism for intermittently shifting said shiftable device, for the purpose set forth.

17. In mechanism of the character set forth, the combination of means for moving sheets, and means for stopping the sheets comprising an apron located beneath the sheets, a movable finger connected in operative relation to said apron and adapted to be moved toward the latter for gripping the sheets between said apron and finger, means tending to move said finger into gripping engagement with the sheets, said apron op-

erating, when shifted in one direction, to hold said finger out of the path of movement of the sheets and against the resistance of said last-named means, and means operating intermittently to shift said apron to a position in which it will cause said finger to extend out of the path of movement of the sheets, for the purpose set forth.

18. In mechanism of the character set forth, the combination of means for moving sheets, and means for stopping the sheets comprising a shiftable apron serving to support the sheets, means operatively connected with said apron and operating, when the latter is shifted, to engage with the sheets, a swingingly-mounted lever connected with one end of the apron, and cam-mechanism operating to intermittently shift said lever and apron, for the purpose set forth.

19. In mechanism of the character set forth, the combination of means for moving sheets, and means for stopping the sheets comprising a swingingly-supported bell-crank lever, a rock-finger located above the sheets, means connecting said finger with said bell-crank for rocking the finger against the sheet below it when the bell-crank is swung in one direction, a spring tending to move said bell-crank in a direction for moving said finger into the path of movement of the sheets, a shiftable apron connected with said bell-crank, and means operating intermittently for shifting said apron to swing said bell-crank against the resistance of said spring, for the purpose set forth.

20. In mechanism of the character set forth, the combination of means for moving sheets, and means for stopping the sheets comprising pivotally supported bell-cranks, a rock-finger located above the path of movement of said sheets, an arm operatively connected with said finger, connections between said arm and one of the bell-cranks operating to depress said finger into the path of movement of the sheet below it when the bell-crank is swung in one direction, a spring tending to swing said bell-crank in a direction for depressing said finger into the path of movement of the sheets, a shiftable apron connected with said bell-cranks and operating, when shifted in one direction, to swing the bell-cranks against the resistance of said spring, and means operating intermittently to shift said apron against the resistance of said spring for the purpose set forth.

21. In mechanism of the character set forth, the combination of means for moving sheets, and means for stopping the sheets comprising a rock-shaft, fingers secured to said shaft above the path of movement of the sheets, arms connected with said shaft and equipped with pins, pivotally supported bell-cranks containing slots into which said pins extend, spring-means tending to swing

said bell-cranks upon their pivots for depressing said fingers into the path of movement of the sheets, an apron connected with said bell-cranks and located below said fingers for coöperation with the latter for clamping the sheets and serving, when shifted in one direction, to swing said bell-cranks against the resistance of said spring-means for raising said fingers out of the path of movement of the sheets, and means for intermittently shifting said apron against the resistance of said spring-means, for the purpose set forth.

22. In a machine of the character described, the combination of a traveling endless sheet-gripper support equipped with gripper-mechanism for engaging with a sheet and advancing it, means for disengaging the gripper-mechanism from the sheet, a shiftable apron serving to support the sheet, and means operatively connected with the apron and operated by shifting the latter for engaging with the tail-end of the sheet to arrest its impetus when released from said gripper-mechanism.

23. In a machine of the character described, the combination of a traveling endless sheet-gripper support equipped with gripper-mechanism for engaging with the sheet and advancing it, means for disengaging the gripper-mechanism from the sheet, a shiftable apron serving to support the sheet, and means operatively connected with the apron and operated by shifting the latter, for clamping the tail-end of the sheet to said apron to arrest its impetus when released from said gripper-mechanism.

24. In a machine of the character described, the combination of a traveling endless sheet-gripper support equipped with gripper-mechanism for engaging with a sheet and advancing it, means for disengaging the gripper-mechanism from the sheet, a shiftable apron serving to support the sheet, means operatively connected with said apron and operated by shifting the latter for engaging with the sheet to arrest its impetus when released from said gripper-mechanism, and means for shifting said apron.

25. In a machine of the character described, the combination of a traveling endless sheet-gripper support equipped with gripper-mechanism for engaging with a sheet and advancing it, means for disengaging the gripper-mechanism from the sheet, a shiftable apron serving to support the tail-end of the sheet, means operatively connected with the apron and operated by shifting the latter, for clamping the tail-end of the sheet to said apron to arrest its impetus when released from said gripper-mechanism, and means for shifting the apron.

26. In a machine of the character de-

scribed, the combination of a traveling endless sheet-gripper support equipped with gripper-mechanism for engaging with a sheet, means for disengaging the gripper-mechanism from the sheet, and means for arresting the impetus of the sheet when released from the gripper-mechanism comprising a movable member, an apron located below said support and sheet and beneath said movable member, and means for operating said movable member to move it toward said apron for gripping the sheet between the latter and said movable member, for the purpose set forth.

27. In a machine of the character described, the combination of a traveling endless sheet-gripper support equipped with gripper-mechanism for engaging with a sheet and advancing it, means for disengaging the gripper-mechanism from the sheet, and means for arresting the impetus of the sheet when released from the gripper-mechanism, comprising a rock-finger, an apron located below the sheet and beneath said finger, means for normally holding said finger out of the path of movement of the sheet, and means for rocking said finger toward the sheet to grip the latter between said finger and apron, for the purpose set forth.

28. In a machine of the character described, the combination of a traveling endless sheet-gripper support equipped with gripper-mechanism for engaging with the sheets and advancing them, means for disengaging the gripper-mechanism from the sheets, and means for arresting the impetus of the sheets when released from the gripper-mechanism, comprising a gripper-device adapted to engage with the tail-ends of the sheets, means tending to move said device into the path of movement of the sheets, a shiftable apron located below the sheets and connected in operative relation to said device and operating, when shifted in one direction, to hold said gripper-device out of the path of movement of the sheets and against the resistance of said last-named means, and means operating intermittently to shift said apron to a position in which it will cause said gripper-device to extend out of the path of movement of the sheets, for the purpose set forth.

29. In a machine of the character described, the combination of a traveling endless sheet-gripper support equipped with gripper-mechanism for engaging with the sheets and advancing them, means for disengaging the gripper-mechanism from the sheet, and means for arresting the impetus of the sheets when released from the gripper-mechanism, comprising a gripper-device adapted to engage with the tail-ends of the sheets, means tending to move said device into the path of movement of the sheets, a shiftable apron located below the sheets and

connected in operative relation to said device and operating, when shifted in one direction, to hold said device out of the path of movement of the sheets and against the resistance of said last-named means, a shiftable lever
5 connected with said apron for shifting the latter, and means for intermittently shifting said lever, for the purpose set forth.

30. In a machine of the character described, the combination of a traveling endless sheet-gripper support equipped with gripper-mechanism for engaging with the sheets and advancing them, means for disengaging the gripper-mechanism from the sheet, and means for arresting the impetus
15 of the sheets when released from the gripper-mechanism, comprising a gripper-device adapted to engage with the tail-ends of the sheets, means tending to move said device into the path of movement of the sheets, a shiftable apron located below the sheets and connected in operative relation to said device and operating, when shifted in one direction, to hold said device out of the path of
20 movement of the sheets against the resistance of said last-named means, a shiftable device connected with said apron for shifting the latter, and cam-mechanism for intermittently shifting said shiftable device, for the purpose set forth.

31. In a machine of the character described, the combination of a traveling endless sheet-gripper support equipped with gripper-mechanism for engaging with the sheets and advancing them, means for disengaging the gripper-mechanism from the sheets, and means for arresting the impetus
35 of the sheets when released from the gripper-mechanism, comprising an apron located beneath the sheets, a movable finger connected in operative relation to said apron and adapted to be moved toward the latter for gripping the sheets between said apron and finger, means tending to move said finger
40 into gripping engagement with the sheets, said apron operating, when shifted in one direction, to hold said finger out of the path of movement of the sheets and against the resistance of said last-named means, and means operating intermittently to shift said apron to a position in which it will cause said finger to extend out of the path of movement of the sheets, for the purpose set forth.

32. In a machine of the character described, the combination of a traveling endless sheet-gripper support equipped with gripper-mechanism for engaging with the sheets and advancing them, means for disengaging the gripper-mechanism from the sheets, and means for arresting the impetus
60 of the sheets when released from the gripper-mechanism, comprising a shiftable apron serving to support the sheets, means operatively connected with said apron and

operating, when the latter is shifted, to engage with the sheets, a swingingly-mounted lever connected with one end of the apron, and cam mechanism operating to intermittently shift said lever and apron, for the purpose set forth. 70

33. In a machine of the character described, the combination of a traveling endless sheet-gripper support equipped with gripper-mechanism for engaging with the sheets and advancing them, means for disengaging the gripper-mechanism from the sheets, and means for arresting the impetus
75 of the sheets when released from the gripper-mechanism, comprising a swingingly-supported bell-crank lever, a rock-finger located above the sheets, means connecting said finger with said bell-crank for rocking the finger against the sheet below it when the bell-crank is swung in one direction, a spring tending to swing said bell-crank in a direction for moving said finger into the path of movement of the sheets, a shiftable apron connected with said bell-crank, and means operating intermittently for shifting
90 said apron to swing said bell-crank against the resistance of said spring, for the purpose set forth.

34. In a machine of the character described, the combination of a traveling endless sheet-gripper support equipped with gripper-mechanism for engaging with the sheets and advancing them, means for disengaging the gripper-mechanism from the sheets, and means for arresting the impetus
95 of the sheets when released from the gripper-mechanism, comprising pivotally-supported bell-cranks, a rock-finger located above said sheets, an arm operatively connected with said finger, connections between said arm and one of the bell-cranks operating to move said finger toward the apron and into the path of movement of the sheet below it when the bell-crank is swung in one direction, a spring tending to swing
110 said bell-crank in the direction for moving said finger into the path of movement of the sheets, a shiftable apron connected with said bell-cranks and operating, when shifted in one direction, to swing the bell-cranks against the resistance of said spring, and means operating intermittently to shift said apron against the resistance of said spring, for the purpose set forth. 115

35. In a machine of the character described, the combination of a traveling endless sheet-gripper support equipped with gripper-mechanism for engaging with the sheets and advancing them, means for disengaging the gripper-mechanism from the sheets, and means for arresting the impetus
120 of the sheets when released from the gripper-mechanism, comprising a rock-shaft, fingers secured to said shaft above the path of movement of the sheets; an arm connected 130

with said shaft and equipped with a pin, a pivotally-supported bell-crank containing a slot into which said pin extends, spring-means tending to swing said bell-crank upon its pivot for depressing said fingers into the path of movement of the sheets, an apron connected with said bell-crank and located below said fingers for coöperation with the latter for clamping the sheets and serving, when shifted in one direction, to swing said bell-crank against the resistance of said spring-means for raising said fingers out of the path of movement of the sheets, and means for intermittently shifting said apron against the resistance of said spring-means, for the purpose set forth.

36. In mechanism of the character described, the combination with an endless traveling sheet-support, of a gripper connected with said support and formed of a pair of pivotally supported levers spaced apart and each directly secured to said support and provided with a sheet-gripping finger and a trip-device, a link connecting said levers together eccentrically of their pivots, and spring means tending to hold said grippers in shifted position.

37. In mechanism of the character described, the combination with an endless traveling sheet-support, of a gripper connected with said support and formed of a pair of pivotally supported levers each directly connected with said support, a link connecting said levers together, a sheet-gripping finger and a trip-device connected with one of said levers, a trip-device connected with the other of said levers, and a spring tending to hold said levers in shifted position when shifted in either direction.

38. In mechanism of the character described, the combination of means for moving a sheet, and means for stopping the sheet comprising coöperating members supported respectively above and below the path of movement of the sheet and arranged in a series extending transversely of said path for gripping the sheet at various points between its edges at the rear end of the sheet and between which members the sheet moves, certain of said members being rock-fingers, means for normally holding said fingers out of clamping engagement, and spring-means for rocking said fingers into clamping engagement with the sheet when the means for holding said fingers out of clamping engagement are released, for the purpose set forth.

39. In mechanism of the character set forth, the combination of means for moving a sheet, and means for stopping the sheet comprising gripper-mechanism formed of coöperating members, one of which is movable toward the other thereof and adapted to engage with the tail-end of a sheet, means tending to move said movable member into

the path of movement of the sheet, a shiftable member connected in operative relation to said movable member and operating, when shifted in one direction, to hold said movable member out of the path of movement of the sheet and against the resistance of said last-named means, and means for shifting said shiftable device to a position in which it will cause said movable member to extend out of the path of movement of the sheet and releasably hold said shiftable device in such position, for the purpose set forth.

40. In mechanism of the character set forth, the combination of means for moving sheets, and means for stopping the sheets comprising gripper-mechanism formed of coöperating members one of which is movable toward and away from the other thereof and adapted to engage with the tail-ends of the sheets, means tending to move said movable member into the path of movement of the sheets, a shiftable member connected in operative relation to said movable member and operating, when shifted in one direction, to hold said movable member out of the path of movement of the sheets and against the resistance of said last-named means, and means operating intermittently to shift said shiftable member to a position in which it will cause said movable member to extend out of the path of movement of the sheets, for the purpose set forth.

41. In mechanism of the character set forth, the combination of means for moving sheets, and means for stopping the sheets comprising gripper-mechanism formed of coöperating members one of which is movable toward and away from the other thereof and adapted to engage with the tail-ends of the sheets, means tending to move said movable member into the path of movement of the sheets, a shiftable member connected in operative relation to said movable member and operating, when shifted in one direction, to hold said movable member out of the path of movement of the sheets and against the resistance of said last-named means, a shiftable lever connected with said shiftable member for shifting the latter, and means for intermittently shifting said lever, for the purpose set forth.

42. In mechanism of the character set forth, the combination of means for moving sheets, and means for stopping the sheets comprising gripper-mechanism formed of coöperating members one of which is movable toward and away from the other thereof and adapted to engage with the tail-ends of the sheets, means tending to move said movable member into the path of movement of the sheets, a shiftable member connected in operative relation to said movable member and operating when shifted in one direction to hold said movable member out of

the path of movement of the sheets against the resistance of said last-named means, a shiftable device connected with said shiftable member for shifting the latter, and cam-mechanism for intermittently shifting said shiftable device, for the purpose set forth.

43. In mechanism of the character set forth, the combination of means for moving sheets, and means for stopping the sheets comprising gripper-mechanism formed of cooperating members one of which is a finger movable toward and away from the other member thereof and adapted to grip the tail-ends of the sheets between them; a shiftable member connected in operative relation with said finger, means tending to move said finger into gripping engagement with the sheets, said shiftable member operating, when shifted in one direction, to hold said finger out of the path of movement of the sheets and against the resistance of said last-named means, and means operating intermittently to shift said shiftable member to a position in which it will cause said finger to extend out of the path of movement of the sheets, for the purpose set forth.

44. In a machine of the character set forth, the combination of means for moving sheets, and means for stopping the sheets comprising gripper-mechanism formed of cooperating members one of which is movable toward and away from the other thereof and adapted to grip between them the tail-ends of the sheets, a shiftable member connected with said gripper-mechanism and operating, when shifted, to move said movable member toward its said cooperating member for engagement with a sheet, a swingingly mounted lever connected with one end of said shiftable member, and cam-mechanism operating intermittently to shift said lever and said shiftable member, for the purpose set forth.

45. In mechanism of the character set forth, the combination of means for moving sheets, and means for stopping the sheets comprising a swingingly-supported bell-crank lever, gripper-members, one of which is a rock-finger located above the sheets and movable toward and away from the other of said members, means connecting said finger with said bell-crank for rocking the finger against the sheet below it when the bell-crank is swung in one direction, a spring tending to swing said bell-crank in a direction for moving it into the path of movement of the sheets, a shiftable member connected with said bell-crank, and means operating intermittently for shifting said shiftable member to swing said bell-crank against the resistance of said spring, for the purpose set forth.

46. In mechanism of the character set forth, the combination of means for moving

sheets, and means for stopping the sheets comprising pivotally-supported bell-cranks, gripper-members one of which is a rock-finger located above said sheets and movable toward and away from the other of said members, an arm operatively connected with said finger, connections between said arm and one of said bell-cranks operating to move said finger toward the other of said gripper-members and into the path of movement of the sheet below it when the bell-crank is swung in one direction, a spring tending to swing said bell-crank in the direction for moving said finger into the path of movement of the sheets, a shiftable member connected with said bell-cranks and operating, when shifted in one direction, to swing the bell-cranks against the resistance of said spring, and means operating intermittently to shift said shiftable member against the resistance of said spring, for the purpose set forth.

47. In mechanism of the character set forth, the combination of means for moving sheets, and means for stopping the sheets comprising a rock-shaft, gripper-members between which the sheets are passed, certain of said gripper-members being fingers secured to said shaft above the path of movement of the sheets, and arms connected with said shaft and equipped with a pin, a pivotally-supported bell-crank containing a slot into which said pin extends, spring-means tending to swing said bell-crank upon its pivot for depressing said fingers into the path of movement of the sheets, a shiftable member connected with said bell-crank and operating, when shifted in one direction, to swing said bell-crank against the resistance of said spring-means for raising said fingers out of the path of movement of the sheets, and means for intermittently shifting said shiftable member against the resistance of said spring-means, for the purpose set forth.

48. In mechanism of the character set forth, the combination with means for moving a sheet, of means for stopping the sheet comprising three or more pairs of cooperating members supported at a corresponding number of points, respectively, above and below the path of movement of the sheet intermediate the paths through which the lateral edges of the sheet move, one of said members being movable toward and away from the other thereof, means tending to move said movable member toward its cooperating member, and means operating to normally hold said movable member in raised position against the resistance of said first-named means, for the purpose set forth.

49. In mechanism of the character set forth, the combination of spaced rotating members, a series of endless traveling members spaced apart and supported on said rotating members and not less than four in

number, sheet-grippers carried by said members, and arranged to render the space between intermediate ones of said second-named members unobstructed, gripper-actuating means in the path of movement of said grippers, means for slitting the sheet comprising coöperating members arranged on opposite sides of the path of movement of the sheet and located in said unobstructed space between said endless members, and means for stopping the slit-sections of the

sheet comprising relatively movable members arranged respectively above and below the path of movement of the sheet and disposed in a series extending transversely of said path for gripping said slit-sheet sections.

CYRUS A. McCAIN.

In presence of—

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