April 30, 1935. D. M. DAVIS 1,999,587

CONVEYER MECHANISM

Filed July 18, 1931 2 Sheets-Sheet 1

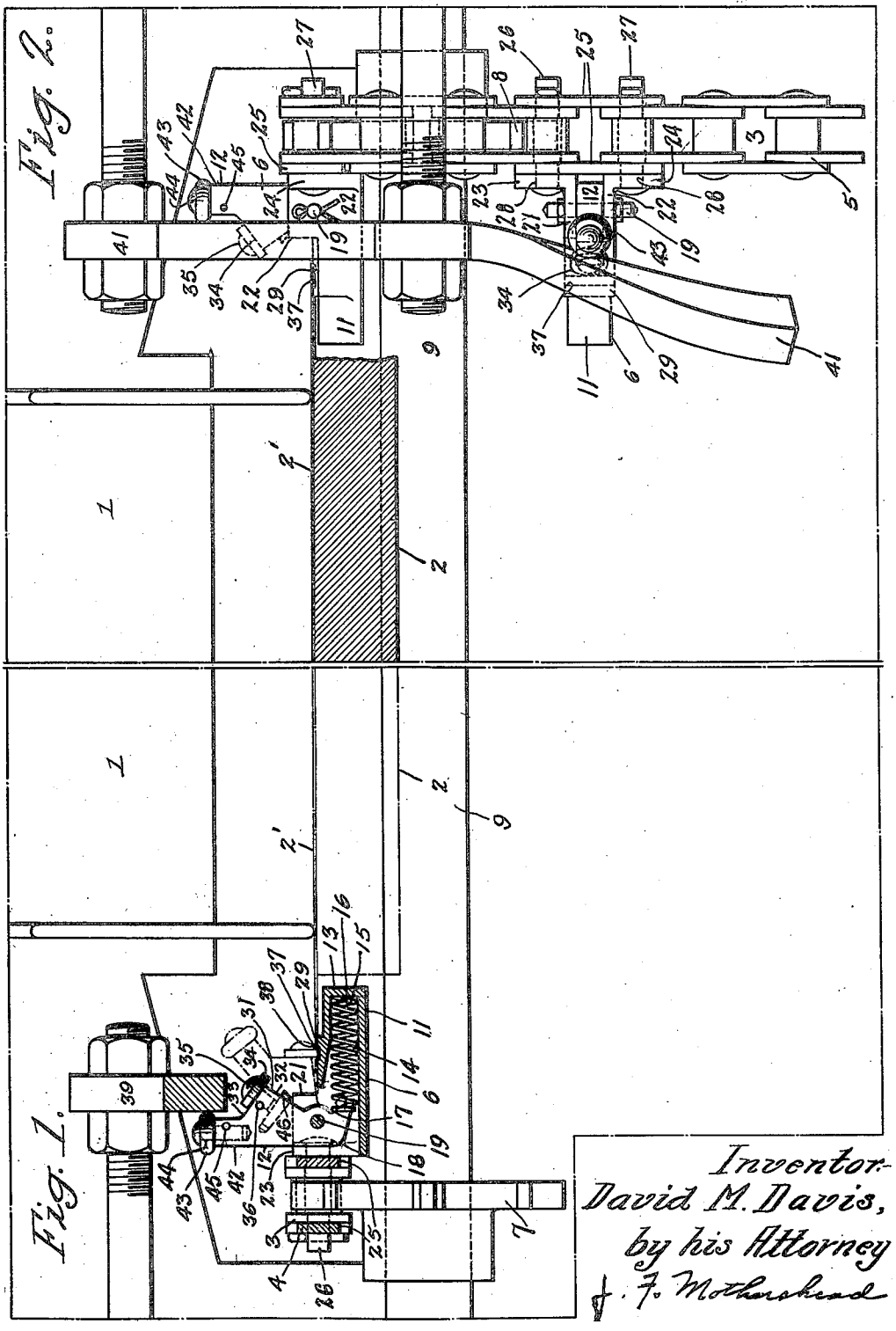


Fig. 2.

Fig. 1.

Inventor.
David M. Davis,
by his Attorney
J. F. Motherhead

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Fig. 3

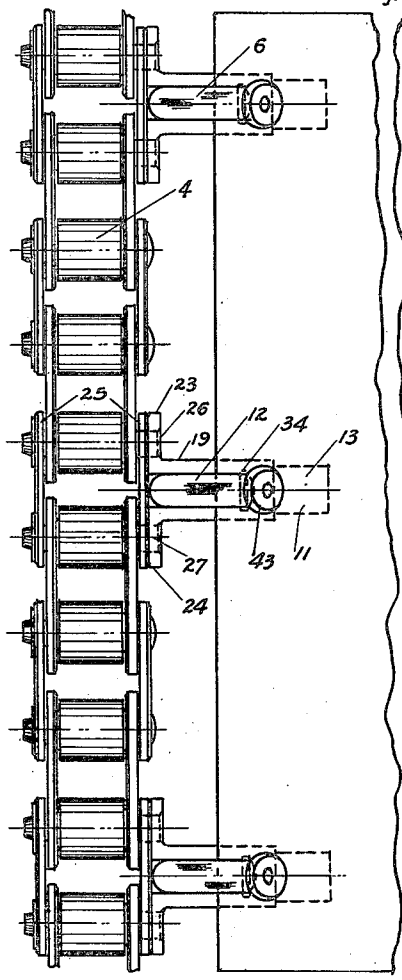
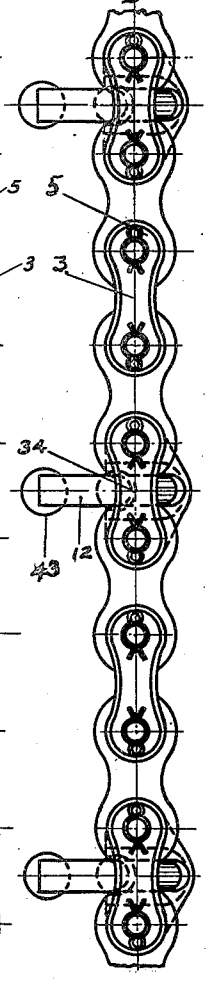


Fig. 4



INVENTOR.

David M. Davis

BY

J. F. Mochersheed

ATTORNEY.

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CONVEYER MECHANISM

David M. Davis, Washington, D. C.

Application July 18, 1931, Serial No. 551,621

10 Claims. (Cl. 34—12)

The present invention relates to improvements in conveyer mechanism, such, for example, as is shown in Letters Patent No. 1,613,445, granted January 4, 1927, upon the application of David M. Davis and William B. Freeman.

One object of the present invention is the provision of improved material-gripping means for conveying mechanism.

Another object of the present invention is the improvement of the conveyer mechanism shown in the aforesaid patent by the inclusion of means which permits the contraction of wet printed paper as it passes through the drying apparatus without releasing the same and without wrinkling or otherwise distorting the paper.

Other objects and advantages of the invention will appear more fully hereinafter, when taken in connection with the accompanying specification, claims and drawings, wherein

Fig. 1 is a vertical sectional view of the left hand portion of the drying apparatus and associated conveyer mechanism embodying the present invention;

Fig. 2 is a similar view of the right hand portion of the drying apparatus and conveyer mechanism, but taken through a vertical plane which includes the feed table;

Figs. 3 and 4 are detail, front and side elevational views, respectively, of a short section of the conveyer mechanism, illustrating the supporting of a sheet of paper by a plurality of longitudinally spaced gripping devices.

Referring to Figs. 1 to 4, inclusive, of the drawings, the drying apparatus illustrated therein may take in general the form of that shown in the aforesaid patent, comprising a main casing 1 provided with suitable drying means. Conveniently positioned just in front of the opening to the main casing 1 is a feed table 2 which is supplied with wet printed sheets 2' from an adjacent printing machine (not shown).

Among other things, the present invention contemplates improved conveyer mechanism 3, whereby the previously printed wet sheets may be successively moved from the feed table 2 through the drying casing 1 and subsequently discharged therefrom without any evidence of wrinkling or distortion. At the same time, the invention contemplates a conveyer mechanism which permits the contraction of the paper, at least in one of its dimensions, without releasing the same from the conveyer mechanism. To this end, the conveyer mechanism 3 is conveniently formed of a pair of spaced endless conveyer chains 4 and 5 and pairs of opposed sheet gripping devices 6 positioned on the pitch line thereof.

As shown in Figs. 1 and 2 a vertical section of the conveyer mechanism, which is positioned outside of the main casing 1 of the drying apparatus, extends upwardly and around a pair of sprocket wheels 7 and 8 which are mounted on a driven sprocket shaft 9 extending therebetween. From the sprocket wheels 7 and 8, the conveyer chains extend forwardly into the main casing 1, carrying with them wet sheets of paper from the feed table 2, as will presently appear in greater detail.

Referring more particularly to the gripping devices 6, as shown in Figs. 1 to 4 inclusive, each of these devices comprises a pair of jaw members 11 and 12. The jaw member 11, may be conveniently formed of a bronze casting, and it is provided with a tubular-like portion 13 having a recess or chamber 14 adapted to receive a helical spring 15. One end of this spring abuts against a closed outer end 16 of the tubular portion 13 and the other end abuts against a shoulder 17 on an arm 18 of the other jaw member 12.

The jaw member 12 is conveniently pivoted on a pin 19 extending between upwardly projecting side lugs 21 and 22 having transversely extending portions 23 and 24, respectively. The lug portions 23 and 24 are secured in abutting relation to a link 25 of the conveyer chain in any convenient manner, as by extending connecting pins 26 and 27 of the chain through openings 28 in the lug portions 23 and 24 and riveting over the exposed end portions of said pins.

The upper side of the stationary jaw member 11 is provided with a substantially flat, sheet-supporting surface 29 which is positioned on the pitch line of the sprocket chain to which it is attached. When the gripping device 6 is in the vertical sheet-receiving position shown at the top of the vertical chain section illustrated in Figs. 1 and 2, this sheet-supporting surface is also positioned in the same plane as the upper side of the feed-table 2.

The jaw member 12 of the gripping device is provided with a portion 31 having a lower wall 32 substantially parallel to the sheet-supporting surface 29 of the jaw member 11 when the gripping device is in the closed position shown in dot-and-dash line in Fig. 1, and also having a front wall 33 at right angles thereto. Positioned in abutting relation to the wall 33 is a disk 34 which is rotatably supported on a pin 35 suitably mounted in the adjacent portion 31 of the upper jaw member 12 and secured therein by means of a locking pin 36. The disk 34 is thus

mounted for rotary movement about an axis at right angles to the direction of movement of the conveyer mechanism, that is, about an axis substantially parallel to the surface of the sheet and transverse to the length thereof; and this disk is of such dimensions as to extend below the lower wall 32 of the upper jaw member 12 and engage the adjacent sheet-supporting surface 29 of the lower jaw member 11.

In practice, the adjacent edge of the sheet of wet paper, which is to be gripped and moved through the casing by the conveyer mechanism, is held in position on the horizontal sheet-supporting surface 29 of the lower jaw member by the spring pressed disk 34, which is in contact therewith, as shown in dot-and-dash lines in Fig. 1. However, should there be a tendency for the paper, in contracting in the direction of its width, that is, transversely of the length of the conveyer, to pull from under the disk 34 and thereby release the paper from the gripper, this may be prevented by forming a recess 37 in the sheet-supporting surface 29 of the lower jaw member 11 which serves as a seat for the adjacent co-acting edge portion of the movable disk 34. When this disk is seated in the recess 37, as shown in dot-and-dash lines in Fig. 1, the adjacent portion of the sheet of paper is forced into the recess 37, folding the same around a shoulder 38 of the recess.

Thus, contraction in the width of the paper is effectively prevented and the consequent release of the paper from the grippers avoided. At the same time, contraction of the paper in the direction of its length, that is, longitudinally of the conveyer mechanism is permitted by reason of the fact that the disk 34 turns on its supporting pin 35 as the paper contracts in length, all as will presently hereinafter appear in greater detail.

In order that the gripping devices may be actuated into their open, paper-receiving positions when they reach the feed table 2, a pair of cams 39 and 41 are conveniently positioned adjacent to the feed table 2 for co-action with the jaw member 12 of each of the gripping devices 6, as illustrated in Figs. 1 and 2 of the drawings. It will be noted that each of the jaw members 12 is provided with a projecting arm portion 42 which carries an anti-friction roller 43 on the outer end thereof adapted for engagement with one of the adjacent cams 39, 41, as shown in Figs. 1 and 2. The roller 43 may be supported on a stationary pin 44 keyed in position by means of a locking member 45. The jaw member 12 and its co-acting cam are so designed that when the gripping device moves into its sheet-receiving position illustrated in solid line at the top of Figs. 1 and 2, the disk 34 is moved entirely out of the path of the incoming sheet so as to permit not only horizontal sheet insertion as occurs in the apparatus illustrated, but also vertical sheet insertion.

When the conveyer mechanism is moved forwardly from the positions shown in the drawings, the jaw members 12 of the upper pair of gripping devices 6 are disengaged from the co-acting cams 39, 41, with the result that these jaw members snap downwardly under the force of the spring 15, moving the disks 34 into engagement with the paper with considerable force. The extent of this force may be regulated by means of a stop 46 extending outwardly from the wall 32 of the jaw member 12 and adapted to engage the adjacent upper side portion of the lower jaw member 11 when the gripping device is in its closed position. The stop 46 may take the form of a tapered pin which is suitably mounted in a tapered recess in the portion 31 of the upper jaw member 12. This stop 46 also serves to prevent undesirable wearing of the disk seat 37 by the disk 34.

In operation, the wet printed sheets 2' are conveniently transferred from the printing machine to the feed table 2 and are automatically fed forwardly (by means not shown), so that the forward side edges of the successive sheets engage the sheet supporting surfaces 29 of opposite jaw members 11 as shown in Figs. 1 and 2. The forward movement of the conveyer mechanism from the position shown in the drawings results in the jaw members 12 being disengaged from the co-acting cams 39, 41, whereupon the disks 34 are snapped into engagement with the adjacent edge portions of the wet printed sheets, resulting in securely gripping the same. The portion of the paper directly under the disks 34 is forced into the recesses 37, thereby further securing the paper and preventing the release thereof from the grippers upon the tendency of the paper to shrink in the direction of its width. Shrinkage in the direction of the length of the paper, that is, longitudinally of the conveyer is not retarded but rather assisted by reason of the rotary mounting of the disks 34, these disks turning upon the longitudinal movement of the paper occurring during the course of the drying operation.

The continued movement of the conveyer mechanism causes the next succeeding pair of gripping devices to be actuated into engagement with the cams 39, 41, and the raising of the jaw members 12 thereof into the vertical position illustrated at the top of Figs. 1 and 2. The rear side edge portions of the sheet in question now rest on the sheet supporting surfaces 29 of this pair of open gripping devices. Subsequent movement of the conveyer results in the actuation of the jaw members 12 out of engagement with their co-acting cams 39, 41, permitting the disks 34 to snap into engagement with the edge portions of the sheet of paper resting on the jaw members 11. Thus, a sheet of wet printed paper is securely supported at its front and rear side edges by two pairs of gripping devices which maintain their gripping contact with the paper throughout its desired path of travel in the drying apparatus. Additional pairs of gripping devices may be used if found necessary to support the paper properly. When the paper has been completely dried, the gripping devices associated with each sheet are opened by cam means (not shown) and the paper is permitted to pass into a desired receptacle. The gripping devices are then carried by the chains 4 and 5 into the paper-receiving position shown in Figs. 1 and 2.

It will be noted that the invention may be variously modified and embodied within the scope of the sub-joined claims. For example, the gripping mechanism may be used in other applications than the preferred one referred to herein and with other materials than paper such as sheet or web textiles.

I claim:

1. In a conveyer, a pair of spaced devices adapted to grip a contractible sheet therebetween, a second pair of spaced devices longitudinally spaced from said first-mentioned pair of devices and adapted to grip therebetween said sheet, said devices comprising coacting sheet-engaging parts, the sheet-engaging part of at least one device

being movable with contraction in the length of said sheet, while substantially immovable as the sheet tends to contract in the direction of its width, and means for mounting said sheet-gripping devices so as to support said sheet on the pitch line of said conveyer.

2. A conveyer comprising a plurality of gripping devices adapted to engage a sheet at longitudinally spaced points so as to support the sheet, the length and width of said sheet being subject to contraction, said gripping devices comprising co-acting parts adapted to permit relative movement between said sheet and said co-acting parts in the direction of one of the dimensions of said sheet only, one of said co-acting parts comprising a sheet-engaging element movable in accordance with the contraction of the sheet in the direction of one of its dimensions.

3. A conveyer comprising a gripping device adapted to engage one edge of a sheet, a second device in spaced relation to said first device and adapted to grip said edge of the sheet, at least one of said devices comprising a pair of jaws, spring means operative on at least one of said jaws, and a sheet-engaging and clamping member secured to one of said jaws, said member being positioned with the axis thereof substantially parallel to the surface of the sheet and transverse to the length thereof.

4. In apparatus of the class described, a device adapted to grip one part of a sheet, at least one dimension of which is subject to change, a second device adapted to grip another part of said sheet, at least one of said devices comprising a pair of jaws, of which one is provided with a movable member, and means for causing said last-mentioned device to grip said sheet with said movable member into engagement with the sheet, said member moving to permit change in said dimension.

5. A device adapted to grip a contractible sheet, comprising a sheet-supporting jaw member having a shoulder, said device also having a co-acting jaw member provided with a movable sheet-engaging disk, and means whereby said device is caused to grip said sheet with said disk so positioned as to fold the adjacent portion of said sheet over said shoulder, said disk moving with the contraction of the sheet in a predetermined direction.

6. A device adapted to grip a contractible sheet, comprising a jaw member having a recess, said device also having a co-acting jaw member provided with a movable sheet-engaging disk, and means for causing said device to grip said sheet, with said disk and the portion of said sheet in contact therewith positioned in said recess, said disk moving upon the contraction of said sheet in one direction.

7. A device adapted to grip a sheet, comprising a pair of co-acting jaws having sheet-engaging portions, means whereby said portions may be actuated into frictional engagement with said sheet, and a stop carried by one jaw for engagement with the other when the said jaw portions are in gripping engagement with said sheet.

8. A device adapted to grip a contractible sheet, comprising a pair of co-acting jaw members, one of said members having a chamber and a sheet-supporting surface, a spring in said chamber, the other of said members being fulcrumed upon the first-mentioned member and positioned to be actuated by said spring, and a sheet-engaging disk carried by one of said members movable upon the contraction of said sheet.

9. A device adapted to grip a contractible sheet, comprising a pair of co-acting jaw members, of which one is provided with a cam engaging portion and a sheet engaging disk, and means for causing said device to grip a sheet positioned between the jaws thereof, whereby the sheet may contract in the direction of one of its dimensions but not the other.

10. In combination, a pair of conveyer chains, and gripping devices secured to the links of said chains, said devices comprising a pair of co-acting jaw members, of which one is in the form of a casing adapted to receive therein a spring and to engage on the outside thereof one edge of a sheet positioned on the pitch-line of said sheets, the other jaw member having a cam-engaging portion and a sheet-engaging portion.

DAVID M. DAVIS.