

June 21, 1932.

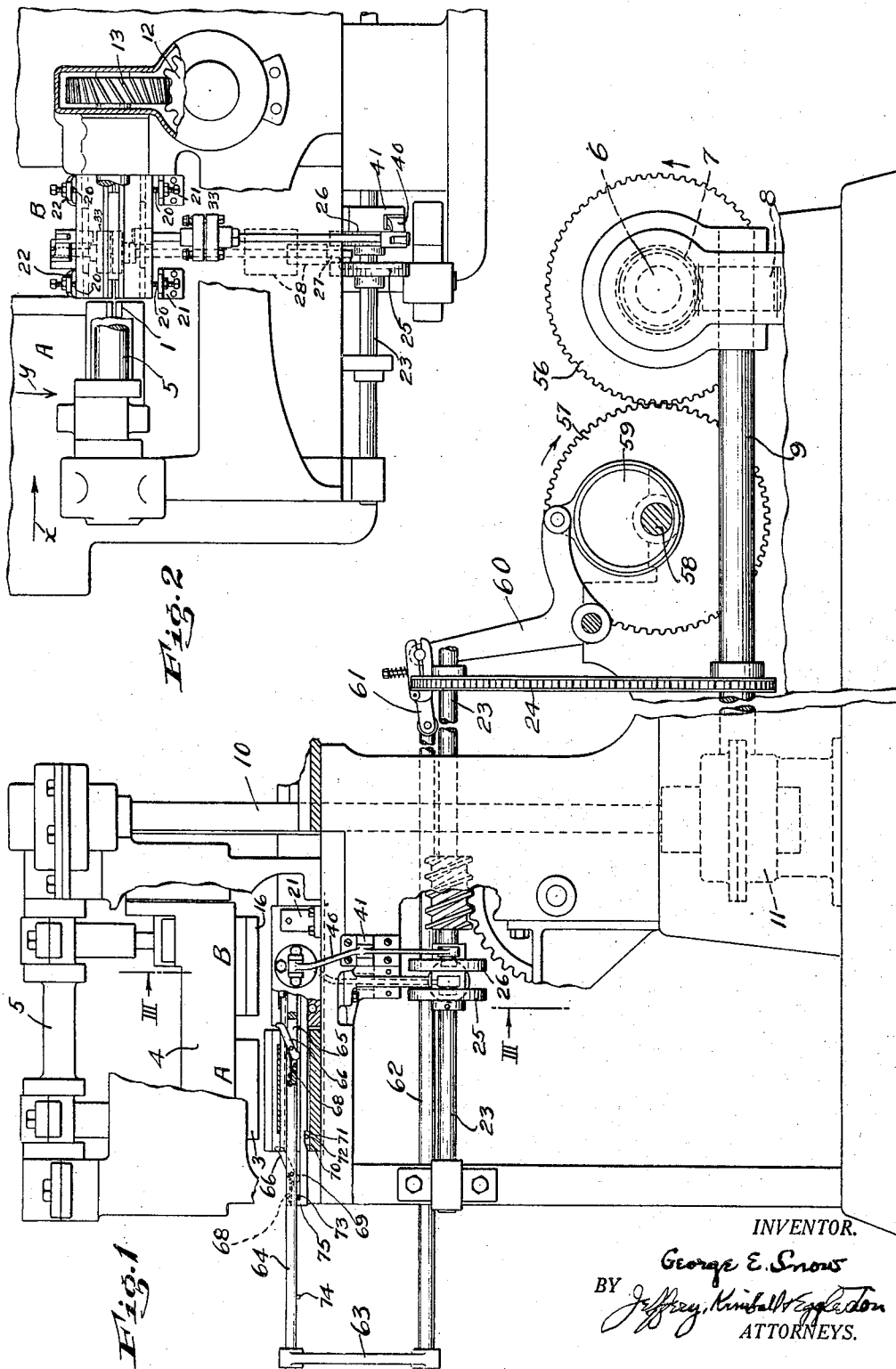
G. E. SNOW

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MACHINE FOR FORMING SEAMING STRIPS

Filed Jan. 3, 1930

2 Sheets-Sheet 1



INVENTOR.

George E. Snow
BY Jeffrey, Kimball & Egerton
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ATTORNEYS.

UNITED STATES PATENT OFFICE

GEORGE E. SNOW, OF MANCHESTER, CONNECTICUT, ASSIGNOR TO THE ORFORD SOAP COMPANY, INC., OF MANCHESTER, CONNECTICUT, A CORPORATION OF CONNECTICUT

MACHINE FOR FORMING SEAMING STRIPS

Application filed January 3, 1930. Serial No. 418,139.

The invention relates to die-operating mechanism and to combinations of associated mechanism therewith, and though of wider application, is primarily designed as a substitute for the seaming-strip side-former-die-operating means shown in the application of Victor Hendrickson for machine for forming composite can bodies, Serial No. 39,903, filed June 27, 1925, now Patent No. 1,807,843, June 2, 1931, and in his application Serial No. 147,670, filed November 11, 1926, to which machine the present invention is shown as applied. Much of the said machine has, however, been omitted as having nothing to do with the present invention, or indicated more or less diagrammatically in view of the complete disclosure and description in one or both of said applications, to which reference may be had for further details of the said machine.

The primary object of the invention is to provide compact and effective die-operating mechanism having power means for retracting the dies, or the die when but one of the dies is movable, including power operated connection to the dies for positively retracting them to predetermined, separated positions, within the limits of the power stroke, in which positions they act as accurately placed guides for strips fed along and between them, said connections being extensible in the remainder of the retractile stroke, and holding the dies fixed in the said positions during the periods in which the strip feed occurs. The invention is, however, also concerned with providing power die-retracting extensible connections, regardless of other features, having spring means therein subject to power stress and capable of temporary deformation thereby on the retractile stroke. The invention further has to do with the location of the die-operating devices and the nature of the operative connections including the extensible couplings interposed therein.

The invention, therefore, consists in the novel subject matter, illustrated in the drawings and described in the specification, or apparent therefrom to those skilled in the art, and which is set forth in the appended claims, which indicate the scope of the invention. It will be understood that the invention may be

otherwise embodied, and that, except as specified in certain of the claims, it is not to be understood as restricted to the structure illustrated.

Referring to the drawings:

Figs. 1 and 2, are, respectively, an incomplete elevation and a corresponding plan of the machine common to both said Hendrickson applications, indicating the relative location of the new side-former-die-operating means in the machine.

Fig. 3 is a cross section on line III—III of Fig. 1, and

Figs. 4 and 5 are incomplete sections through the forming dies showing stages of the forming operation succeeding that illustrated in Fig. 3, Fig. 5 being in part diagrammatic.

In this as in both the Hendrickson applications the tin seaming strip used as the means of uniting the opposed edges of the fibre can body blank, is formed in two stages at stations A and B, being given its initial form at A and its final form at B. Blank storage and feed means for conveying blanks to the station A, where they are sheared into sub-blanks, as well as initially formed, are represented only by the arrows *x* and *y* which indicate respectively (Fig. 2) the main or initial feed from the blank magazine and the direct feed to the station A, further illustration being considered unnecessary, in view particularly of the full disclosure in the earlier of the Hendrickson applications. Means for feeding the initially formed strip and the finished strip endwise from station A to station B, and from station B down the line have been illustrated more or less diagrammatically, since they have been fully described and illustrated in the first of said applications.

In the machines of this, as in those of both the said applications, a fixed die having a centrally slotted rectangular rib 1 supported on the table 2 at station A, with the cooperation of the overhead female die 3 on reciprocating crosshead 4, gives the strip the initial form indicated at *a* in Fig. 3. The crosshead 4 is suspended from crank shaft 5 driven from power shaft 6 by gears 7, 8 fast respectively

thereto and to shaft 9, meshing gears on shaft 9 and upright shaft 10 concealed by gear casing 11 and gears 12, 13, fast respectively to shaft 10 and to the crank shaft. The shaft 6 may be directly driven by electric motor thereon, but the power, clutch and brake devices are preferably as shown in the Hendrickson applications. The partially formed strip *a* is next given the temporary intermediate form *b* (Fig. 4) and then the final shape *c* (Fig. 5) by the longitudinally slotted truncated die 14 on the fixed die block 15 mounted on table 2 at station B, with the cooperation of the presser 16 on crosshead 4 and the side former dies 17 on side die blocks 18 slidable forward and back on the table 2 and on pairs of guide pins 19 fastened in die block 15, to which they are conveniently secured, at points near the base of the block equidistant from its central transverse plane, by inserting them through holes therein for which their middle part is a tight fit and driving them to final position in which their ends project outward from opposite sides of the block. Each side die block 18 is provided with a pair of correspondingly placed bores having correct sliding fit with the respective pins. This is a simple way of insuring accurate die movement. As in the later of the aforesaid Hendrickson applications, the maximum separation of the dies 17 is limited to a predetermined distance substantially the width of the strip to be fed between them, by adjustable stops 20 supported from the table, or other part of the frame, by stands 21 or brackets 22 as may be more convenient. These stops are best located in the outward path of the die blocks themselves. For convenience of illustration to avoid confusion with other parts they are shown somewhat above the position they usually occupy substantially in line horizontally with the die actuating connections shortly to be described and which hold the dies in the predetermined positions of maximum separation while the blank is being fed past them. The former dies are thus made to act during the feeding as correctly placed, fixed guides leaving just sufficient room between them for the blank or strip to be fed with due freedom and accuracy. This is important since the long and narrow character of the strip, fed by being pushed at the middle of one end exaggerates slight errors of angle and produces a tendency of the front end of the strip to tilt or ride up out of its normal path so as to cause jamming and interfere with proper operation. By adjusting the stops, the feed space may be made to have substantially the same maximum dimension in the plane of the dies and between them as that of the intervening blank, just enough more than the said dimension to insure an easy sliding fit for the blank.

This utilization of the side dies as correctly placed guides is an advance on the

earlier Hendrickson application wherein the spring pressed die-blocks, owing to necessary lost motion in the operating connections, followed said connections outward beyond the proper guide position, but it is broadly speaking common to the later Hendrickson application and the present application, which, however, presents a substantial advance over both said Hendrickson applications in neither of which was there positive retraction of the side dies, reliance for retraction being had in both on springs reacting between the fixed block 5 and the side die blocks 17, there being no retractile power connection. There was, therefore, no certainty that the retraction of the dies might not be interfered with by obstruction or sticking of a die block, or by weakening of a spring.

The present invention, on the contrary, provides power means for positively retracting the dies as well as for advancing them, thus insuring certain and uniform action. It includes in the power means extensible connections from the dies to the power capable of lengthening on the retractile stroke and of shortening on the forward stroke, the maximum separation of the dies being less than the stroke. Spring means in the said connections being power operated hold the die blocks against the stops throughout the periods during which strips are fed.

The side die operating means of this application is very compact as compared with that of the two Hendrickson applications in each of which are included two rock shafts extending the length of stations A and B and other mechanism taking up considerable space, the actuation being through the overhead crosshead crank shaft 5. In the present case counter shaft 23 driven from shaft 9 by chain 24 has fixed thereto cams 25, 26 located side by side and positively connected by linkwork respectively to the front side die block, i. e. the one near the blank feed indicated by the arrow *y*, and to the other or rear side die block. On reference to Figs. 1 and 2 it will be apparent that the cams and connections are located in or adjacent the central vertical plane transverse of the dies. The linkwork connecting cam 25 to the front die block, the lefthand block in Fig. 3, consists of a thrust bar 27 mounted to slide in bracket 28 secured to the frame and having a pin 29 and cam roller 30 on the pin, an adjustable and automatically extensible link having parts 31, 32 connected to each other by a special coupling 33 shortly to be described and each having a yoke or bifurcated end receiving respectively and pivotally connected to, the end of the thrust bar 27 and that of lever 34 fulcrumed at 35 in bracket 36 mounted on the frame, and link 37 one end of which embraces and is pivotally secured by pin 38 to the upper end of lever 34 and the other pivotally connected to pin 39 fixed in the side die block 18, this link

lying in the central vertical plane of the die block. As indicated in Fig. 2, the upper end to the lever 34 is displaced to the right in that figure so as to lie in the central transverse plane of the die blocks. The linkwork connecting the other cam 26 to the rear die block, the one to the right in Fig. 3, consists of the lever 40 fulcrumed at 41 in bracket 42 on the frame and having pin 43 and cam roll 44 thereon, the thrust link having parts 45, 46 connected to each other by another special coupling 33 and respectively embracing and pivotally connected to the upper end of lever 40 at 47 and pivotally secured to pin 39 fixed in the rear side die block.

The upper end of the lever 40 is displaced (to the left in Fig. 2) so as to be in the central vertical transverse plane of the die blocks and to deliver its thrust and pull in that plane wherein the links 37 and 45, 46 are also located. The couplings 33 are identical, each having opposed heads 33' adjustably supported on the screw-threaded ends of the respective adjacent parts of the link, held from relative angular movement and urged toward or into contact with each other by spring means, but capable of axial separation, though rigid against thrust in either direction. Each head has a set (as shown, a pair) of pins or bolts 48 having collars 49 located in corresponding recesses and secured by nuts 50, the other end of each pin extending freely through the other head and having concentrically mounted thereon a spring 51 located in a recess 52 and reacting between the nut and washer 53, 54 on the bolt and the bottom of the recess. These bolts may be arranged, as shown, in pairs whose members are diametrically disposed, there being in the coupling illustrated two such pairs, one carried by each of the heads. The heads may thus be identical, being merely turned relatively 90° in assembling. The intensity of the spring action may be varied by adjustment of the nuts 53. Thrust and lock nuts 55 are provided for each coupling on the link-members 32 and 46.

Fig. 3 shows the die blocks 18 retracted against the stops 20 and held there by the continuance of the retractile stroke, the stops being within the limits of the stroke, which excess of movement of the connections after the dies have reached the exact positions in which they can best serve as guides subjects the springs to stress tending to deform them temporarily and to lengthen the connections as shown in Fig. 3. In this figure, the retractile stroke has been completed and the power operated springs compressed as the connections lengthened on the separation of the heads so as to firmly hold the dies in their guide positions throughout the action of the cylindrical part 25', 26' of the cams, the successive periods represented by these cam parts synchronizing with the active periods of the

endwise blank feed above referred to and hereinafter described more in detail. The fixity of the dies when required to act as guides is thus assured. It will be observed that in Fig. 3 the bulges 25'' and 26'' of the cams are about to act on the cam rolls and connections, the shortening of the connections preceding the rigid thrust which advances the dies from their guide positions in the forming operation being about to occur. Fig. 4 illustrates the intermediate stage of the forming operation and Fig. 5 shows its completion, the heads 33' of the coupling being in contact and the retractile stroke being about to commence. During its first part the strength of the springs keeps the heads in contact under ordinary circumstances, but on obstruction of the die blocks, within the stroke limit, as by the stops, the continuance of the stroke subjects the springs to stress by the power and lengthens the connections thus permitting the necessary lost motion, or cam overthrow, while maintaining the fixity of the dies in their exact guide position during the endwise feed of the strip.

The power connections to this feed are as follows, shaft 6, gear 56, fast thereon, gear 57 fast to counter shaft 58, eccentric 59 on the countershaft, bell crank 60, excess-strain release link 61, rod 62, crosshead 63, to feed rod 64, which is thus reciprocated endwise of the feedway in the centrally located recess in the fixed die blocks shown in Figs. 3 to 5. This rod 64 has, in its central longitudinal plane, a series of slots 65 in which are mounted three suitably spaced pivoted feed dogs 66 which are thus located in the central longitudinal plane of the feedway and fixed die blocks and dies which are slotted at 67 in this plane to permit the operation of the feed dogs which are moved by the rod endwise in this slot. Springs 68 serve to project the dogs in advance of their feed operation into feed position and slide 69 which is adapted for reciprocation endwise and also up and down in said slot 67 positively retracts the dogs when moved up and allows the springs to project them when it is moved down. This slide 69 has notches in its lower edge each having an incline 70 and a horizontal portion 71 and is supported by fixed pins 72, on which the straight or the notched portions of its lower edge rest as the case may be. The reciprocation of the feed rod 64, near the end of each stroke, brings the lug 73 or the lug 74 on the rod, as the case may be, into contact with a projection 75 on the slide 69, the endwise movement in alternate directions thus produced causing the upward and downward movement of the slide 69 at the proper time. Only one of the cooperating notches and pins is illustrated and only two of the three dogs, the construction and spacing being the same and there being nothing new per se in these features.

I claim:

1. Apparatus of the character described comprising a pair of dies, one of which is reciprocable toward and from the other, a power shaft, and die-reciprocating connections from the reciprocable die to said shaft comprising a pair of axially aligned heads fixed against angular movement relatively to each other and opposing to each other plane faces in a common plane transverse to their common axis and each having longitudinal guide pins fast to it and extending freely through the other and spring means interposed between said respective heads and pins.
2. Apparatus of the character described comprising a pair of dies one of which is linearly reciprocable toward and from the other, a power shaft, and die-reciprocating connections from the reciprocable die to said power shaft including a linearly reciprocable composite link having aligned members, opposed heads adjustably mounted on adjacent ends of said members, respective sets of longitudinal pins secured to one of said heads and extending freely through the other, the pins of each set having coaxial springs held thereon and located respectively in cavities in the head through which the free ends of the pins project and each adapted to react between its pin and head.
3. Apparatus of the character described comprising side former dies, stops limiting their separation to substantially the width of the blank to be acted on by the dies, power means and operative connections therefrom to the dies for advancing said dies to form the blank and for retracting them to positions determined by said stops, said connections having incorporated therein and subject to movement of translation therewith spring means operated by said power means for holding the dies, during recurring predetermined periods, in said predetermined positions, and means for feeding blanks endwise between and in guiding contact with said side dies while they are so held.
4. In apparatus of the character described, a pair of dies, power means including operative connections for positively advancing and retracting said dies, stops limiting the retraction of said dies to less than the power stroke, said connections including spring means subject to movement of translation therewith for holding said dies, between each retraction and the next advancement, fixed in the positions predetermined by said stops, and means for feeding a blank edgewise along and between said dies and in guiding contact therewith while they are thus fixed.
5. In apparatus of the character described, a relatively long and narrow feed way, longitudinally extending strip-forming dies flanking said feed way, power driven means including extensible spring connections to said dies for positively advancing and re-

tracting them, stop means limiting the extent of the retraction of the dies to less than that of certain parts of the extensible connections located between the stops and the power, and means to feed a strip by pushing it endwise along said feed way between said side dies and in guiding contact therewith when in their positions of maximum but limited separation.

6. Apparatus of the character described, comprising a pair of dies, power means, connections positively connecting said power means to said dies for reciprocating them toward and from each other, stop means limiting the maximum separation of said dies to substantially the maximum dimension of the blank in the operative plane of the dies and between them, said power means and operative connections between the power and the dies effecting the separation of said dies, and maintaining them fixed, during predetermined regularly recurring periods, in the positions predetermined by the stop means, means for feeding a blank between said dies when in said fixed positions wherein they act as accurately placed guides for the blank being fed, and spring means in the connections between said dies and power means and subject to movement of translation with said connection and to temporary deformation and yielding on the retraction stroke on blocking by the stop means of the movement of the dies away from each other.

7. Apparatus of the character described comprising a pair of dies, power means for causing separation of said dies including a power shaft and operative extensible connections therefrom, and means associated with said connections for holding the separation of the dies fixed, during predetermined recurring periods, at a distance substantially equal to the maximum dimension of the blank in the operating plane of the dies and between them, and means for feeding successive blanks endwise between and in guiding contact with the die faces during said predetermined periods.

8. In apparatus of the character described, a feedway, a pair of dies flanking the feedway, stops for determining the extent of separation of the dies, and power means for advancing and for retracting said dies comprising a power shaft, and extensible operative connections therefrom to each of said dies having interposed therein spring means capable of temporary deformation on the retractile stroke to lengthen the connections and permit overthrow after the stops have come into play and rigid abutment members coming into contact with each other on the active or blank forming stroke of the dies.

9. In apparatus of the character described, a linearly reciprocable die, power means including axially reciprocable operative connections, an extensible coupling in said connec-

tions having permanently axially aligned opposed heads and spring means urging opposed faces of said heads into contact for rigid thrust on the forming die stroke but yieldable on the retractile stroke to permit their limited separation and the lengthening of the connections.

10. Apparatus of the character described comprising dies one of which is reciprocable toward and from the other, power means, and die-operating reciprocable connections therefrom to one of the dies, and stop means limiting the retractile stroke of the die, said connections including members rigidly connected respectively to the die and to the power means and comprising also opposed abutting heads fast respectively to said respective members and providing rigid resistance to thrust in either direction, said heads having lost motion connection permitting their limited separation and the lengthening of the connections on the retractile stroke on die obstruction.

In testimony whereof, I have signed this specification.

GEORGE E. SNOW.