March 13, 1962 R. W. POWERS, JR 3,024,955

SYSTEM FOR CENTERING A MOVING WEB

Filed Sept. 15, 1958 2 Sheets-Sheet 1

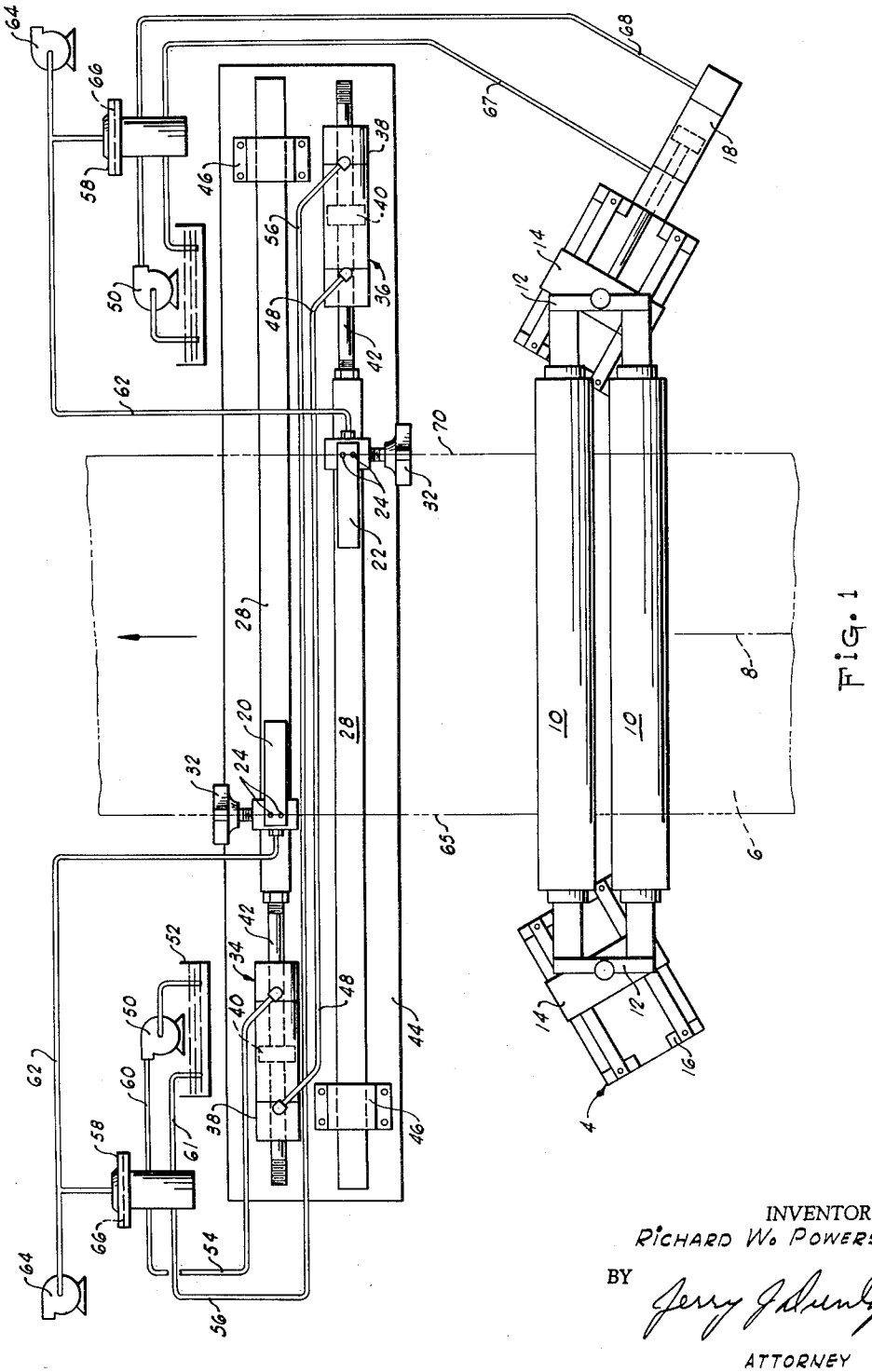

FIG. 1

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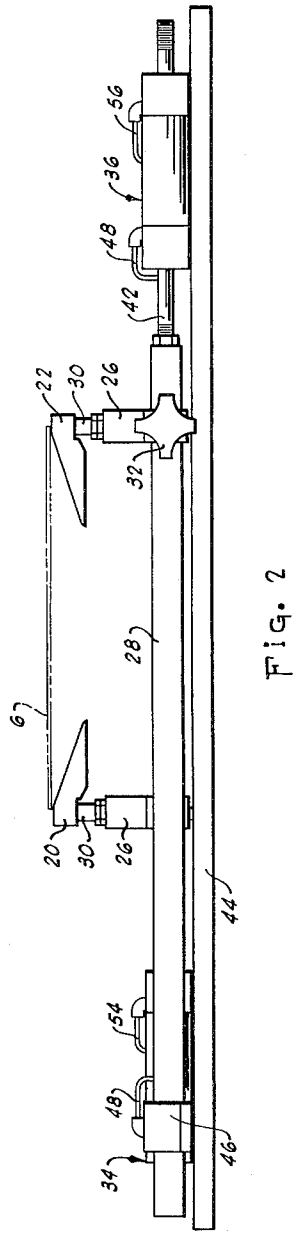

Fig. 2

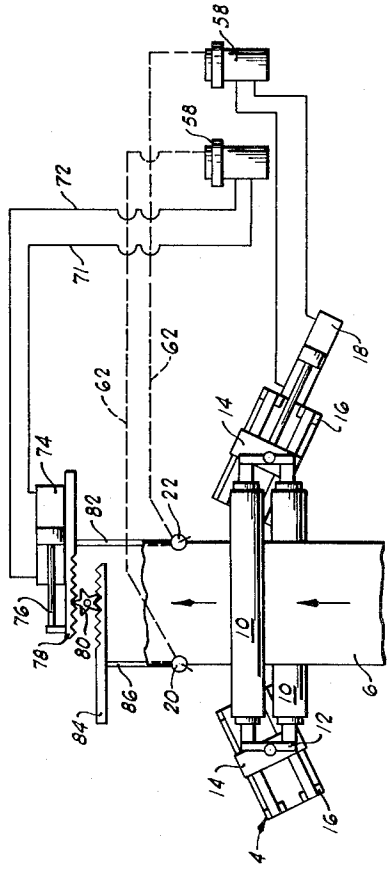

Fig. 3

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3,024,955

SYSTEM FOR CENTERING A MOVING WEB

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9 Claims. (Cl. 226—22)

This invention relates, as indicated, to an improved system for centering a moving web.

As it is well known in many different industries, such as in the textile and printing industries, a moving web of material of any appreciable length must be guided laterally if an operation, such as printing, is to be performed on the moving web; otherwise the web will invariably veer off course and foul the printing operation. Heretofore, the only practical guiding operation which has been accomplished is to guide a moving web in such a manner that one edge of the web will always be located at a predetermined lateral position at one or more stations along the path of travel of the moving web. The guiding of a web to position one edge thereof is normally accomplished by some means for laterally shifting the web, such as an unwind roll shifting mechanism, or a cambering roller assembly as disclosed in United States Patent No. 2,797,091, with the shifting mechanism being moved laterally in response to signals received from a sensing head cooperating with the edge of the web which is being guided along a predetermined line. The guiding of a web to pre-position one edge of the web is adequate for many web handling operations. However, some types of web handling operations (such as in the printing of some textile materials), require that the center of the web be positioned in a predetermined plane at some station along the path of travel of the web and in such operations the width of the web will frequently vary. Therefore, the guiding of one edge of the web is not sufficient.

Many prior attempts have been made to center a moving web. However, prior systems have either been so complicated as to be commercially impractical or the systems have not been sufficiently responsive to accurately maintain the centerline of a web in a predetermined plane at the desired location along the path of the web.

The present invention contemplates a novel system for automatically centering a moving web at any desired station along the path of travel of the web. More specifically, the present invention contemplates the use of a web shifting mechanism for moving the web laterally, and only two sensing heads which cooperate with the opposite edges of the moving web. One of the sensing heads operates to track the respective edge of the web and is connected to the opposite sensing head in such a manner that the sensing heads are moved in opposite directions upon changes in width of the web. The other sensing head operates to control the shifting mechanism in such a manner to retain the respective edge of the web in a predetermined lateral relationship with the respective head. As a result, the centerline of the web is retained in a fixed lateral position as the web leaves the shifting mechanism.

An important object of this invention is to retain the centerline of a moving web in a fixed lateral position at a predetermined station along the path of travel of the web.

Another object of this invention is to provide a novel system for automatically centering a moving web.

Another object of this invention is to provide a system for centering a moving web which utilizes conventional and readily available web guiding units or elements.

A further object of this invention is to provide a system for centering a moving web by use of a web shifting mechanism wherein the web shifting mechanism is operated automatically and with a minimum amount of

delay upon variation in either the width of the web or a change in the path of travel of the web.

Another object of this invention is to provide a system for centering a moving web utilizing only two sensing heads, wherein the heads are maintained at equal distances on opposite sides of the centerline of the web and are responsive to variations in the width of the web with minimum time delay.

A still further object of this invention is to provide a system for centering a moving web which is simple in construction, will have a long service life, and may be economically manufactured.

Other objects and advantages of the invention will be evident from the following detailed description, when read in conjunction with the accompanying drawings which illustrate my invention.

In the drawings:

FIGURE 1 is a plan view of a system incorporating this invention, with portions of the elements of the system shown schematically, and with a web (shown in dashed lines) being centered by the system.

FIGURE 2 is an elevational view of the sensing heads and means for moving the sensing heads laterally with respect to the centerline of a web being controlled by the system.

FIGURE 3 is a schematic plan view of a modified system incorporating this invention.

Referring to the drawings in detail, and particularly FIG. 1, reference character 4 generally designates a shifting mechanism engaging a web 6 being moved in the direction indicated by the arrows. The shifting mechanism 4 may be of any desired construction which will operate to shift the web 6 laterally and control the lateral position of the centerline 8 of the web. For example, the shifting mechanism 4 may comprise a pair of rollers 10 extending laterally across the web 6, with the web being wrapped over one roller 10 and under the other roller 10 to maintain substantial frictional engagement between the rollers and web. The opposite ends of the rollers 10 are supported by suitable brackets 12, with each bracket being rotatably secured on a shaft extending upwardly from a shoe 14, such that the rollers 10 may be canted or swiveled at their opposite ends with respect to the shoes 14. Each shoe 14 is slidingly supported on a suitable guide member 16 extended at an angle to the centerline 8 of the web 6. The guides 16 are extended in opposite directions to provide a combination canting and lateral shifting movement of the rollers 10 upon movement of the shoes 14. This type of shifting mechanism is known in the trade as a cambering roller guide assembly and is described and shown in detail in United States Patent No. 2,797,091. The shoes 14 are moved on the guides 16 by a suitable hydraulic ram 18 to shift the web 6, as will be described in detail below. It will be understood that the shifting mechanism 4 may be of any other construction, such as a cradle mechanism (not shown) supporting the roll from which the web 6 is being unwound, it being only necessary that the shifting mechanism 4 be capable of laterally shifting the web 6 and be subject to automatic control.

A pair of sensing heads 20 and 22 are supported, as will be described, adjacent to the shifting mechanism 4 on opposite sides of the centerline 8 of the web 6. Each of the sensing heads 20 and 22 may be of any desired construction which will generate a control signal when the relative lateral position on the head is changed with respect to the adjacent edge of the web 6. For example, each of the sensing heads may be a feeler type which physically engages the respective edge of the web 6, electronic eye type which generates an electrical signal when the position of the edge of the web 6 is changed relative to the sensing head, or a vacuum type sensing head as

illustrated in FIGS. 1 and 2. Each of the sensing heads 20 and 22 is provided with a pair of orifices 24 through which a vacuum is maintained, as will be described, and is suitably supported by a bracket 26 (FIG. 2) secured on a laterally extending bar or guide 28. An adjusting arm or screw 30 extends between each of the heads 20 and 22 and the respective supporting bracket 26 to facilitate the vertical adjustment of the sensing heads and control the extent of contact between the heads 20 and 22 and the web 6. A suitable set screw 32 extends through the side of each of the brackets 26 into engagement with the respective guide bar 28, such that the lateral positions of the heads 20 and 22 on the guide bars 28 may be adjusted as desired for the width of the particular web 6 to be controlled. It will be noted that the heads 20 and 22 are arranged adjacent the opposite edges of the web 6 equal distances from the centerline 8 of the web, providing, of course, that the edges of the web 6 are relatively straight, as is the case in substantially all web handling problems.

The guide bars 28 are moved lengthwise by a pair of hydraulic rams generally designated by reference characters 34 and 36, with each of the rams 34 and 36 being connected to one of the guide bars 28. Each of the rams 34 and 36 comprises a cylindrically-shaped cylinder 38 and a piston 40 (FIG. 1) slidingly disposed in the cylinder 38 and responsive to differential fluid pressures on the opposite ends thereof for longitudinal movement in the respective cylinder 38. A piston rod 42 extends from each piston 40 through the opposite ends of the respective cylinder 38. It will be understood that each piston rod 42 is suitably sealed (not shown) in the opposite end portions of the respective cylinder 38 to prevent loss of pressure of the fluid injected into either end portion of the respective cylinder to act on the respective piston 40. The inner end of each piston rod 42 is adjustably connected to one end of the respective guide bar 28 in any desired manner, such as by threading the piston rod into the adjacent end of the bar 28, such that the longitudinal position of each bar 28 may be adjusted when the piston 40 of the respective ram 34 or 36 is in about the center of the respective cylinder 38. Thus, the lateral positions of the sensing heads 20 and 22 may be adjusted to mate with the respective edges of the web 6 at the beginning of a guiding operation with the pistons 40 of the rams in their center-most positions. The rams 34 and 36 are suitably anchored to a base plate 44 extending laterally underneath the web 6 to retain the rams in fixed positions. A suitable bearing 46 is also mounted on the base plate 44 adjacent each of the rams 34 and 36 to slidingly receive the outer end portion of one of the guide bars 28, such that the bars will be retained level and aligned during lateral movement of the guide bars and the sensing heads, as will be described.

A conduit 48 is connected at one end to the outer end portion of the ram 34 and at its opposite end to the inner end portion of the ram 36 to transfer hydraulic fluid from one of the rams to the other ram, as will be described. The rams 34 and 36 are supplied with hydraulic fluid under pressure by a suitable pump 50 having its inlet connected to a supply of the hydraulic fluid 52. The pump 50 is connected to the ram 34 by a conduit 54 leading to the inner end portion of the respective ram and by a conduit 56 leading to the outer end portion of the ram 36, with a suitable valved control unit 58 interposed between the conduits 54 and 56 and the discharge conduit 60 of the pump 50. It will also be noted that a return line 61 extends from the control device 58 to the fluid supply 52. The valve control device 58 may be any suitable four-way valve construction which is responsive to signals from the sensing head 20 for establishing communication alternately between the pump discharge conduit 60 and the conduits 54 and 56. When a vacuum type sensing head 20 is used, as previously described, the head is connected by a conduit 62 to a suitable vacuum pump 64 which constantly retains a vacuum on the orifices 24 of the sensing head 20. The conduit 62 is also connected to the upper end of the control means 58 such that the vacuum in the line 62 acts upon a diaphragm 66 in the upper end portion of the control 58 to operate the four-way valve portion of the control 58. As previously indicated, any suitable control 58 may be used, although I prefer to use a control valve of the type illustrated in the co-pending application of Irwin L. Fife et al., Serial No. 661,859, filed May 27, 1957, and entitled Metering Valves.

In operation of the vacuum type sensing head 20, the respective edge 65 of the web 6 functions to open and close the orifices 24 to initiate operation of the control unit 58. When the respective edge 65 of the web 6 tends to move laterally outward with respect to the head 20 and cover the orifices 24, a greater vacuum is created in the conduit 62 by the pump 64 to raise the diaphragm 66 and shift the valve portion of the control 58 to such a position that the pump discharge conduit 60 is placed in communication with the conduit 54. It will then be apparent that the high pressure hydraulic fluid being pumped by the pump 50 will be forced into the inner end portion of the ram 34 and act on the piston 40 to move the piston 40, piston rod 42, respective guide bar 28 and the sensing head 20 outwardly away from the centerline 8 of the web 6, which in turn tends to move the orifices 24 of the head 20 out from under the edge 65 of the web 6. Outward movement of the piston 40 in the ram 34 forces hydraulic fluid from the outer end portion of the ram 34 through the conduit 48 to the inner end portion of the ram 36, such that the piston 40 of the ram 36 is moved outwardly substantially simultaneously with outward movement of the piston 40 in the ram 34. It should be apparent that when the piston 40 of the ram 36 is moved outwardly, the respective piston rod 42 and guide bar 28 are also moved outwardly to laterally shift the other sensing head 22 in a direction opposite to the movement of the sensing head 20. It should also be noted that the rams 34 and 36 are constructed the same size, such that the sensing heads 20 and 22 will be moved not only in opposite directions, but will be moved equal distances upon actuation of the rams 34 and 36. Hydraulic fluid in the outer end portion of the ram 36 is returned through the conduit 56 and the control 58 to the return line 61, and hence to the hydraulic fluid supply 52.

When the edge 65 of web 6 moves in a direction to uncover the orifices 24 in the sensing head 20, more air will be fed into the conduit 62 to decrease the vacuum exerted on the diaphragm 66, such that the control valve 58 is shifted in an opposite position. In this opposite position of the control valve 58, the pump discharge conduit 60 is connected to the conduit 56 to supply high pressure hydraulic fluid into the outer end portion of the ram 36. This high pressure fluid forces the respective piston 40 of the ram 36 inwardly to move the sensing head 22 inwardly toward the centerline 8 of the web 6. Such inward movement of the piston 40 of the ram 36 forces hydraulic fluid through the conduit 48 into the outer end portion of the ram 34 which moves the piston 40 of the ram 34 and the sensing head 20 inwardly toward the centerline 8 of the web 6. This inward movement of the sensing head 20 tends to move the respective orifices 24 underneath the edge 65 of the web 6 to again control the vacuum in the conduit 62 and control the operation of the control unit 58. It will also be noted that hydraulic fluid in the inner end portion of the ram 34 is returned through the conduit 54 and the drain line 61 to the hydraulic fluid supply 52 when the piston 40 of the ram 34 is moved inwardly.

When the position of the web 6 with respect to the sensing head 20 is such that the orifices 24 of the sensing head 20 are approximately half-way covered by respective edge 65 of the web 6, the diaphragm 66 is in a neutral position, such that no high pressure hydraulic fluid is being supplied from the pump discharge line 60

to either of the lines 54 or 56. In this position, the hydraulic fluid is merely recirculated from the pump 50 through the control unit 58 and back through the drain line 61 to the hydraulic fluid supply 52. It will therefore be observed that the sensing head 20 may be considered a tracking or follower head to follow lateral movements of the edge 65 of the web 6. When the head 20 is in a predetermined lateral position with respect to the edge 65 of the web 6, the rams 34 and 36 will be held in fixed positions to retain both of the sensing heads 20 and 22 in fixed positions with respect to the web 6. However, if the relative position of the sensing head 20 with respect to the adjacent edge 65 of the web 6 is changed, the sensing head 20 is moved in a direction to again align the orifices 24 with the edge 65 of the web 6, and the sensing head 22 is moved equally and oppositely with respect to the sensing head 20.

When a vacuum type sensing head 22 is used for edge 70 of web 6, it is connected by a conduit 62 to a suitable vacuum source 64 and to a control unit 58 in the same manner as the sensing head 20. The control unit 58 associated with the sensing head 22 is supplied with high pressure fluid by a pump 50 in the same manner as the control unit 58 previously described, and is connected by conduits 67 and 68 to the opposite end portions of the ram 18 associated with the shifting mechanism 4. Thus, the sensing head 22 is utilized to control operation of the shifting mechanism 4 and retain the respective edge portion 70 of the web 6 in a predetermined lateral position with respect to the sensing head 22.

When the edge 70 of the web 6 extends approximately half-way over the orifices 24 of the sensing head 22, a predetermined vacuum is exerted in the respective conduit 62 to retain the respective control unit 58 in a neutral position and inactivate the ram 18, such that the shifting mechanism 4 is retained in a fixed position with respect to the moving web 6 and retains the web 6 moving in the same direction. That is, when the shoes 14 of the shifting mechanism 4 are retained in fixed positions, the path of movement of the web 6 will not be changed by the shifting mechanism 4. When the edge 70 of the web 6 moves relatively inward with respect to the sensing head 22 to uncover a larger portion of the orifices 24, the respective control unit 58 is actuated to direct high pressure hydraulic fluid through the conduit 67 into the inner end portion of the ram 18; whereupon the right-hand shoe 14 of the shifting mechanism 4 is moved in a direction generally away from the web 6 and the opposite shoe 14 is moved in a direction generally toward the web 6. This movement of the shoes 14 tends to simultaneously shift the rollers 10 to the right (when viewed as in FIG. 1) and swivel the rollers 10 in a clockwise direction to guide the web 6 leaving the rollers 10 to the right. As a result, the edge 70 of the web 6 is again moved over the orifices 24 of the sensing head 22. Conversely, when the edge 70 of the web 6 tends to cover a greater portion of the orifices 24 of the sensing head 22, the control unit 58 is actuated in the opposite direction to direct high pressure fluid through the conduit 68 into the outer end portion of the ram 18 and move the shifting mechanism 4 in an opposite direction. This opposite movement of the shifting mechanism 4 tends to guide the web 6 leaving the rollers 10 to the left to again partially uncover the orifices 24 of the sensing head 22.

It will therefore be apparent that the sensing head 22 controls the operation of the shifting mechanism 4 to guide the web 6 in such a manner that the edge 70 of the web is retained in a predetermined lateral position with respect to the sensing head 22. It may also be noted that the relative lateral position of the edge 70 of the web 6 with respect to the sensing head 22 will vary either when the web 6 tends to veer to the right or the left, or whenever the sensing head 22 is moved by actuation of the sensing head 20 without a simultaneous change in the width of the web 6 in an appropriate direction.

In summarizing the operation of the sensing heads 20 and 22 and the shifting mechanism 4, it will be observed that the sensing head 20 tends to track or follow the edge 65 of the web 6 to retain a predetermined lateral position of the sensing head 20 with respect to the edge 65 of the web 6. The sensing head 20 will provide a signal to the respective control unit 58 upon any variation in the lateral position of the sensing head 20 with respect to the edge 65 of the web 6. These variations in the relative lateral positions of the sensing head 20 and the edge 65 of the web 6 may arise from numerous causes, such as a change in width of the web 6 as it is being moved through the shifting mechanism 4 and over the sensing heads 20 and 22, or by a veering of the web 6 from its preferred path of travel. Anytime the relative position of the edge 65 of the web 6 and the sensing head 20 is changed, the control unit 58 associated with the sensing head 20 is actuated to operate the rams 34 and 36 to move the sensing head 20 in a direction to follow the relative lateral movement of the edge 65 of the web, with a simultaneous movement of the sensing head 22 in an opposite direction. Therefore, the centerline between the sensing heads 20 and 22 is always retained in a fixed position. On the other hand, any change in the relative positions of the edge 70 of the web 6 and the sensing head 22 will provide an actuation of the control unit 58 associated with the sensing head 22 to move the shifting mechanism 4 in an appropriate direction which tends to guide the web 6 back along such a path of movement that the edge 70 of the web is retained in a fixed lateral relation with respect to the sensing head 22. As a result, the centerline 8 of the web 6 leaving the rollers 10 of the shifting mechanism 4 is retained in a predetermined plane, such that the web 6 may enter any desired mechanism, such as a printing machine, with assurance that the centerline of the web will constantly be maintained in a fixed lateral position with respect to the printing machine.

As an example of a typical operation of the present system, let it be assumed that the edge 70 of the web 6 is substantially straight, but the edge 65 of the web is tapered to gradually increase the width of the web 6 as the web is being moved through the shifting mechanism 4. With the edges 65 and 70 of the web being aligned with the orifices of the respective sensing heads 20 and 22 prior to the change in width of the web, the shifting mechanism 4 will be in a fixed lateral position and the centerline 8 of the web will be coincident with the centerline between the sensing heads 20 and 22. Upon an increase in width of the web of the type previously indicated, the edge 65 of the web tends to cover a greater portion of the orifices 24 of the sensing head 20. This movement actuates the respective control unit 58 associated with the sensing head 20 in a manner previously described to actuate the rams 34 and 36 in a direction to move the sensing heads 20 and 22 laterally outward away from the centerline 8 of the web. Outward movement of the sensing heads 20 and 22 is continued until the edge 65 of the web is again in a predetermined relation with respect to the orifices 24 of the sensing head 20. The outward movement of the sensing head 22 will move the respective orifices 24 from underneath the edge 70 of the web to actuate the respective control unit 58 and move the shifting mechanism 4 to the right as previously described. As a result, the web is guided to the right to tend to again align the edge 70 with the orifices 24 of the sensing head 22. It will thus be apparent that the direction of travel of the web 6 will be changed while the sensing head 20 is being moved outwardly to follow the edge 65 of the web, such that the sensing head 20 will need to be moved outwardly a minimum distance to again align the respective orifices 24 with the edge 65 and the centerline 8 of the web will be aligned with the centerline between the sensing heads 20 and 22 in a minimum of time. With the use of hydraulic systems for moving the sensing heads 20

and 22 laterally and for moving the shifting mechanism 4, a minimum delay is experienced between a variation in either edge of the web 6 and the respective sensing head and actuation of the system to re-align the centerline 8 of the web 6 with the centerline between the sensing heads 20 and 22. As a practical matter, I have found that either the sensitivity of the heads 20 and 22 should be different, or a restriction should be placed in either the hydraulic system which moves the sensing heads or the hydraulic system which moves the shifting mechanism 4, such that the two hydraulic systems will not begin moving in resonance to provide a substantially continuous change in the positions of the sensing heads 20 and 22. In other words, the response obtained by the tracking sensing head 20 should be slightly different from the response obtained by the guiding sensing head 22, such that the two responses will not reach a continuous out-of-phase relation and provide a continual shifting of the sensing heads 20 and 22 and the shifting mechanism 4.

As illustrated in FIG. 3, I also contemplate the use of a rack and pinion construction for moving the sensing heads 20 and 22 in response to the sensing head 20, in lieu of the hydraulic system using the rams 34 and 36 as illustrated in FIGS. 1 and 2. In the modified construction, the sensing head 20 is connected by a vacuum line 62 to a control unit 58 in the same manner as previously described. The respective control unit 58 is in turn connected by conduits 71 and 72 to the opposite ends of a suitable ram 74. The cylinder of the ram 74 is suitably secured in a fixed position, and the piston rod 76 of the ram is connected to a suitable rack 78 which cooperates with one side of a stationary pinion 80. The sensing head 22 is secured to the rack 78 by a suitable bracket 82, and the head 20 is secured to a rack 84 engaging the opposite side of the pinion 80 by use of a suitable bracket 86.

The embodiment illustrated in FIG. 3 operates in substantially the same manner as the embodiment previously described, in that the sensing head 20 actuates its respective control unit 58 to supply hydraulic fluid through either the conduit 71 or 72 to the ram 74. Movement of the ram 74 is transmitted through the piston rod 76 to move the rack 78 in one direction and turn the pinion 80. The pinion 80 in turn engages the opposite rack 84 to move this opposite rack 84 in a direction opposite to the rack 78. As a result, the sensing heads 20 and 22 are moved in opposite directions and equal distances in response to changes in the relative position of the sensing head 20 and the respective edge of the web 6. The sensing head 22 in the embodiment illustrated in FIG. 3 operates in the same manner as previously described to control the operation of the shifting mechanism 4.

In each of the embodiments described above, it will be noted that the sensing heads are positioned on the side of the shifting mechanism to which the web is moving, i.e., downstream from the shifting mechanism. The sensing heads are therefore located adjacent or at the station where the centerline of the web is to be aligned with a predetermined plane and a precise control of the centerline of the web is obtained. However, the sensing heads may be positioned upstream from the shifting mechanism and the centerline of the web will be controlled, although such control will not be as precise as when the sensing heads are located downstream from the shifting mechanism.

From the foregoing it will be apparent that the present invention provides a novel system for centering a moving web. The system utilizes conventional elements or parts to minimize the cost of a system incorporating this invention. Also, the present system utilizes a minimum number of parts or elements to further minimize the cost of a system incorporating this invention. Only two sensing heads are required, with one of the sensing heads following one edge of a web being controlled by the system, and the other sensing head controlled a shifting mechanism for guiding the moving web and retaining the centerline of the moving web coincident with the centerline between the two sensing heads. It should again be noted that the sensing heads, the control units and the shifting mechanism may be of any suitable construction, and the present invention is not limited to vacuum type sensing heads, hydraulic control units and a cambering type shifting or guiding mechanism as specifically described herein.

Changes may be made in the combination and arrangement of parts or elements as heretofore set forth in the specification and shown in the drawings, it being understood that changes may be made in the embodiments disclosed without departing from the spirit and scope of the invention as defined in the following claims.

I claim:

1. A system for centering a moving web, comprising a movable sensing head at each side edge of the web, means responsive to only one of the sensing heads for moving the respective head laterally in following relation with lateral variations of the respective side edge of the web and simultaneously moving the other sensing head an equal distance in an opposite direction, and means for shifting the web laterally only in response to said other sensing head for retaining the opposite side edge of the web in a predetermined relation with respect to said other sensing head.

2. A system as defined in claim 1 characterized further in that said means for moving the sensing heads includes a hydraulic ram connected to each sensing head, and means for supplying hydraulic fluid to the opposite ends of said rams only in response to said one sensing head.

3. A system for centering a moving web, comprising means for shifting the web laterally, sensing means at each edge of the web adjacent the shifting means for sensing lateral movement of both edges of the web, power means for simultaneously moving said sensing means in opposite directions, control means connected to only one of said sensing means for energizing said power means in response to said one sensing means and retaining said one sensing means in a predetermined lateral relation with the respective edge of the web, and a second control means connected only to the other sensing means for energizing said shifting means in response to the other sensing means and retaining the opposite edge of the web in a predetermined lateral relation with respect to said other sensing means.

4. A system for retaining the centerline of a web moving from fore to aft in a predetermined plane at a predetermined station along the path of travel of the web, comprising means in front of the station for shifting the web laterally, a first sensing means between the web shifting means and the station for sensing relative lateral movement between one side edge of the web and the respective means, a second sensing means between the web shifting means and the station for sensing relative lateral movement between the opposite side edge of the web and the respective means, means responsive only to said first sensing means for moving said first sensing means into a predetermined lateral relation with respect to said one side edge of the web and simultaneously moving said second sensing means in an opposite direction, and means responsive only to said second sensing means for operating the web shifting means and moving said opposite side edge of the web into a predetermined lateral relation with respect to said second sensing means.

5. A system as defined in claim 4 characterized further in that said means for moving said sensing means in opposite directions includes a hydraulic ram connected to each sensing means, and means for supplying hydraulic fluid to the opposite ends of said rams only in response to said one sensing means.

6. A system for retaining the center line of a web moving from fore to aft in a predetermined plane at a

predetermined station along the path of travel of the web, comprising means in front of the station for shifting the web laterally, a first sensing head positioned between the web shifting means and the station for sensing relative lateral movement between one side edge of the web and the respective sensing head, a second sensing head between the web shifting means and the station for sensing relative lateral movement between the opposite side edge of the web and the respective sensing head, a hydraulic system connected to said sensing heads for moving said sensing heads simultaneously in opposite directions, a control valve in said hydraulic system connected to said first sensing head for actuating said hydraulic system in response to the relative lateral positions between said first sensing head and said one side edge of the web, and means connecting the second sensing head to the web shifting means only for shifting the web in response to the lateral positions of said second sensing head and said opposite side edge of the web.

7. A system as defined in claim 6 wherein said hydraulic system includes a hydraulic ram connected to each of the first and second sensing heads, and conduits cross-connecting said rams to said control valve.

8. A system as defined in claim 1 characterized further in that said means for moving the sensing heads includes a pinion, a first rack engaging one side of the pinion and connected to one of the sensing heads, a second rack engaging the opposite side of the pinion and connected to the other sensing head, and means for moving one of the racks in response to said one sensing head.

9. A system as defined in claim 8 characterized further in that said means for moving one of the racks comprises a hydraulic ram connected to the rack, a supply of hydraulic fluid under pressure, a valve connected to the fluid supply and the opposite ends of the ram, and means for shifting the valve in response to said one sensing head.

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