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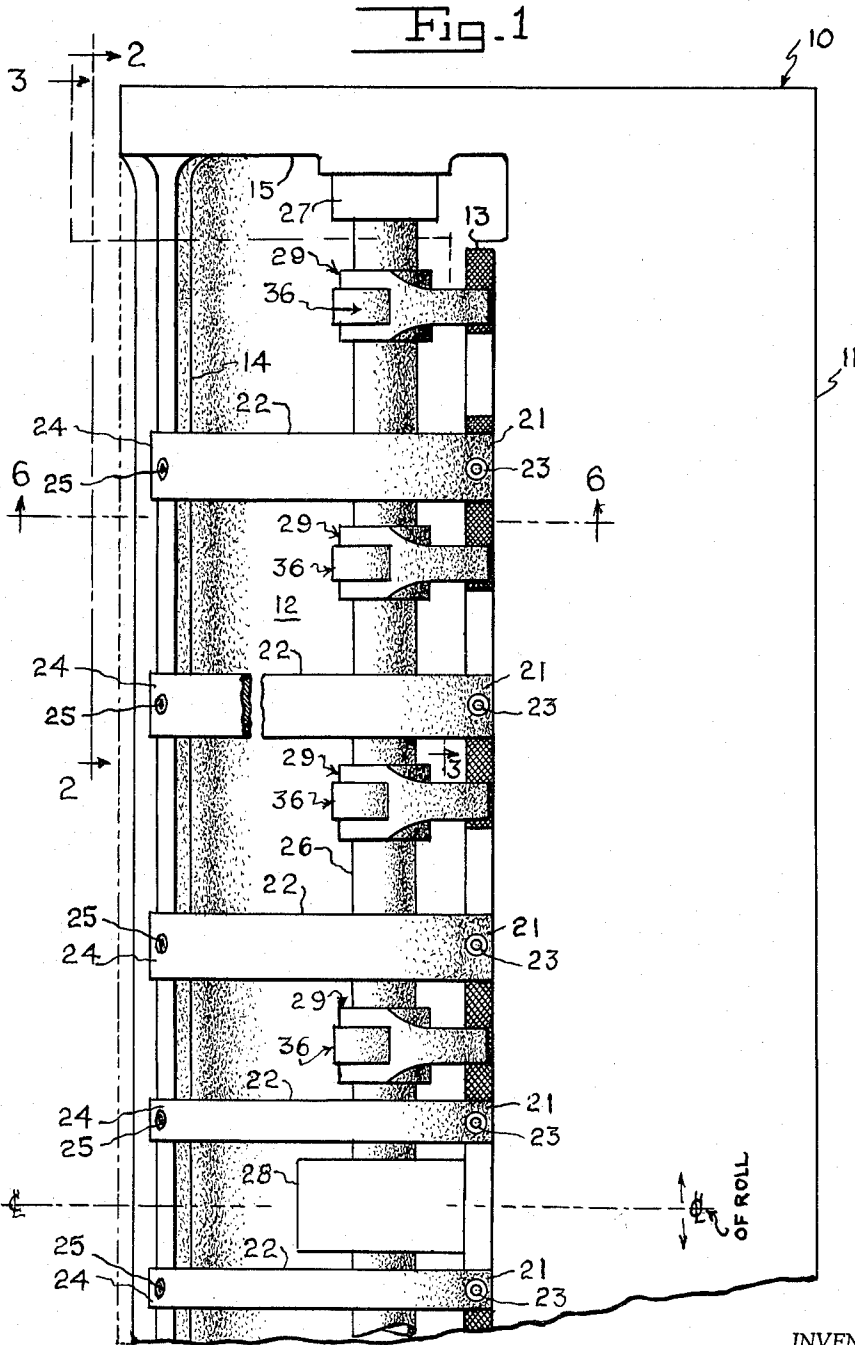
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3,163,558

COMBINED SHEET SUPPORT ROLL AND SHEET GRIPPER ASSEMBLY

Filed April 9, 1962

3 Sheets-Sheet 1



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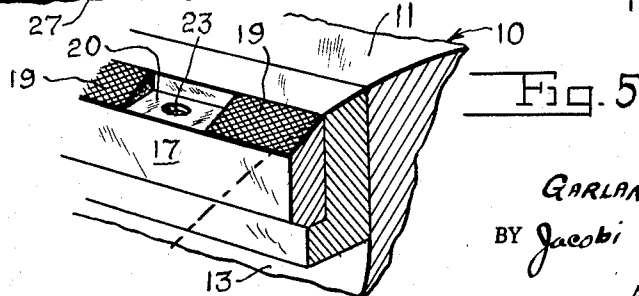
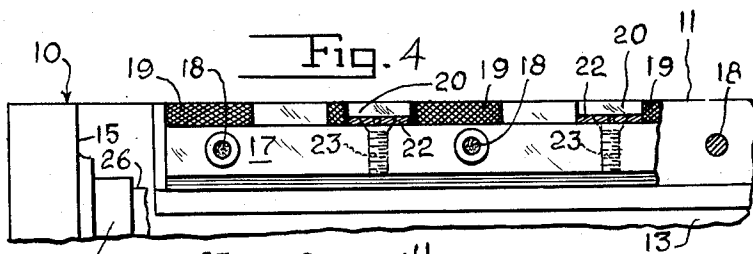
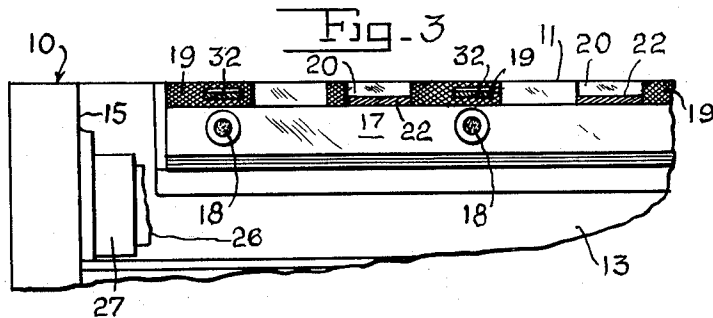
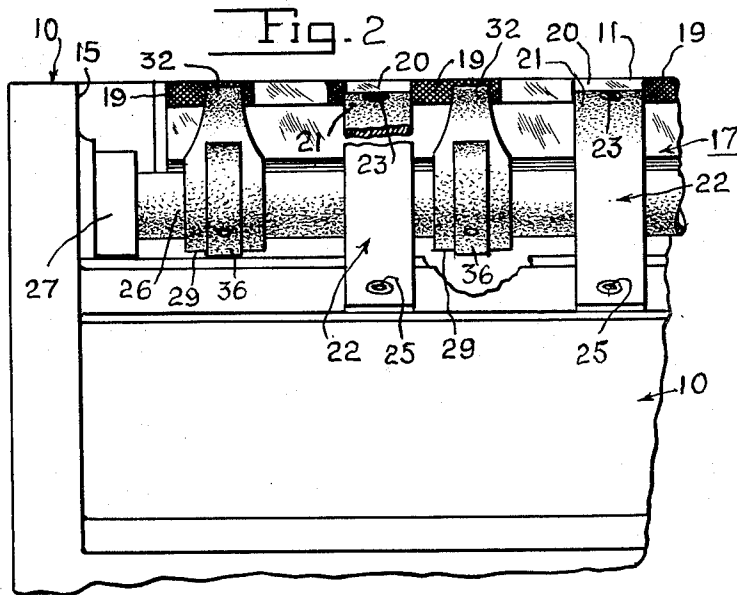
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3 Sheets-Sheet 2



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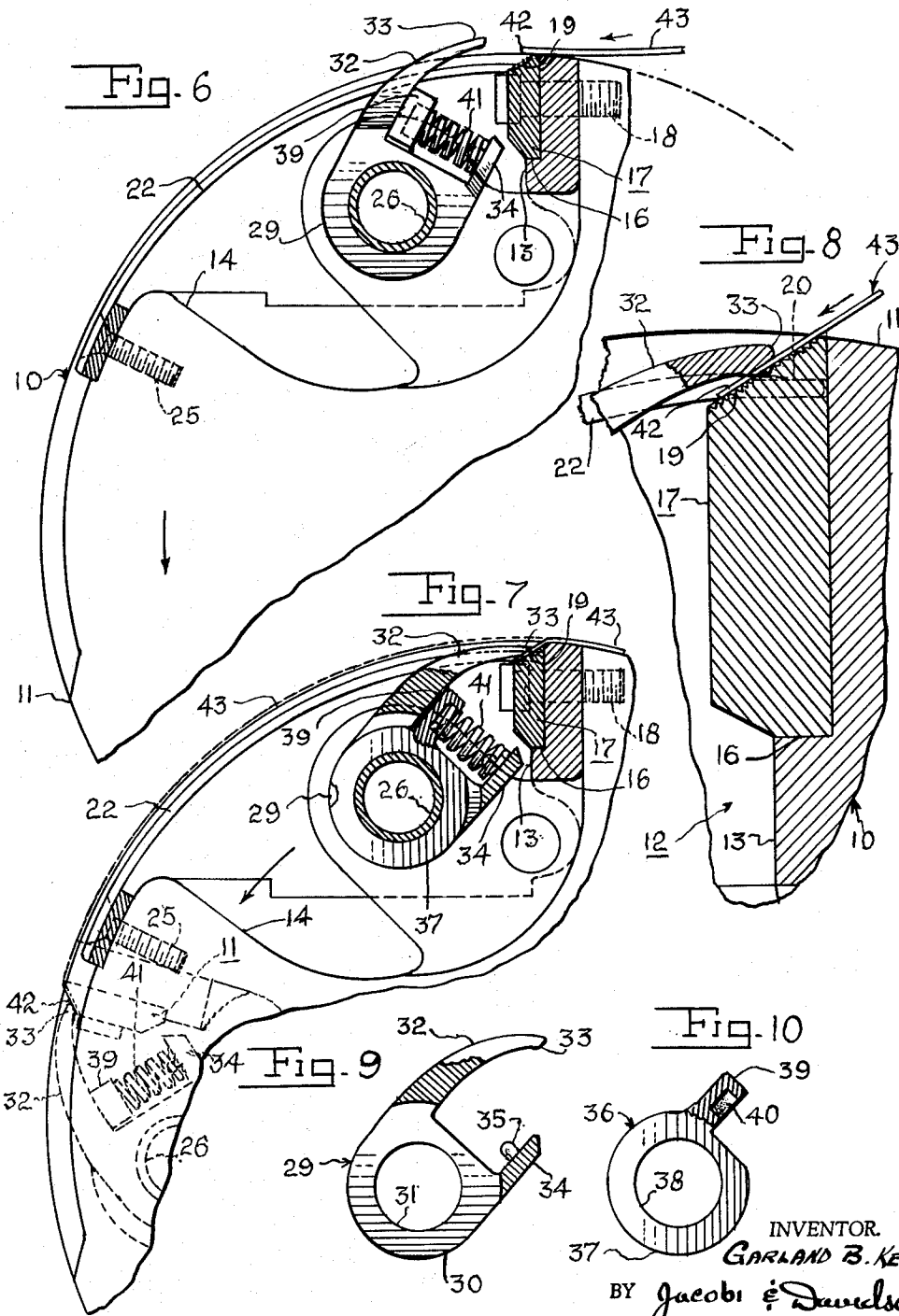
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COMBINED SHEET SUPPORT ROLL AND SHEET GRIPPER ASSEMBLY

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3 Sheets-Sheet 3



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COMBINED SHEET SUPPORT ROLL AND SHEET GRIPPER ASSEMBLY

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This invention relates to material handling and more particularly to a combined sheet supporting roll and sheet gripper assembly for use in feeding sheets of flexible material in contact with the surface of a roll.

Gripper means have, heretofore, been utilized for feeding sheets in contact with rolls, particularly in the printing art and in general, these devices consisted of a roll having gripper fingers mounted thereon and in which the ends of the fingers engaged the sheets of flexible material and clamp the same to the surface of the roll. Since it was necessary for the gripper fingers to engage the outer surface of the flexible sheets, obviously some portion of the gripper fingers, of necessity, projected outwardly of the circumference of the roll and where the roll was of the type which during operation contacted another roll, it was necessary to provide clearance recesses in the surface of the other roll to accommodate the projecting portions of the gripper fingers. Such an arrangement was perfectly satisfactory in the printing art where the presence of the clearance notches or openings presented no problem and in fact, in certain instances, such notches or openings could be advantageously utilized for other purposes.

Prior art gripper constructions could not, however, be utilized in certain types of apparatus in which the sheet of material engaged by the grippers and supported on the surface of the roll was engaged by a coating roll for the purpose of applying a coating of plastic or other material thereto. In such an operation it is necessary to maintain a uniform thickness of coating material on the surface of the coating roll and this is normally accomplished by the use of a doctor blade and if the coating roll were provided with recesses or openings for providing clearance for the gripper fingers on the contacting roll, the doctor blade would operate to force coating material into such recesses or openings thereby resulting in a waste of material, fouling of the machine with a consequent loss of time resulting from the necessity of cleaning the coating material from the recesses. Consequently, for this type of an operation it is necessary to provide gripper means in conjunction with a roll for supporting sheets of flexible material in which it is not necessary to provide clearance notches or openings for the gripper fingers in an engaging coating or other type of roll and the instant invention provides an apparatus for accomplishing this purpose.

It is accordingly an object of the invention to provide a combined sheet supporting roll and sheet gripper assembly in which the gripper assembly during operation retracts entirely within the circumference of the roll.

A further object of the invention is the provision of a combined sheet supporting roll and sheet gripper assembly in which the leading edge of a sheet of flexible material is firmly clamped in position by the gripper assembly, no portion of such assembly projecting outwardly of the circumference of the roll.

A still further object of the invention is the provision of a combined sheet supporting roll and sheet gripper assembly in which a longitudinally extending recess is provided in the roll for accommodating the gripper assembly and in which a beveled sheet engaging surface is provided adjacent one edge of the recess and gripper fingers engaged the leading edge of a sheet of material and clamp

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the same in engagement with the sheet engaging surface and with the leading edge of sheet material bent inwardly of the circumference of the roll.

Another object of the invention is the provision of a combined sheet supporting roll and sheet gripper assembly in which the gripper assembly operates to yieldably clamp the leading edge of a sheet of flexible material in position on the roll.

Further objects and advantages of the invention will be apparent from the following description taken in conjunction with the accompanying drawings wherein:

FIG. 1 is an elevational view showing a portion of a sheet supporting roll, together with a gripper assembly installed thereon;

FIG. 2 a sectional view taken substantially on the line 2-2 of FIG. 1 and showing the arrangement of the gripping fingers together with the guard straps disposed therebetween;

FIG. 3 a sectional view taken substantially on the line 3-3 of FIG. 1 and showing the manner in which the gripping fingers engage the sheet engaging surface on a bar attached to the roll;

FIG. 4 a sectional view similar to FIG. 3, but omitting the gripper fingers and showing the manner in which the guard straps are secured in place;

FIG. 5 a fragmentary view in perspective showing a portion of the beveled sheet engaging surface, together with the notch in the sheet engaging bar for accommodating one end of the guard straps;

FIG. 6 a sectional view taken substantially on the line 6-6 of FIG. 1 and showing the gripper fingers in open position for receiving the leading edge of a sheet of flexible material;

FIG. 7 a view similar to FIG. 6, but showing the gripper fingers closed in sheet clamping position and also showing in dotted lines the position of the gripper assembly and the sheet engaged thereby upon rotation of the roll;

FIG. 8 a fragmentary sectional view to an enlarged scale and showing the manner in which the gripper fingers clamp the leading edge of the sheet in engagement with the beveled sheet engaging surface;

FIG. 9 an elevational view with parts broken away and in section for greater clarity and showing the structure of one of the sheet gripper members; and

FIG. 10 an elevational view with parts broken away and in section for greater clarity and showing one of the gripper finger actuating members.

With continued reference to the drawings, there is shown a combined sheet supplying roll and sheet gripper assembly the roll 10 comprising an elongated cylindrical body having a cylindrical sheet supporting surface 11 interrupted by a longitudinally extending recess 12 having sidewalls 13 and 14 and end walls 15. As best shown in FIG. 8, the sidewall 13 of the recess 12 is provided with a generally rectangular notch 16 which serves to receive a longitudinally extending bar 17 removably secured in place by screw threaded fastening means or the like 18 and the bar 17 is provided with an inwardly beveled sheet engaging surface 19 on the outer edge thereof, it being noted that the sheet engaging surface 19 is knurled and terminates in alignment with the sheet supporting surface 11 of the roll 10.

The outer edge of the bar 17 is provided with spaced notches 20 and such notches serve to receive the ends 21 of a plurality of spaced generally arcuate guard straps 22 disposed transversely of the recess 12 with the end 21 of the guard straps 22 being secured in place by screw threaded fastening means or the like 23 with the outer surface of the ends 21 of guard straps 22 being disposed inwardly of the supporting surface 11 on the roll 10 and also inwardly of at least a portion of the beveled

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sheet engaging surface 19 on the bar 17. The opposite ends 24 of the guard straps 22 are secured to the roll 10 by screw fastening means or the like 25 adjacent the sidewall 14 of the recess 12 and with the outer surface of the guard straps 22 at the ends 24 also disposed inwardly of the sheet supporting surface 11 of the roll 10.

The gripper assembly may well comprise a longitudinally extending rocker shaft 26 journaled in bearings 27 in the end walls 15 of the recess 12 and if necessary, in intermediate bearings 28 also disposed in the recess 12 in the roll 10. A plurality of spaced gripper members 29 are rotatably mounted on the rocker shaft 26 and the gripper members 29 comprise a bifurcated hub 30 having an aperture 31 therein for rotatably receiving the rocker shaft 26 and projecting from the hub 30 is a finger 32 terminating in a sheet engaging jaw portion 33. Also projecting from the hub 30 is an ear 34 of less length than the gripping finger 32 and as clearly shown in FIG. 9, the ear 34 is in spaced substantially parallel relation to the finger 32 and the ear 34 is provided with an upstanding stud 35, the purpose of which will presently appear.

An actuating member 36 is provided for each gripping member 29 and as clearly shown in FIG. 10, the actuating member 36 is provided with a collar 37 having an aperture 38 therein for receiving the rocker shaft 26 and as clearly shown in FIG. 1, the actuating member 36 is fixed on the rocker shaft 26 with the collar portion 37 of the actuating member 36 disposed within the bifurcated hub 30 of the gripper member 29. As shown in FIG. 10, a boss 39 projects from the collar 37 of the actuating member 36 and the boss 39 is provided with a recess 40, the purpose of which will presently appear.

As best shown in FIGS. 6 and 7, in assembled relationship the boss 39 on the actuating member 36 is disposed in substantially parallel spaced relationship to the ear 34 on the gripper member 29 and a compression spring 41 is disposed between the boss 39 and the ear 34 with one end of the compression spring 41 received in the recess 40 of the boss 39 and with the opposite end of the compression spring 41 received over the stud 35 on the ear 34.

With particular reference to FIG. 6, upon rotation of the rocker shaft 26 counter-clockwise, the actuating member 36 will be moved by the rocker shaft 26 and the boss 39 will engage the finger 32 to move the gripper 29 and finger 32 outwardly to the position shown in FIG. 6 with the gripping jaw surface 33 of the finger 32 disposed outwardly of the sheet supporting surface 11 of the roll 10. At this time, the leading edge 42 of a sheet of flexible material 43 may be moved into position with the leading edge 42 disposed outwardly of the sheet engaging surface 19 on the bar 17 and thereafter as clearly shown in FIG. 7, clockwise rotation of the rocker shaft 26 will result in moving the boss 39 against the compression spring 41 which in turn will move against the ear 34 on the gripper 29 and move the finger 32 and gripping jaw surface 33 into engagement with the leading end 42 of the sheet 43 to firmly and yieldably clamp the leading end 42 in engagement with the sheet engaging surface 19 on the bar 17. As clearly shown in dotted lines in FIG. 7 and in full lines in FIG. 8, the leading end 42 of the sheet 43 is bent inwardly in engagement with the sheet engaging surface 19 on a bar 17 and the remainder of the sheet 43 trails rearwardly from the bar 17 in contact with the sheet supporting surface 11 of the roll 10. It is also apparent from an inspection of FIGS. 7 and 8 that the entire finger 32, as well as the remainder of the assembly is disposed completely inwardly of the surface 11 of the roll 10 and consequently, there can be no interference between the gripper assembly and an adjacent roll in contact with the sheet supporting surface 11 of the roll 10.

It will be seen that by the above described invention there has been provided a relatively simple, yet highly

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effective gripper assembly for use with a sheet supporting roll and in which the gripper assembly operates to securely clamp the leading edge of the sheet in position to pull the same around the supporting surface of the roll and at the same time, interference between the gripper mechanism and an adjacent contacting roll is completely prevented by reason of the fact that the entire gripper mechanism during operation is disposed within a recess in the surface of the roll.

It will be obvious to those skilled in the art that various changes may be made in the invention without departing from the spirit and scope thereof and therefore the invention is not limited by that which is shown in the drawings and described in the specification, but only as indicated in the appended claims.

What is claimed is:

1. A combined sheet supporting roll and sheet gripper assembly, said roll comprising an elongated cylindrical body having a cylindrical sheet supporting surface interrupted by a longitudinally extending recess, a longitudinally extending bar disposed in said recess and removably secured to said roll along one side edge of said recess, an inwardly beveled sheet engaging surface on the outer edge of said bar, said sheet engaging surface being knurled and terminating in alignment with said sheet supporting surface, the outer edge of said bar having spaced notches therein and a plurality of spaced generally arcuate guard straps disposed transversely of said recess, one end of said strap being received in said notches and secured to said bar with the outer surface of said straps adjacent said one end being disposed inwardly of at least a portion of said beveled sheet engaging surface, the opposite ends of said straps being secured to said roll adjacent the opposite side edge of said recess, the outer surface of said straps at said opposite ends being disposed inwardly of the adjacent sheet supporting surface of said roll, said gripper assembly comprising a longitudinally extending rocker shaft mounted in said recess, a plurality of spaced gripper members, each gripper member comprising a bifurcated hub rotatably received on said shaft, a finger projecting from said hub and movable into engagement with said beveled sheet engaging surface with the outer side of said finger disposed inwardly of said sheet supporting surface and an ear of less length than said finger projecting from said hub into spaced substantially parallel relation to said finger and an actuating member for each gripper member, each actuating member comprising a collar fixed to said shaft within said bifurcated hub, a boss projecting from said collar between said finger and said ear and a compression spring disposed between said boss and said ear, whereby upon rotation of said shaft in one direction said boss will engage said finger to move the same to a position projecting outwardly of said sheet supporting surface and upon movement of the leading edge of a sheet over said beveled sheet engaging surface and movement of said shaft in the opposite direction, said boss, spring and ear will move said finger to bend the leading edge of the sheet and yieldably clamp the same in engagement with said beveled sheet engaging surface and with said finger disposed inwardly of said sheet supporting surface.

2. A combined sheet supporting roll and sheet gripper assembly, said roll comprising an elongated cylindrical body having a cylindrical sheet supporting surface interrupted by a longitudinally extending recess, a longitudinally extending bar disposed in said recess and removably secured to said roll along one side edge of said recess, an inwardly beveled sheet engaging surface on the outer edge of said bar, the outer edge of said bar having spaced notches therein and a plurality of spaced generally arcuate guard straps disposed transversely of said recess, one end of said straps being received in said notches and secured to said bar with the outer surface of said strap adjacent said one end being disposed inwardly of at least a portion of said beveled sheet engaging surface, the op-

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posite end of said straps being secured to said roll adjacent the opposite side edge of said recess, the outer surface of said straps at said opposite end being disposed inwardly of the adjacent sheet supporting surface of said roll, said gripper assembly comprising a longitudinally extending rocker shaft mounted in said recess, a plurality of spaced gripper members, each gripper member comprising a bifurcated hub rotatably received on said shaft, a finger projecting from said hub and movable into engagement with said beveled sheet engaging surface with the outer side of said finger disposed inwardly of said sheet supporting surface and an ear of less length than said finger projecting from said hub in spaced substantially parallel relation to said finger and an actuating member for each gripper member, each actuating member comprising a collar fixed to said shaft within said bifurcated hub, a boss projecting from said collar between said finger and said ear and a compression spring being disposed between said boss and said ear, whereby upon rotation of said shaft in one direction said boss will engage said finger to move the same to a position projecting outwardly of said sheet supporting surface and upon movement of the leading edge of a sheet over said beveled sheet engaging surface and movement of said shaft in the opposite direction, said boss, spring and ear will move said finger to bend the leading edge of the sheet and yieldably clamp the same in engagement with said beveled sheet engaging surface and with said finger disposed inwardly of said sheet supporting surface.

3. A combined sheet supporting roll and sheet gripper assembly, said roll comprising an elongated cylindrical body and having a cylindrical sheet supporting surface interrupted by a longitudinally extending recess, a longitudinally extending bar disposed in said recess and removably secured to said roll along one side edge of said recess, an inwardly beveled sheet engaging surface on the outer edge of said boss and a plurality of spaced generally arcuate guard straps disposed transversely of said recess, one end of said straps being secured to said bar with the outer surface of said straps adjacent said one end being disposed inwardly of at least a portion of said beveled sheet engaging surface, the opposite ends of said straps being secured to said roll adjacent the opposite side edge of said recess, the outer surface of said straps at said opposite ends being disposed inwardly of the adjacent sheet supporting surface of said roll, said gripper assembly comprising a longitudinally extending rocker shaft mounted in said recess, a plurality of spaced gripper members, each gripper member comprising a bifurcated hub rotatably received on said shaft, a finger projecting from said hub and movable into engagement with said beveled sheet engaging surface with the outer side of said finger disposed inwardly of said sheet supporting surface and an ear of less length than said finger projecting from said hub in spaced substantially parallel relation to said finger and an actuating member for each gripper member, each actuating member comprising a collar fixed to said shaft within said bifurcated hub, a boss projecting from said collar between said finger and said ear and a compression spring disposed between said boss and said ear, whereby upon actuation of said shaft in one direction said boss will engage said finger to move the same to a position projecting outwardly of said sheet supporting surface and upon movement of the leading edge of a sheet over said beveled sheet engaging surface and movement of said shaft in the opposite direction, said boss, spring and ear will move said finger to bend the leading edge of the sheet and yieldably clamp the same in engagement with said beveled sheet engaging surface and with said finger disposed inwardly of said sheet supporting surface.

4. A combined sheet supporting roll and sheet gripper assembly, said roll comprising an elongated cylindrical body having a cylindrical sheet supporting surface interrupted by a longitudinally extending recess, a longitudinally extending bar disposed in said recess and removably

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secured to said roll along one side edge of said recess, an inwardly beveled sheet engaging surface on the outer edge of said bar and a plurality of spaced generally arcuate guard straps disposed transversely of said recess, one end of said straps being secured to said bar with the outer surface of said straps adjacent said one end being disposed inwardly of at least a portion of said beveled sheet engaging surface, the opposite ends of said straps being secured to said roll adjacent the opposite side edge of said recess, said gripper assembly comprising a longitudinally extending rocker shaft mounted in said recess, a plurality of spaced gripper members, each gripper member comprising a bifurcated hub rotatably received on said shaft, a finger projecting from said hub and movable into engagement with said beveled sheet engaging surface with the outer side of said finger disposed inwardly of said sheet supporting surface and an ear of less length than said finger projecting from said hub in spaced substantially parallel relation to said finger and an actuating member for each gripper member, each actuating member comprising a collar fixed to said shaft within said bifurcated hub, a boss projecting from said collar between said finger and said ear and a compression spring disposed between said boss and said ear, whereby upon rotation of said shaft in one direction said boss will engage said finger to move the same to a position projecting outwardly of said sheet supporting surface and upon movement of the leading edge of a sheet over said beveled sheet engaging surface and movement of said shaft in the opposite direction, said boss, spring and ear will move said finger to bend the leading edge of the sheet and yieldably clamp the same in engagement with said beveled sheet engaging surface and with said finger disposed inwardly of said sheet supporting surface.

5. A combined sheet supporting roll and sheet gripper assembly, said roll comprising an elongated cylindrical body having a cylindrical sheet supporting surface interrupted by a longitudinally extending recess, an inwardly beveled sheet engaging surface on one side edge of said recess and a plurality of spaced generally arcuate guard straps disposed transversely of said recess, one end of said straps being secured to said roll with the outer surface of said straps adjacent said one end being disposed inwardly of at least a portion of said beveled sheet engaging surface, the opposite end of said straps being secured to said roll adjacent the opposite side edge of said recess, said gripper assembly comprising a longitudinally extending rocker shaft mounted in said recess, a plurality of spaced gripper members, each gripper member comprising a bifurcated hub rotatably received on said shaft, a finger projecting from said hub and movable into engagement with said beveled sheet engaging surface with the outer side of said finger disposed inwardly of said sheet supporting surface and an ear of less length than said finger projecting from said hub in spaced substantially parallel relation to said finger and an actuating member for each gripper member, each actuating member comprising a collar fixed to said shaft within said bifurcated hub, a boss projecting from said collar between said finger and said ear and a compression spring disposed between said boss and said ear, whereby upon rotation of said shaft in one direction said boss will engage said finger to move the same to a position projecting outwardly of said sheet supporting surface and upon movement of the leading edge of a sheet over said beveled sheet engaging surface and movement of said shaft in the opposite direction, said boss, spring and ear will move said finger to bend the leading edge of the sheet and yieldably clamp the same in engagement with said beveled sheet engaging surface and with said finger disposed inwardly of said sheet supporting surface.

6. A combined sheet supporting roll and sheet gripper assembly, said roll comprising an elongated cylindrical body having a peripheral sheet supporting surface interrupted by a longitudinal extending recess having an in-

clined longitudinal extending sheet supporting edge disposed below the peripheral surface of said roll, said gripper assembly comprising finger means selectively movable into gripping engagement with said sheet supporting edge, support means disposed within said recess for supporting said finger means within said recess for movement between an open position where said finger means project beyond said recess and above the peripheral surface of said roll and a closed position where said finger means are completely within said recess and engage said sheet supporting edge, and actuating means disposed completely within said recess and cooperating with said support means for selectively biasing said finger means into said open

and closed positions, and arcuately shaped guard means disposed transversely of the recess and extending between opposite longitudinal edges thereof and coincident with the outer surface of the roll so as to maintain a continuous peripheral sheet supporting surface on said roll.

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