July 10, 1962 H. L. SEIDEN 3,043,532

SHEET REGISTRY CONTROL

Filed Dec. 22, 1958 2 Sheets-Sheet 1

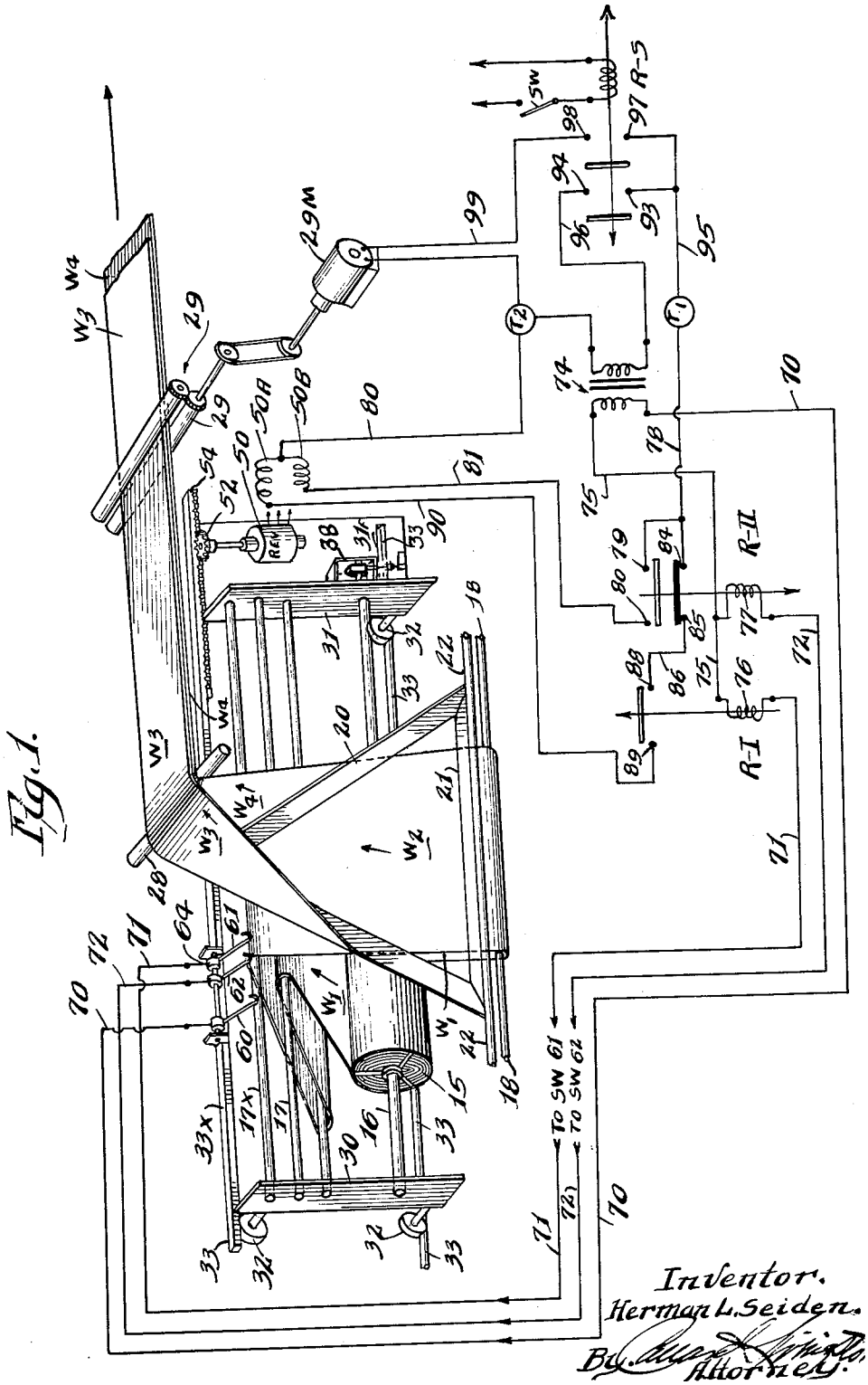


Fig. 1.

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Fig. 3.

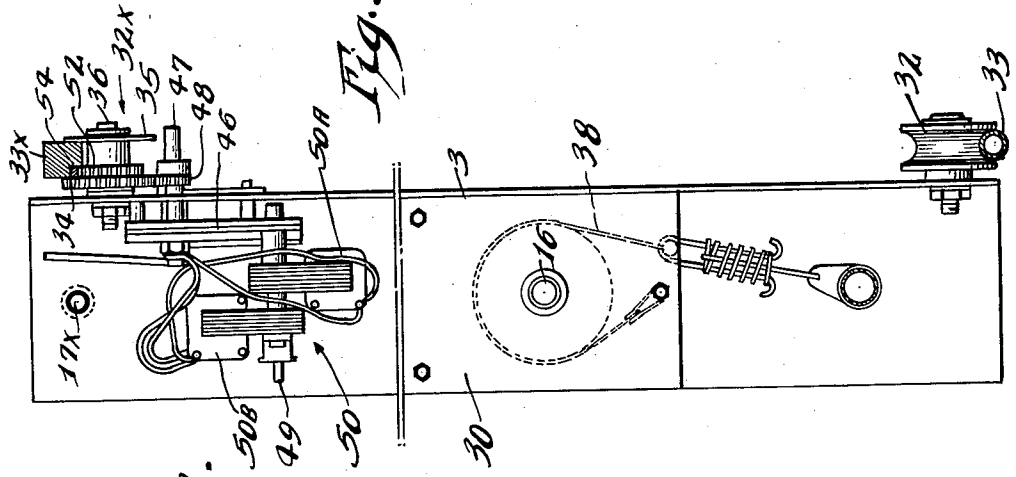


Fig. 2.

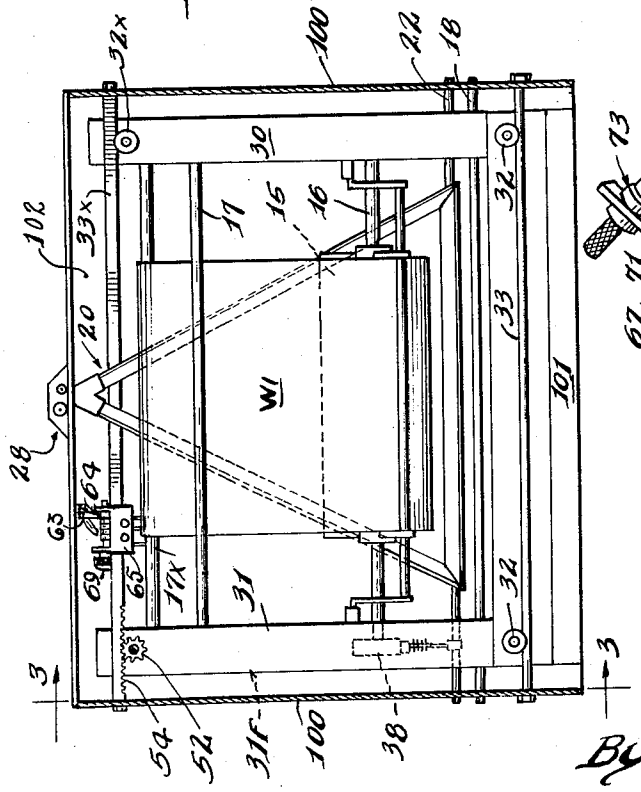
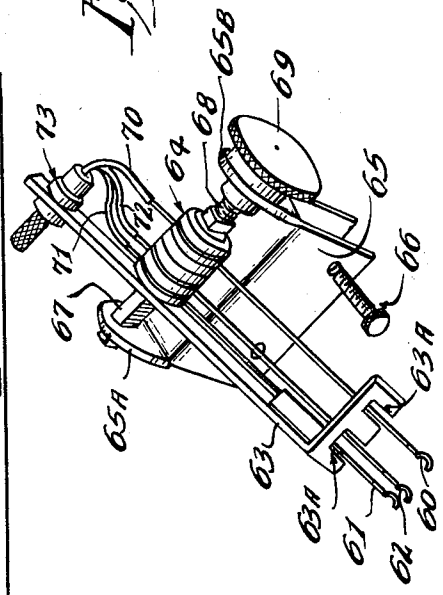


Fig. 4.



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SHEET REGISTRY CONTROL

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2 Claims. (Cl. 242—57.1)

The present disclosures relate to improvements in sheet-feeding mechanisms, and more particularly means for controlling or correcting the register of the sheeting by monitoring an edge of the web as it feeds outwardly from a roll of stock and correspondingly shifting the position of the stock foil to effect the necessary corrections in position of the web.

In its more detailed aspects, the invention provides a shiftable carriage for supporting a roll of sheeting, a motor means for reversibly shifting the carriage small distances to correct the register of the web; and circuit means including feeler contact means of improved character for sensing the meander of at least one edge of the sheet and accordingly actuating the corrective motor means as necessary.

Still further features of novelty and utility relate to details of the construction and operation of the shiftable carriage means, the monitoring feeler means, and the corrective motor and control circuit, all of which will appear more fully as the following description proceeds in view of the annexed drawings, in which:

FIG. 1 is a skeletonized schematic in perspective of parts of a sheet-feeding and forming apparatus employing the new register means together with control circuit means therefor;

FIG. 2 is a vertical section through a commercial embodiment of a sheet-feeding and forming machine incorporating the mechanisms shown in FIG. 1, parts being shown in elevation;

FIG. 3 is a side elevation of the sheet carriage to enlarged scale, as seen in the direction of lines 3—3 of FIG. 2;

FIG. 4 is an enlarged perspective detail of the sheet-monitoring feeler-contact unit.

In making bags from heat sealable polyethylene sheeting and like synthetic films, it is the practice according to one method to fold a stock web of single thickness into one of double thickness, then cut off desired sections of the double web and heat-seal or weld the opposite lapped free or cut edges to form the two sides of the bag, the fold which results from the doubling of the sheet into two layers constituting the bottom of the bag, and the top margins opposite thereto forming the top of the bag which will be left open until the bag is filled.

It is frequently desirable to provide a gusset in the aforesaid fold corresponding to the bottom of the bag to present a more shapely (square) appearance when filled with bulky objects such as potatoes, apples, and the like; but whether such gussets are formed or not, the folding operation alone requires that the sheet web be advanced to the folding means in an optimum condition of register so that the sheet will run true and the lapped edges will match up when the fold is completed.

There are a number of reasons why the sheeting tends to run or meander continually out of register, the chief of these being the fact that the thin, somewhat flexible synthetic sheeting, despite precautions, tends to wind unevenly into the stock rolls, and consequently unwinds with like unevenness. Other factors such as electrostatic properties, variations in thickness and width of the sheeting, stretch, and the like, make it necessary to correct the travel of the sheeting constantly.

One of the principal reasons for effecting such corrections in fabricating heat-sealed or welded bags is to assure the proper lapping of the superposed edges of the folded-over sheeting so that when those lapped edges are welded the seam can be kept narrow and close to the edge.

The invention is described in its broader aspects in view of FIG. 1, wherein a roll 15 of polyethylene sheeting is rotatably carried on a stock spindle 16, and the unwinding web W_1 is looped back and forth over a system of feed rollers 17, 17X, and ultimately over a bottom feed roller 18 to travel upwardly as the infeeding single-thickness web W_2 for advance into engagement with the main folding or lapping means in the form of a stationary triangular guide 20 welded along its base member 21 to a base bar 22.

The sheeting is restrained from reeling out by a brake means 38 applying friction to stock spindle 16. As the sheet web W_2 rises over the converging opposite sides of the triangular form, the upper apex or nose portion of which confronts the middle of the single sheet, the latter is folded over into two smaller overlapping webs W_3, W_4.

At this juncture, the feeding direction is changed 90 degrees by bringing the lapped webs straight up and over a top folder outfeed roller 28 with the web W_3 on top of web W_4, which rides over said roller.

The lapped webs are pulled in this entire operation by motor-driven feed-roller means 29, which in practice are preferably part of a sheet-feeding, measuring, sealing, and cut-off machine (not otherwise shown), or as shown for example, in my copending application, Serial No. 745,165. The feed-roller means 29, however, may be incorporated as a part of the present machine if desired.

Ostensibly, the long edges of the rolled sheeting are supposed to be straight, and if this were the fact and it were practically possible to keep the advancing web moving always in a straight path over the form 20, notwithstanding the unevenness of the winding or stock roll, the problem of registry would not be so serious. But in practice the stock sheeting does not have true edges and the web will not run true and efforts to guide the sheet margins prove futile.

Accordingly, the present apparatus provides correction by shifting the stock roll and the web-guiding means together, this being achieved by mounting the stock spindle 16 and the several feeding, tension, and guide rollers 17, 17X on a shiftable carriage comprising, as shown schematically in FIG. 1, a pair of bracket plates 30, 31, each having pairs of upper and lower trolley wheels 32 respectively riding on upper and lower track rods 33, 33X, the latter being supported in fixed position as parts of a cabinet or chassis structure (to be described more particularly hereinafter), it being noted here, however, that the triangular form 20 and out-feeding roller 28 are also supported by this cabinet or chassis and hence are likewise stationary relative to the shiftable carriage means 30, 31, 32, etc.

Motor means for shifting the carriage includes a reversible electric motor 50 of a known type having a built-in reduction gear and mounted on a flange 31F of one of the carriage plates and fitted with a pinion means 52 drivingly meshing with a stationary gear rack 54, also carried by a bar on the cabinet, or chassis. Thus, when motor 50 is energized, the carriage means 30, 31 and various spindle appendages, will move on its trolley wheels 32 on track rods 33, the direction of movement depending on the circuit connections to motor 50.

Means for controlling the motor 50 directionally includes a control circuit comprising a set of three feeler contacts or fingers 60, 61, 62 carried on insulating means 64, which in turn is adjustably carried by the cabinet or chassis, referred to more particularly hereinafter.

The feeler contacts are disposed to bear upon a metal web-guiding rod 17X over which the single-thickness web

portion W_1 moves toward the folding form 20, the size and disposition of these fingers being exaggerated in FIG. 1 to emphasize the fact that the two innermost fingers 61 and 62 (nearest the sheet edge) are quite close together, while the outermost third finger 60 is spaced away from the other two by a considerably greater distance.

The pair of inner fingers 61, 62 controls the range of meander or excursion, while outer finger 60 rides continually on the rod 17X to connect power thereto and serves as a common ground for the two control fingers 61, 62.

As the sheeting meanders back and forth (i.e. axially) on rod 17X it will pass beneath fingers 61 and 62, breaking the circuits thereof to rod 17X.

When the sheet web rides beneath only the innermost finger 61 it is travelling in the proper register range; and when it shifts either beneath both fingers 61, 62 (i.e. to the left, FIG. 1) or out from beneath both fingers 61, 62 (to the right, FIG. 1) it is beyond the permissible range of excursion and one or the other directional windings 50A or 50B of the carriage motor will be energized to correct the condition.

As depicted in the circuit diagram of FIG. 1, the common ground feeler 60 is connected via conductor 70 to one terminal of a low-voltage transformer 74, the remaining terminal of which connects via conductor 75 to one side of the windings 76, 77 of a pair of motor control relays generally indicated at R–I, R–II, each of which controls connection of power to one of the reverse windings of the carriage motor 50.

The remaining terminals of each relay coil connect via conductors 71, 72, respectively, to one of the feeler fingers 61 or 62. Thus, when the sheet web permits finger 62 to touch the bar 17X relay R–II pulls in; or relay R–I pulls in if the absence of sheeting beneath feeler 61 permits it to touch spindle bar 17X.

When the web is travelling beneath both feeler fingers 61, 62, both relays R–I, R–II are dropped out since there is no power on conductors 71, 72 to their coils 76, 77. In this condition of things motor winding 50B will be energized by closure of the normal contacts 79–80 on relay R–II when it drops back (from the pulled-in condition of FIG. 1), thus connecting power from terminal T_1, conductor 78, said contacts 79, 80, and jumper 81 to winding 50B, which will cause the carriage to shift in a direction toward the right, FIG. 1, tending to shift the web from beneath feeler 62, toward feeler 61; but as soon as this shift permits feeler 62 to contact the bar 17X, relay R–II pulls in again, breaking this motor circuit as its contacts 79—80 to stop the motor.

Should the web wander from beneath the innermost feeler 61, both relays R–I, R–II will pull in, thus energizing the other carriage motor winding 50A by power from terminal T_1, conductor 78, R–II contacts 84, 85 closed, jumper 86, R–I contacts 88, 89 closed, conductor 90 to winding 50A, thus shifting the carriage and hence the web in the opposite direction, i.e. back toward the left and feeler 61 (FIG. 1) until feeler 61 is separated from 17X to drop out relay R–I and break this motor-operating circuit to winding 50A at R–I contacts 88, 89. Since relay R–II at this time is pulled in the circuit to the other winding 50B at R–II contacts 79, 80 are open.

The feeler fingers 60, 61, 62 are very highly constructed and dimensioned so that the control pair 61—62 can be positioned close to each other to define the permissible range of meander, for instance within about one-sixteenth inch, and also to minimize drag pressure on the sheeting. To prevent bending these fingers by collision of the sheet edge therewith in any gross shifting of the web while it is not running out, a supervisory control circuit is provided to disable the registry monitoring and control circuit whenever the sheet stops paying out. This supervisory circuit utilizes a third relay means R–S, the coil 92 of which is energized from any suitable master control means such as a starting switch or relay switch SW associated with the present apparatus or with an auxiliary sheet-feeding, sealing, or bag-making machine, which hauls the sheeting to and through it.

Whenever the supervisory relay pulls in, its contacts 93—94 are closed to complete a power circuit for the transformer 74 via conductors 95, 96, thus conditioning the registry monitoring unit for operation. Also, contacts 97, 98 on the supervisory relay means start the sheet-feeding motor 29M via conductors 95, 99, so that the sheeting must normally be in motion at any such time as the registry monitoring or controlling apparatus is effective to start the carriage motor 50.

A commercial embodiment of the sheet-feeding and forming apparatus described in the schematic of FIG. 1, provides a chassis in the form of a skeletonized or open-type cabinet shown in section in FIG. 2 to include a pair of end-wall plates 100 tied together by narrow upper and lower cross panels 101, 102 bolted thereto, and by the cross rods 18, 22 and trolley rods 33 heretofore mentioned. Thus, the cabinet is open at its top, front, and rear sides, and is closed only at its opposite ends by wall plates 100.

The registry control unit 64 may be clamped in any position along the square top rod 33X and for this purpose, as depicted in FIG. 4, the feeler fingers 60, 61, 62 are mounted on a U-shaped bracket stamping 65 which fits slidably on said square rod and can be clamped down by nut and bolt means 66 (FIGS. 2 and 4).

The assembly of insulating spacers 59 and feeler fingers 60, 61, 62 is clamped on a cross rod 67 squared at one end to key and slide in a trunnion flange 65A struck up from the bracket with the opposite end of the rod tapped to receive the threaded stem 68 of a knob 69 supported in the other upset bracket flange 65B.

Also clamped onto the square rod 67 with the feelers is a long guard bar 63 having an offset end in which are formed long slots 63A through which the contacting ends of the feeler fingers project, these slots being wide enough to permit turning the knob 69 to slide the same sidewise therein small amounts to selectively position them relative to the control edge of the sheeting on cross bar 17X.

The conductors 70, 71, 72 to the feeler fingers are preferably carried in a sheath or cable tied to the guard bar 63 as at 73 (FIG. 4).

As depicted in FIG. 3, the shiftable carriage means is supported at the bottom on a round rail 33 which may be ordinary steel tubing with ball bearing pulley wheels 32 appropriately grooved to ride securely thereon. But at the top of the carriage the rod 33X is made square in cross section and has a lower part of its face routed out to provide a seat for the gear rack 54, which meshes with drive pinion 52, forming an assembly part of the upper pulley or trolley wheel means 32X. A second pinion 34 of larger diameter is made fast with pinion 52 and defines one side of the "grooved" part of this upper pulley means for confining therein the square upper trolley rod, the opposite side of this groove being defined by a disc 35 on the outer end of the pulley spindle 36.

Any suitable form of reversible motor 50 may be employed, but in the construction portrayed in FIG. 3, a very economical arrangement has been provided in the form of two small self-starting induction motors reversely driving a common shaft 49 coupling into a small reduction gear unit 46, the output shaft 47 of which is provided with a driving pinion 48 meshing with the larger pulley gear 34.

Thus, the reversible motor means 50 will produce reverse torque on the common shaft 49 depending on which of the respective windings 50A or 50B of the two common-shaft motors is energized by the control circuit means of FIG. 1.

I claim:

1. In a sheet-feeding machine of the type employing a stationary frame and a sheet-roll carriage shiftable on said frame back and forth relative to a desired sheet-feeding path, improvements comprising: a stationary cross bar on said frame parallelling the line of shifting

movement of said carriage; a rack of gear teeth formed on said bar lengthwise thereof; a pinion journalled on said carriage to engage said rack for rotation in opposite directions to shift the carriage as aforesaid; reversing motor means on the carriage driving said pinion; and feeler means comprising a bracket slidably carried on said bar and including three spaced-apart feeler contact fingers carried by said bar, two particular ones of which are closer together than the distance separating them from the third finger; a conductive sheet-supporting feed rod situated near and in parallelism with said cross bar in position to be contacted by said fingers to complete control circuits therethrough; said feed rod being adapted to have sheet webbing trained thereover to insulate the fingers from the rod; means for securing the bracket in set positions along said bar to locate said two particular fingers relative to an edge of the sheet webbing and the third finger contacting said rod; and circuit means connected with said feeler fingers and motor means for starting and stopping the latter responsive to predetermined meander in opposite directions of said edge relative to said two particular fingers in relation to the spacing thereof, whereby to keep the sheet webbing running true between predetermined opposite lateral limits determined by said spacing of the fingers.

2. In a sheet registry control for sheet-feeding machines adapted to feed out longitudinally a web of sheeting cooperably with a laterally-movable web-shifting carriage and reverse-drive motor means for shifting the carriage to justify the web travel laterally, improvements comprising, in combination a carriage, a reverse-drive motor means for driving the carriage and reverse-drive circuit

means for energizing said motor means to effect opposite shifting of the carriage, said motor means being movable with said carriage; a stationary cross bar paralleling the travel of the carriage and the plane of the sheet web shifted laterally thereby; a rack of gear teeth carried by said bar and drivingly engaged by a pinion driven by said motor means whereby the carriage is shifted responsive to energization thereof in its reverse driving action; a bracket slidably seated on said bar to shift therealong crosswise of the sheet web; sheet-registry contact means connected with said circuit means to control the motor means and carried by said bracket and projecting into the said plane of the sheet web to engage the latter adjacent an edge thereof; means providing a long contact and web-guiding rod running laterally beneath said web at said plane across the range of lateral meander thereof and engageable by said contact means or separated therefrom by the absence or presence of said web therebetween; and means for securing said bracket at selected positions of lateral adjustment along said bar, said long contact rod being connected with said circuit means.

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