

Jan. 29, 1957

W. F. HUCK
 DEVICE FOR AUTOMATICALLY MAINTAINING SIDE
 REGISTRY IN TRAVELING WEBS
 Filed Nov. 15, 1954

2,779,591

Fig. 3

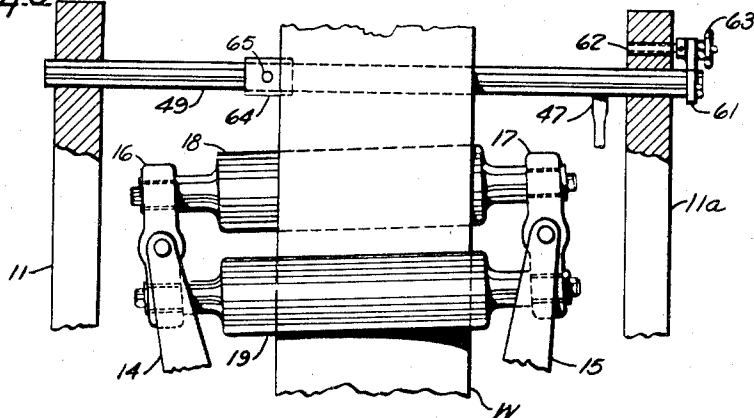


Fig. 1

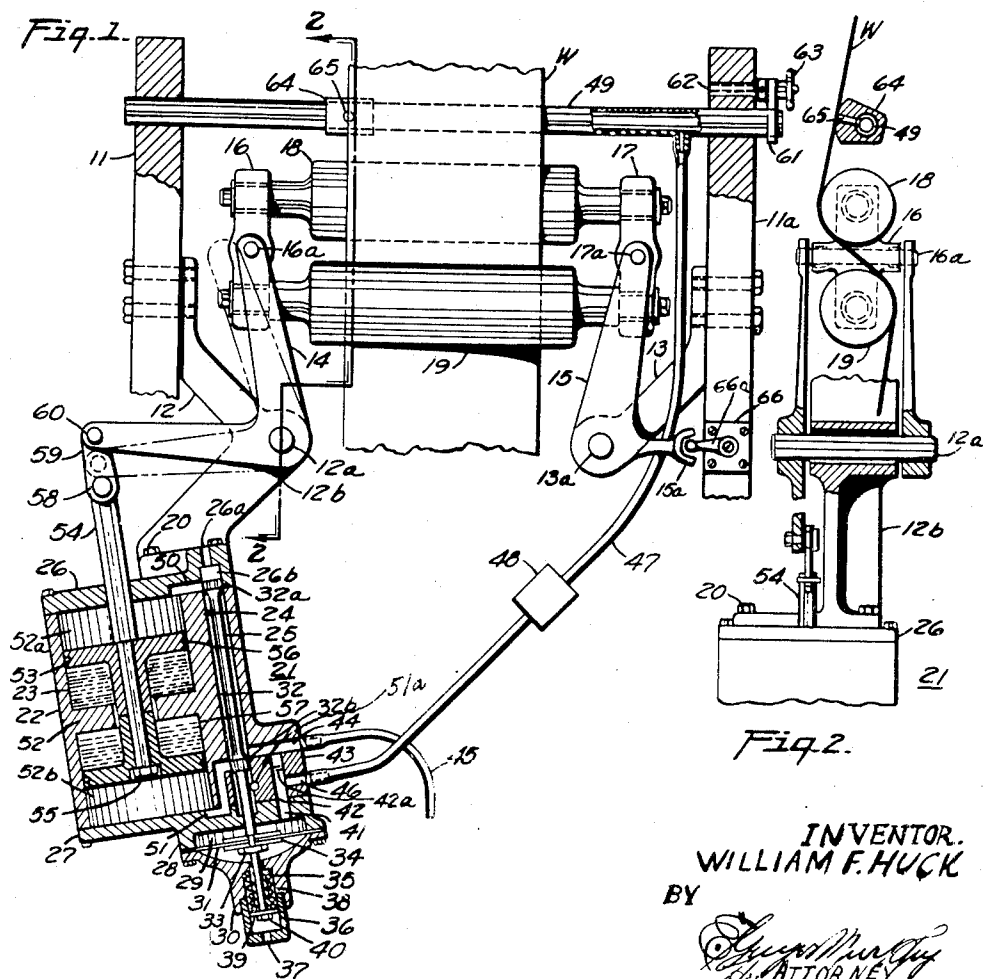


Fig. 2

INVENTOR.
 WILLIAM F. HUCK
 BY

James M. Huck
 ATTORNEY

1

2,779,591

DEVICE FOR AUTOMATICALLY MAINTAINING SIDE REGISTRY IN TRAVELING WEBS

William F. Huck, Forest Hills, N. Y., assignor to
Huck Company, New York, N. Y., a partnership

Application November 15, 1954, Serial No. 468,902

3 Claims. (Cl. 271—2.6)

This invention relates to means for assuring accurate side registration of a running web of material, and more particularly to an improved device for automatically registering and maintaining side registry of a running web.

An object of the invention is to provide a simplified fluid-controlled means for maintaining accurate side registry of traveling webs of material.

Another object is to provide a fluid-controlled, web-registering device, of comparatively simple design and inexpensive construction, automatic and self-regulating in its functions, and particularly adapted for use in commercial printing establishments.

Another object is the provision of a device for automatically maintaining accurate side registry of a running web, and embodying simplified fluid-pressure means with a minimum of friction and a comparatively large amplification of small pressure differentials produced by misalignments of a running web.

Another object is to provide a novel, side-registering device for running webs; having inherent position-responsive means to assure accurate side registry and also damping qualities to prevent excessive corrections and any tendencies to vibration of the parts being adjusted.

A further object is the provision of a device for the automatic side registry of traveling webs, and which may be readily applied to existing printing and/or web-guiding apparatus.

In the drawings depicting a preferred form which the invention may assume:

Figure 1 is a fragmentary elevational view, partly in section, showing the web-controlling rollers, and with the running web in normal or neutral position;

Figure 2 is a fragmentary, side or end elevational view, taken on line 2—2 of Figure 1, and as viewed in the direction of the arrows; and

Figure 3 is a fragmentary plan view showing the web-controlling rollers automatically moved by the mechanism and effective to return the web to the normal or neutral position illustrated in Figure 1.

In the printing industry, where running webs of paper or other material are printed upon while traveling through their respective machines, an important consideration is the maintenance of correct alignment of the printed characters on the web prior to its subsequent severing into pages and the like. In multi-color printing, correct alignment of the printed characters, objects, etc., is imperative.

Numerous devices have been placed on the market, all with a view to the automatic maintenance of accurate side registry of a traveling web and consequently of the printed characters thereon. However, many of these prior devices involve comparatively expensive, complicated and frequently bulky equipment. It will be understood that where numerous webs are to be operated upon in a confined space, the use of bulky registering mechanism is, generally speaking, not only inconvenient to the operators, but impractical by virtue of their interference with the functioning of the machines with which they are associated.

2

The present invention particularly contemplates a pneumatic or fluid control of the position of a web with respect to its lateral disposition and with a view to the correct alignment of the printed characters. The maintenance of accurate side registry of traveling webs, according to this invention, is attained by the utilization of comparatively simple and directly applied means.

Among the advantages accruing to the present device is the reduction of friction to a minimum and the attainment of a highly effective amplification of the registering means with a small pressure differential produced by a slight misalignment or lateral displacement of the running web's position. The net result is a simplified construction and an accurate automatic maintenance of side registry of the traveling web. The invention particularly lends itself for use in the field of newspaper and kindred printing where, in view of the multiplicity of operating components, the room available for extra or auxiliary devices is limited and must be reserved for the inspection of the product, the convenience of the operators and the best functioning of the machine.

Referring now in particular to the drawings wherein similar characters of reference indicate corresponding parts in the several views of the preferred forms of the invention, 11 and 11a are supporting frames arranged in spaced parallelism and to which are fastened brackets 12 and 13. A bell-crank lever 14 is fulcrumed on a pin or stud 12a arranged in the bracket 12, and in a similar fashion, a lever or arm 15 is fulcrumed on a stud 13a arranged in the bracket 13. A pair of spaced bearing blocks 16, 17 are pivotally supported in parallelism, as by pins 16a, 17a fast to the ends of levers 14, 15.

Between the frames 11 and 11a, an upper roller 18 has its opposite ends or journals rotatably associated in the upper portion of the oppositely-disposed bearing blocks 16, 17; and correspondingly, a second or lower roller 19 that is located in spaced parallelism beneath the upper roller 18, has its opposite ends turnably accommodated in the lower portion of the said bearing blocks 16, 17.

A web of material "W," as best shown in Figure 2, is engaged or led under the lower roller 19 and thence over the upper roller 18. Further inspection of Figure 1 will disclose that bracket 12 has a depending extension 12b that is fastened, as by the screws 20, to one of the cover plates, in this instance the upper cover plate 26, of an assembly designated generally at 21 and effective to shift the rollers 18, 19 to correct misalignments of the web "W."

The assembly 21 comprises a cylindrical body portion 22 having a comparatively large central bore, as at 23, and an integrally formed thickened wall portion, as at 24, which is apertured to provide a comparatively narrow elongated passageway therethrough, as at 25. Cover plate 26, mentioned above, and the lower cover plate 27 sealingly close the bore 23 and passageway 25. The upper cover plate 26 has a short duct 26a opening into a counterbore 26b for a purpose that will appear hereinafter.

The lower cover plate 27 has an exteriorly-projecting annular flange 28 providing a recess or cavity 29. The cavity 29 is normally closed by a dome-shaped lid or cover 30 bolted to the annular flange 28. Arranged in the recess 29 and clamped between the annular flange 28 and the dome-shaped lid 30 is a flexible diaphragm 31 having an elongated valve stem fastened to its centre, as by the nut 33 and washers 34. The valve stem 32, as best shown in Figure 1, is slidably mounted in the passageway 25 and has its lower threaded portion accommodated in a pocket 35 formed integrally with the lid 30, the pocket 35 being normally covered by a cap 36 threadedly secured to the lid 30, and having an air-admittance opening 37.

The pocket 35 accommodates a compression spring 38

3

confined between the bottom of the pocket and a washer 39 slidably retained on the valve stem 32 by a nut 40 threadedly engaged on the lower portion of the said valve stem. The valve stem 32, in the manner indicated, is urged downwardly, as viewed in Figure 1, by the biasing action of the spring 38.

It will be understood that the force or downward urge of the spring 38 may be regulated or graduated by means of the nut 40. The nut 40 may be turned on the threaded valve stem to increase or decrease the degree of compression of the said spring with a view to maintaining the diaphragm 31 in the normal flat or undistorted condition shown in Figure 1, except as hereinafter described when undesired deviations of web alignment occur, which are corrected by this device.

A passageway or duct 41 extending through the lower cover plate 37 from the cavity 29, registers with a duct 42 having a baffle 42a and located in an outer section 43 of the thickened wall portion 24 of the assembly 21. The duct 42 communicates with another duct 44 arranged transversely between adjacent surfaces of the said outer section 43 and the thickened wall portion 24. The passageway or duct 44 communicates, as by the pipe 45, with an evacuating or pressure source (not shown) of conventional design.

A short passageway 46 arranged transversely to the passageway 41 is connected to a pipe 47, passing through a filter 48 and communicating at its upper end with a tube 49 supported in the frames 11 and 11a.

The passageway 25 is in alignment with the short duct 26a and counterbore 26b, and is closed at the top and bottom by valve bodies or heads 32a, 32b on the valve stem 32. Adjacent the upper end of the passageway and communicating therewith and with the counterbore 26b when the valve stem 32 is moved to raise its valve heads 32a, 32b from their seats, is a somewhat irregular-shaped duct or recess 50 normal to and joining the passageway 25 and the upper part of the hollow body portion 22. In a somewhat similar fashion, a lower duct following a zig-zag path 51, communicates with the passageway 25 and with the lower portion or chamber of the bore of the hollow body portion 22. It is to be understood that passageway 25, below the lower valve head 32b, is normally at atmospheric pressure by means of a small orifice 51a arranged in the thickened wall portion 24 and communicating with the outer air.

The assembly 21 has a centrally-positioned, inwardly directed partition 52 which may be considered as dividing the hollow body portion into two chambers; i. e., an upper chamber 52a and a lower chamber 52b. The partition is centrally apertured to accommodate the adjacent, oppositely-directed, aligned shaft portions or ends of a dual piston 53 having an upper and a lower portion fastened to a reduced section of a piston rod 54, as by the nut 55. Packing rings, as at 56, on the dual piston 53, serve to maintain a fluid-tight seal with the upper and lower chambers of the hollow body portion 22.

The upper and lower chambers of the hollow body portion are filled with a viscous fluid, such as oil 57, and communicate, one with the other, via the annular space encircling the adjacent ends of the upper and lower portions of the dual piston 53.

The upper portion of the piston rod 54 is slidably accommodated in the centrally-apertured upper cover 26, and is pivotally connected, as at 58, with a link 59 that, in turn, is pivotally connected, as at 60, with the bell crank lever 14. Axial motion of the piston rod 54, imposed by the attached dual piston 53, it will be observed, will communicate a rocking motion to the bell crank lever 14 on its fulcrum support 12a. This rocking motion of the lever 14 will cause a lateral movement or adjustment of the two rollers 18, 19 mentioned above.

The horizontally positioned tube 49 that communicates with the pipe 47, has fastened at one end thereto a bracket 61 having an adjusting screw 62 threadedly arranged in

4

the adjacent upright 11a. A hand-wheel 63 fast on the stem of the adjusting screw 62 provides convenient manipulation of the latter, when desired, for the lateral adjustment of the tube 49.

A shoe 64 fast on the outer surface of the tube 49, has a small orifice 65 on its surface that communicates with the interior of the tube 49. This orifice is normally located so that a line drawn transversely through the centre of the orifice will be in alignment with the left hand edge of the web "W."

It is to be observed that the pins or studs 12a and 13a are located somewhat closer to a line extending longitudinally and centrally between the two uprights or frames 11 and 11a, than pins 16a, 17a. By virtue of this construction, the pins 16a and 17a and consequently the adjacent attached portions of the levers 14, 15 are movable, as indicated by the dot-dash lines. The net result of the movement mentioned may be understood, by way of example, by reference to Figure 3 wherein the two parallel rollers 18, 19 are shown tilted angularly to an equal extent with the result that the web "W" will follow the path illustrated in Figure 3.

In further accordance with the invention, the lever 15 may have an extension or fork, as at 15a, that is adapted to engage an arm or finger 66a of an adjacent double-acting limit switch, of conventional design, indicated generally at 66 and fastened to the frame 11a. It will be understood that means (not shown) connected to the limit switch 66 may permit the corrective action of the above-described mechanism to be transmitted to a preceding web side registry mechanism for an initial or coarse adjustment of the side registry of the traveling web.

The function and mode of operation of the device has been in part indicated, but may be summarized as follows:

Assuming the parts are in the predetermined normal or neutral running position illustrated in Figure 1 wherein the left-hand edge of the web "W" covers one-half of the orifice 65 of the shoe 64 on the air-conducting pipe 49, and further assuming that a vacuum-creating source (not shown) has been connected to pipe 45, air drawn through the half-closed orifice 65 will flow through tube 49 into pipe 47, duct 42, duct 44 and thence through pipe 45 to the aforesaid evacuating source. The orifice 65 is so designed that air flowing into it, when partly obstructed, as by the baffle 42a, will create a moderate vacuum in the cavity 29 tending to urge the stem 32 upwardly. This tendency is counterbalanced by the downward urge of spring 38 so that the diaphragm 31 is maintained substantially flat, and the valve heads 32a, 32b exactly covering the entrance to the opening 26b and the bottom of the tubular passage 25 which communicates with the zig-zag duct 51 and consequently with the lower chamber 52b.

If the web "W" should be displaced to the right, as shown in Figure 3, the left-hand edge of the web "W" would completely uncover the orifice 65 and air would freely enter the latter with a consequent increase of air pressure in the cavity 29 thereby permitting the spring 38 to urge the valve stem 32 downwardly. Under the conditions last-described, the air, freely entering the passageway 25, via duct 42 and duct 44, will pass into the lower chamber 52b of the assembly casing via the zig-zag duct 51. Simultaneously, air at atmospheric pressure will enter the port or duct 26a in the upper cover plate and thence, through port 26b and duct 50, into the upper chamber 52a. The dual piston 53 will be urged downwardly by the air pressure last-indicated, but the movement of the said dual piston will be damped or resisted by the viscous fluid designated generally at 57 on either side of the partition 52, thus preventing unduly quick motions of the said piston and assuring its smooth operation.

The downward movement of the piston 53 alluded to will angularly move or rock the bell crank lever 14 on its fulcrum pivot 12a and consequently tilt or move rollers 18, 19 and the web "W" engaged by them, from right to left, as viewed in Figure 3, to an extent sufficient to half-

5

cover the orifice 65. This will return the parts to their normal running position and the web "W" is then in correct running position.

If the web "W" should be positioned too far to the left thereby completely covering the orifice 65 and thus preventing entrance of air, the vacuum in cavity 29 will be accentuated and the diaphragm 51 then urged upwardly so that the attached valve stem 32 will correspondingly move upwardly to displace its upper and lower valve heads 32a, 32b from their normal positions, as illustrated in Figure 1.

By this movement of the valve stem 32, the upper valve head 32a will initially uncover and place duct 50 into communication with the passageway 25 which meanwhile has been maintained in a state of partial vacuum via the exhausting pipe 45. Simultaneously, the lower valve head 32b will uncover the zig-zag duct 51 into communication with the lower portion of the passageway 25, which portion is at atmospheric pressure, as above-indicated, by virtue of the orifice 51a leading to the outer air.

The combined effect of the partial vacuum communicated to the upper chamber 52a plus the introduction of air at substantially atmospheric pressure into the lower chamber 52b via the now open zig-zag duct 51, lower portion of the passageway 25 and orifice 51a, will urge the dual piston 53 upwardly. This upward movement of the piston 53 will rock the bell crank lever 14 in a clockwise direction and consequently move the rollers 18, 19 and thereby the web "W" from left to right. This will partly uncover the orifice 64 in the shoe 64 to the neutral mid-position and therefore restore the state of equilibrium of the diaphragm 31 that previously existed, and as described above. The web "W" will now be restored to the normal or neutral position illustrated in Figure 1.

While the device has been described and illustrated in its preferred form as operating through the intermediary of a vacuum-creating source, it is also equally operable by fluid pressure in excess of atmospheric pressure. For this last-mentioned mode of operation, no change in the design or construction of the device is required, but the spring 38 is withdrawn from the pocket 35 in the lid 30, placed within the cap 36 under the washer 39 and seated on the floor of the said cap.

This is effected by merely removing the threaded cap 36 from the lid 30, and the washer 39 and nut 40 from the end of the valve stem; then threading the nut 40 back on the valve stem sufficiently to permit the valve stem to accommodate the spring 38, then sliding the washer 39 up on the valve stem and into contact with the pressure-adjusting nut 40, then inserting the spring 38 within the cap 36, and then threadedly engaging the latter with the lid 30. The spring 38, now seated on the floor of the cap and compressingly confined between it and the washer 39, will communicate an upward thrust or urge to the under side of the washer 39 and consequently to the valve stem 32 with its attached valve heads 32a, 32b.

As previously described with reference to the operation of the device by vacuum-creating means, the urge of the spring 38, in this instance an upward urge, may be varied by turning the nut 40 on the threaded valve stem in order to maintain the diaphragm 31 in the normal flat condition shown in Figure 1 or until deviations of web alignment occur and which require corrections that are performed by the instant device.

The operation of the device from a fluid pressure source instead of the previously-described vacuum creating source, is as follows:

With the parts, including the web "W" in the normal position illustrated in Figure 1, air under pressure will flow through the pipe 45 from the pressure source (not shown) into the passageway 25, past the baffle 42a and through duct 42, into the recess 29 with a pressure drop as it enters the latter which communicates with the outer air via the pipe 47, tube 49 and orifice 65. The orifice

6

65, as shown, is normally half-covered by the edge of the web "W."

If the orifice 65 should become more exposed by movement of the web "W" to the right, an increased flow of air will take place and the pressure in the recess will decrease. The spring 38, in this instance, by virtue of its normal upward thrust against the under side of the washer 39 abutting the nut 40 threaded on the valve stem 32, will overbalance the downward pressure in the recess 29 imposed by the compressed air on the flexible diaphragm 31, and will move upwardly the valve stem 32 with its attached valve heads 32a, 32b. The compressed air pressure will enter the upper chamber 52a via the now exposed duct 50 from the passageway 25. Simultaneously, air at atmospheric pressure will enter the lower chamber 52b of the casing assembly 21, through orifice 51a zig-zag duct 51. The dual piston 53 will now move downwardly, thereby rocking the bell-crank lever 14 in counter-clockwise direction and consequently moving rollers 18, 19 and web "W" to the left sufficiently to cover the orifice 65 to establish the corrective action described above with reference to the operation of the device by means of vacuum-creating instrumentalities.

If the web "W" should shift from the position illustrated, to the left thereby covering the orifice 65, the air pressure will obviously increase in the duct 42 and recess 29, thereby forcing the diaphragm 31 downwardly to admit the compressed air into the lower chamber 52b via the zig-zag duct 51. At the same time, the upper duct 50 will communicate the upper chamber 52 with the outer air through the short duct 26a and counterbore 26b. The increased air pressure in the lower chamber 52b will now force the dual piston 53 upwardly, thus rocking the bell-crank lever 14 in a clockwise direction to move the attached rollers 18, 19 and the web "W" to the right, thereby uncovering the orifice 65 until a position of equilibrium with respect to the operating components is reached, as heretofore explained in detail.

It is to be understood that the invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof, and it is therefore desired that the present embodiment be considered in all respects as illustrative and not restrictive, reference being had to the appended claims rather than to the foregoing description to indicate the scope of the invention.

What I claim is:

1. In a device for maintaining side registry of a running web, a frame, a pair of web-guiding rollers arranged in opposed parallelism and engaging opposite sides of a running web, a pair of bearing boxes pivotally connected to opposite ends of said web-guiding rollers, a pair of levers hingedly connected to said pair of bearing boxes, a pair of brackets fastened to the frame and rockably supporting said pair of levers, an assembly fastened to one of said brackets and having a piston slidable therein, a connecting rod secured to said piston and hingedly connected to one of the levers, said assembly including a cylinder and valve means, said valve means controlling the flow of liquid into and out of said cylinder, a tubular member slidably mounted on the frame and having a fluid-admittance orifice, said orifice being slidably engaged by the running web, manually-operable means connected to the tubular member and to the frame, said manually-operable means being constructed and adapted to vary the position of the tubular member with respect to the frame and consequently to vary the position of the orifice relatively to the running web; and other means connecting the valve means to the tubular member and to a source of fluid pressure.

2. In a device for maintaining side registry of a running web, a frame, a pair of web-guiding rollers arranged in opposed parallelism and engaging opposite

sides of a running web, a pair of bearing boxes pivotally connected to opposite ends of said web-guiding rollers, a pair of levers hingedly connected to said pair of bearing boxes, a pair of brackets fastened to the frame and rockably supporting said pair of levers, an assembly 5 fastened to one of said brackets and having a piston slidable therein, a connecting rod secured to said piston and hingedly connected to one of the levers, said assembly including a cylinder and valve means, said valve means being constructed and adapted to control the flow 10 of fluid into and out of said cylinder, a tubular member slidably mounted on the frame and having a fluid-admittance orifice, said orifice being slidably engaged by the running web, a threaded member engaged in said frame, a bracket fastened to the threaded member and 15 to the tubular member, said threaded member being constructed and adapted to shift the last-mentioned bracket and the tubular member in a plane normal to the frame, and other means connecting the valve means to the tubular member and to a source of fluid pressure.

3. In a device for maintaining side registry of a running web, a support, a pair of web-guiding rollers arranged in spaced parallelism and adjustably mounted on said support, said rollers being engaged with and effective to guide a running web, a tubular member mounted 20 on the support and having a fluid-admittance orifice, manually-adjustable means connected to the tubular member and to the support, said manually-adjustable means

being effective to move the tubular member relatively to the support and said orifice being slidable by an edge portion of the running web, an assembly connected to the support, a partition arranged within the assembly and having an opening, a piston slidably mounted within the assembly and having a connecting rod passing through the opening, a pair of levers rockably connected to the support, a pair of bearing boxes hingedly connected to said pair of levers and rotatably supporting said rollers, a hinged connection between the connecting rod and one of said pair of levers, a viscous fluid within said assembly and on either side of said partition, said viscous fluid being contactable with interior, opposed portions of the piston and adjacent opposed surfaces of the partition, valve means within the assembly and operable by fluid pressure, and tubular means connecting the valve means to the tubular member and to a source of fluid pressure.

References Cited in the file of this patent

UNITED STATES PATENTS

632,744	Petsche	Sept. 12, 1899
1,634,984	Dickhaut	July 5, 1927
1,982,685	Muller	Dec. 4, 1934
2,281,965	Sylie	May 5, 1942
2,431,557	Hornbostel	Nov. 25, 1947
2,491,636	Amos	Dec. 20, 1949