Jan. 8, 1952 E. C. SLOAN 2,581,724

BANDING MACHINE

Filed Nov. 23, 1946 4 Sheets-Sheet 1

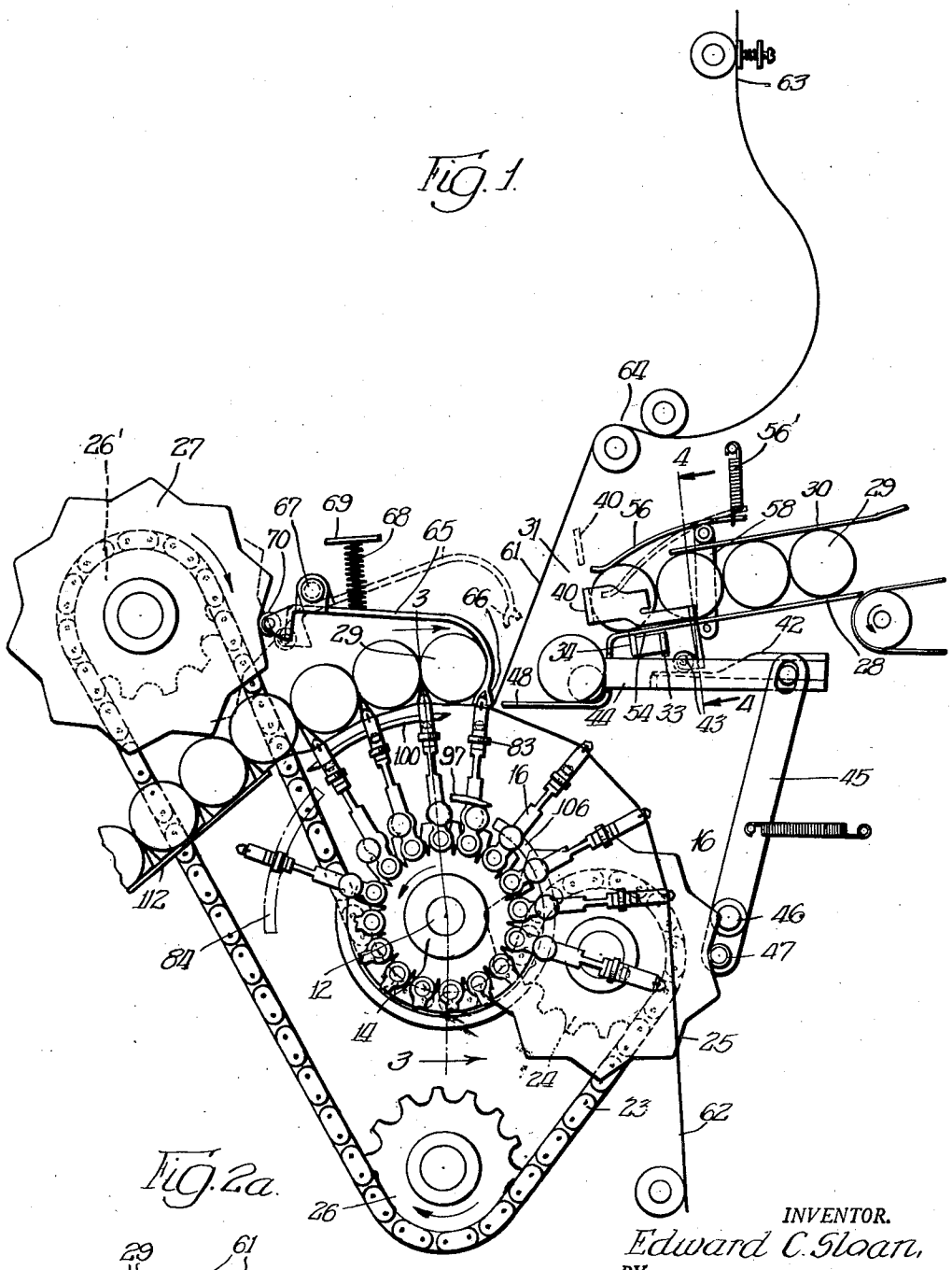


Fig. 1.

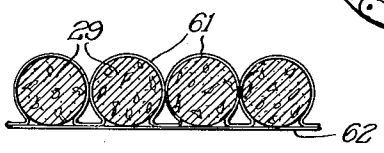


Fig. 2a.

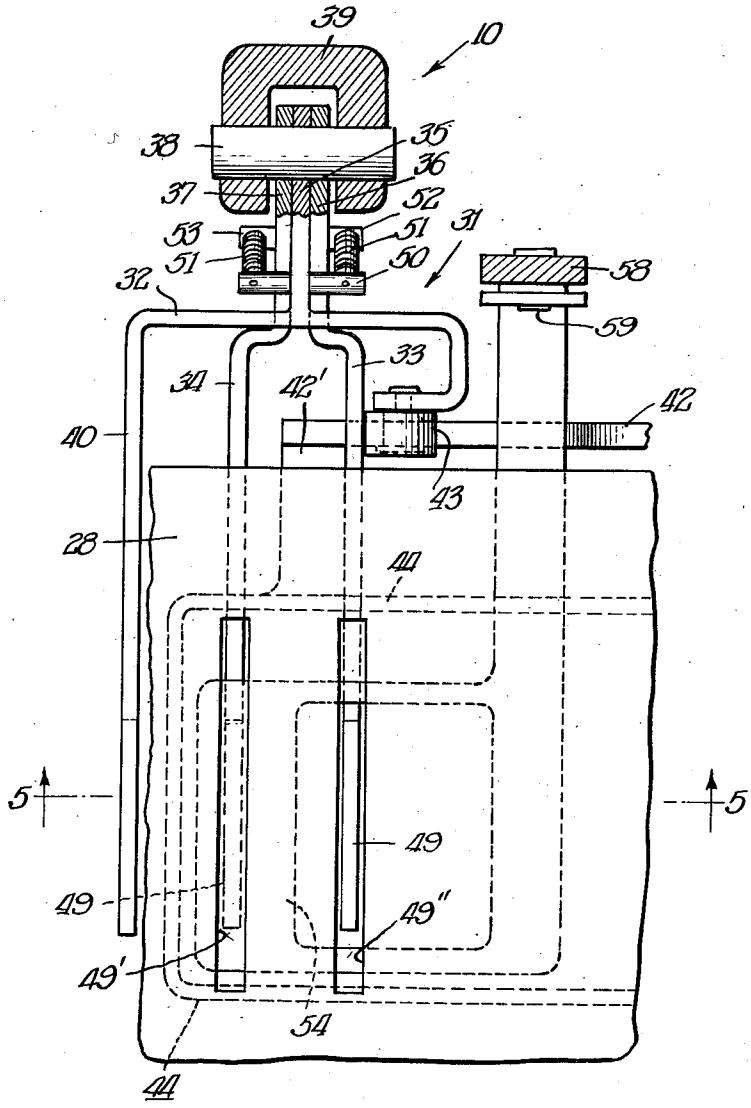
INVENTOR.
Edward C. Sloan,
BY
Cromwell Dreistr Warden
Attys.

Jan. 8, 1952 E. C. SLOAN 2,581,724

BANDING MACHINE

Filed Nov. 23, 1946 4 Sheets-Sheet 2

Fig. 2



INVENTOR.
Edward C Sloan,
BY
Cromwell, Greist & Warden
Attys

Jan. 8, 1952 E. C. SLOAN 2,581,724

BANDING MACHINE

Filed Nov. 23, 1946 4 Sheets-Sheet 3

Fig. 3.

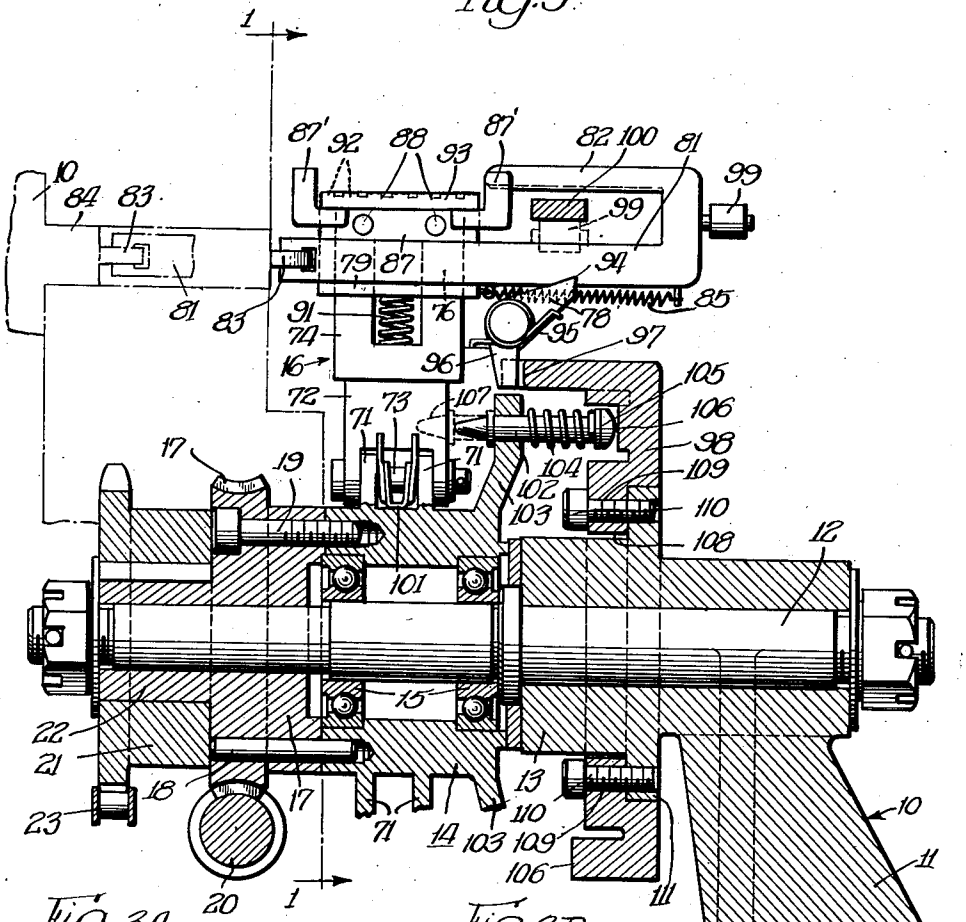


Fig. 3A.

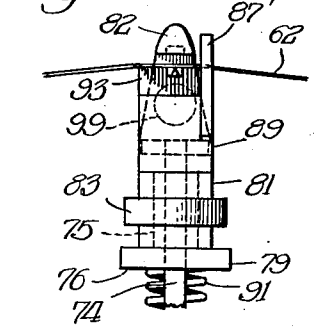
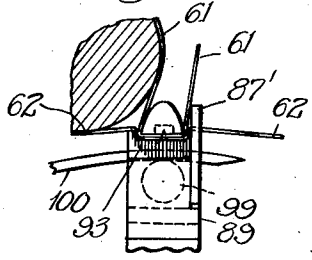


Fig. 3B.



INVENTOR.
Edward C. Sloan,
BY
Cromwell, Greist & Warden.
Attys.

Jan. 8, 1952 E. C. SLOAN 2,581,724

BANDING MACHINE

Filed Nov. 23, 1946 4 Sheets-Sheet 4

Fig. 4

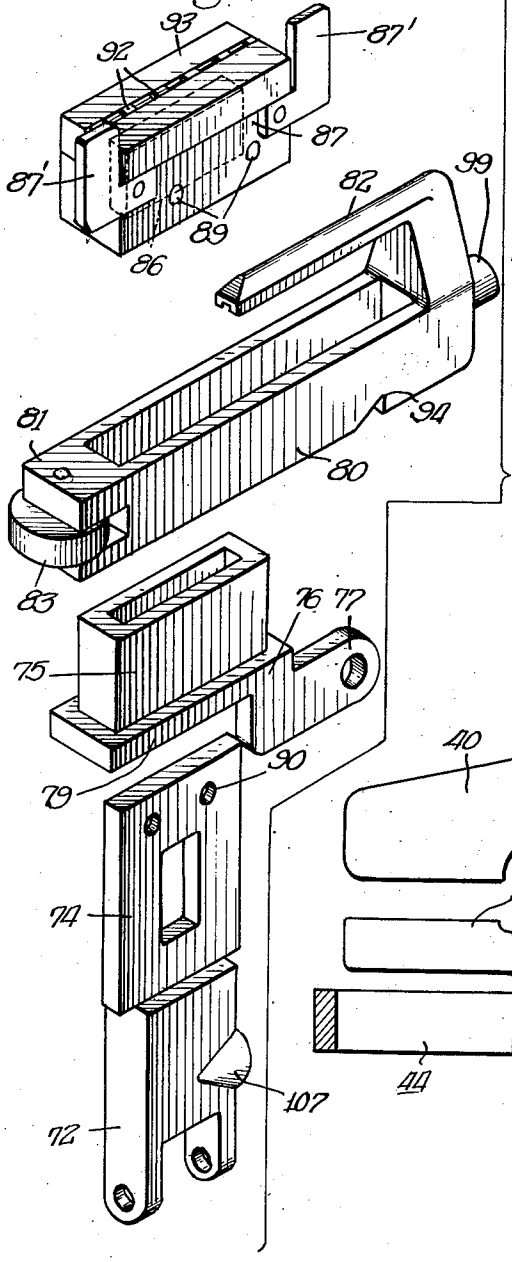


Fig. 5

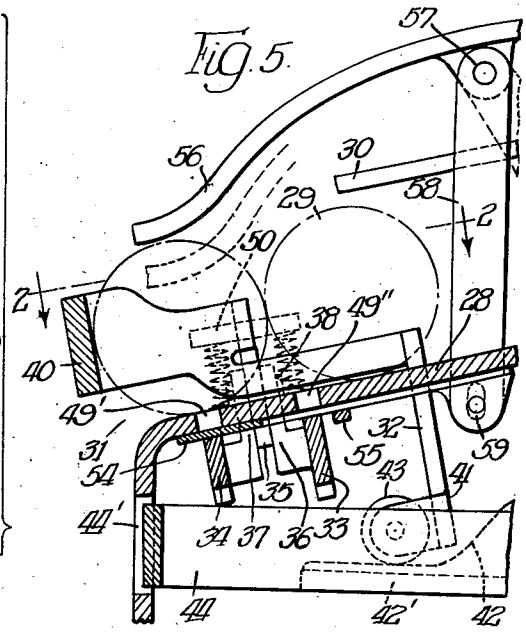
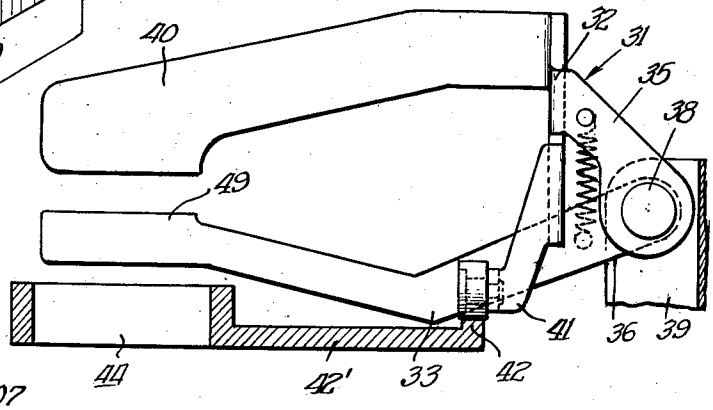


Fig. 6



INVENTOR.
Edward C Sloan,
BY
Cromwell, Greist & Warden
attys.

Patented Jan. 8, 1952 2,581,724

UNITED STATES PATENT OFFICE

2,581,724

BANDING MACHINE

Edward C. Sloan, Madison, Wis., assignor to Kartridg-Pak Machine Co., Chicago, Ill., a corporation of Illinois

Application November 23, 1946, Serial No. 711,908

37 Claims. (Cl. 53—98)

1

This invention pertains to improvements in a banding machine of the type adapted to apply continuous web material in encircling relation to each of a series of aligned, advancing articles.

An object of the invention is to provide an apparatus embodying synchronized provisions to effect the continuous feed of the articles to be fed, the association of the banding material relative to the articles and the completion of the banding operation wherein the web material is sealed to itself between articles, all in a much expedited and increasedly smooth fashion as compared to existing comparable apparatus, and with an improved, displacement-resisting seal of said material between the articles.

It is a further object of the invention to provide a banding machine of the type described having improved article feeding or advancing means and a control therefor adapted to advance a succession of articles and associate the same in uniform relation to one another, regardless of variations in the size of the articles, in combination with means for associating and sealing web material relative to the articles in an improved high speed manner.

Yet another object is to provide article advancing means and a plurality of coacting sealing heads of the type described, wherein said heads have a novel floating mounting rendering the same automatically self-adjusting relative to the article banded, during advance thereof by said means, notwithstanding differences in size of the articles.

Another object is to provide a banding machine of the character described, including a rotatable support carrying a plurality of individually operable banding or sealing heads, and means for actuating said heads in uniformly timed relation to one another during a linear advance thereof with the articles, for the purpose of banding a succession of articles in a very rapid fashion.

Still further, a specific object of the invention is to provide a plurality of individually actuable banding or sealing heads carried on a rotatively traveling support, each head comprising a pair of coacting, relatively movable members, together with cam controlled means to effect a predeterminedly synchronized actuation of said members in radial and transverse directions relative to the articles, whereby said members are initially engaged with web material between the articles, then caused to seal said material while carried by said support for advance with the articles, then retracted to an inoperative position

2

relative to the material and articles, in combination with article advancing means insuring a rapid translation of the articles and heads during the operation of the latter.

A still further object is to provide a machine of the type described including article advancing means, a web tucker operable in predetermined relation to said means to position a web about an article advanced thereby and a plurality of traveling sealing heads adapted to align automatically with the tucker, said heads each having coacting relatively movable parts timed with respect to said tucker to effect banding and sealing of the web about each article of a series of advancing articles, regardless of difference in size of the latter.

Another object is to provide novel article advancing means including an improved escapement-type device insuring a pre-determinedly timed discharge of the articles in a positive, controlled manner, regardless of substantial variations in size of said articles.

The foregoing statements are indicative in a general way of the nature of the invention, but other and more specific objects will be apparent to those skilled in the art upon a full understanding of the construction and operation of the device.

In the drawings:

Fig. 1 is a view in side elevation, diagrammatic in character, illustrating the assembly of article and web feeding means with the web tucker, banding and sealing instrumentalities, which assembly constitutes the present invention;

Fig. 2 is a fragmentary view in elevation, viewed from a line generally corresponding to line 2—2 of Fig. 5, illustrating certain details of the article feeding, advancing and timing components of the assembly, certain other parts having been omitted in order to simplify the showing;

Fig. 2–A is a fragmentary view in vertical section, more particularly illustrating the continuously banded product of the present machine;

Fig. 3 is a fragmentary view in a radial section through the rotary spider or head support of the apparatus illustrated in Fig. 1, approximately on line 3—3 of that figure, showing certain details of construction and relationship of the elements constituting each of the individual heads and their relation to said support;

Figs. 3–A and 3–B are fragmentary views in side elevation, illustrating the action of the banding and sealing heads of the apparatus, prior to and during sealing engagement with the banding material, respectively;

Fig. 4 is an exploded view in perspective, more clearly illustrating the construction of the individual banding and sealing heads of the machine;

Fig. 5 is a fragmentary view in side elevation partially in vertical section on a line corresponding to line 5—5 of Fig. 2, showing in somewhat larger scale the article advancing and control means of the apparatus; and

Fig. 6 is an end view further illustrating certain structural details of the article control means of Fig. 5.

This invention pertains to improvements in an article banding machine of the general type illustrated and described in the earlier patent to Sloan, No. 2,379,937 of July 10, 1945, and especially deals with the provision of apparatus making possible a very rapid rate of banding, i. e., in the neighborhood of five times the output rate of previous related types of machines. Another very advantageous feature is that this capacity is attained without regard to possible non-uniformities in size of the articles banded. While herein shown as a machine for banding each article of a series of generally rounded, elongated articles, such as sausages, by the application of a paper web or like material in individual encircling relation to the sausages, at the same time connecting a number of thus banded sausages in an equally spaced series, it will be evident from the description to follow that the machine is equally applicable to a similar type of banding of numerous other objects.

In the present apparatus individual sealing operations are performed between each of a series of advancing articles by means of individual sealing heads carried by a rotary support, there being a large number of such heads each having a pair of relatively reciprocable sealing members and each coacting in closely timed relation to a further reciprocable tucker member. A full and continued engagement of the members referred to with an advancing web of sealing material is had, said members remaining in sealing engagement with said web throughout a substantial angle of arcuate travel of the support. Thus, a very effective displacement resisting sealing of the web between the articles results, notwithstanding the markedly increased output. In association with the foregoing banding or sealing means I provide article control and advancing means of an improved character insuring unfailingly uniform positioning of the articles with reference to one another regardless of variations in size thereof, always apt to occur when articles such as sausages are handled. In Fig. 2–A I illustrate a continuously banded series of sausages or wieners, for the banding of which the present machine is particularly devised. A package of this type is illustrated and described in the patent to Seiferth, No. 2,379,934 of July 10, 1945.

Referring to the drawings, the moving parts of the machine are carried on a suitable frame support such as I have illustrated in Fig. 3 and designated generally by the reference numeral 10. The drawings are largely diagrammatic or schematic and in certain thereof it has been deemed desirable to omit a showing of the frame referred to, in the interest of simplicity and clarity. However, those skilled in the art will readily envision simple means for mounting the various coacting parts on a support in the general manner herein contemplated.

Referring to Fig. 3, in conjunction with Fig. 1, frame 10 has an extension or bracket 11 which has a transverse bore fixedly receiving a horizontal supporting shaft 12, said shaft projecting forwardly of an enlarged boss 13 on bracket 11. A rotary supporting spider 14 has the hub thereof journaled on shaft 12 through the agency of ball-bearings 15 whereby to accomplish a free, anti-friction rotation of the spider. This spider serves as a support for a multiplicity of sealing and banding heads, here generally designated 16, but to be later described in detail. Spider 14 is actuated by a worm gear 17 concentric therewith, located relative to the hub of the spider, for assembly purposes, by means of a pin 18. The worm gear is fixedly secured to the spider by a plurality of bolts 19 and is driven from a worm 20 suitably journaled in the frame 10. The worm is in turn driven from any desired source of power in a well known manner.

A drive sprocket 21 is splined on a forward projection of the hub 22 of the worm gear 17 and functions as a means for actuating various other instrumentalities to be described. To this end I illustrate a continuous drive chain 23 which passes around sprocket 21, then around a similar, relatively mounted sprocket 24 on which a star shaped cam 25 is secured, thence around an appropriately journaled idler sprocket 26, and thence around a further rotary sprocket 26' to which a second star shaped cam 27 is secured, before returning to sprocket 21. In this manner spider 14 is caused to travel in counterclockwise direction, as viewed in Fig. 1, and cams 25, 27 are each rotated in the opposite, clockwise direction. These cams respectively control the actuation of certain article advancing means and web tucking and banding means, hereinafter described, in predetermined timed relation to the controlled actuation of the sealing heads 16, as will appear.

The aforesaid article advancing means are illustrated in Figs. 1, 2, 5 and 6 and comprise an inclined sheet metal slide 28 over which the articles, herein illustrated as elongated wieners or sausages and designated 29, are advanced by any appropriate means, not constituting part of this invention. As they advance down the slide, the articles are restrained and controlled somewhat by the inclined upper retainer means 30 until discharged, one by one, to the sealing and banding means. This operation is controlled in a novel manner, to the end that the articles are fed forward in predetermined, unvarying relation to one another, regardless of possibly varying size or diameter thereof.

To the end noted, I provide the escapement device illustrated in Figs. 2, 5 and 6 and designated generally by the reference numeral 31. It consists of three individually swingable escapement or control members 32, 33, 34 provided with rearwardly extending pivot portions 35, 36, 37 respectively which swing in parallel generally vertical planes about a common pivot pin 38 carried by an extension 39 of machine frame 10 (see Fig. 2). The pivot portion 35 of member 32 is disposed between the other two pivot portions and branches out forwardly in a forked construction, including the spaced parallel control arms 40 and 41; while members 33, 34, which are identical in shape, are offset away from one another, forwardly of the pivot point, lying parallel to and between said arms.

The reference numeral 42 designates a reciprocable cam which controls the vertical movements of the members 32, 33 and 34 by engaging a follower roller 43 carried by arm 41 of the mem-

ber 32, said cam 42 being conveniently formed on a lateral extension 42' of a reciprocating article advancing or pusher bar 44 of U-shaped strap metal outline (see Fig. 2). As illustrated in Fig. 1, bar 44 has a pin and slot driving connection to an actuating lever 45 which is pivoted to the machine frame at 46. Lever 45 has a cam follower roller 47 spring urged against the surface of cam 25, hence rotation of cam 25 through its chain drive is accompanied by oscillatory movement of the lever 45 about its pivot, with attendant horizontal reciprocation of the pusher bar 44. As a result of this movement cam 42 intermittently engages follower 43 to elevate the control arm 40 of member 32, which is integral with the follower-carrying arm 41, from the solid line position of Fig. 1 to the dotted line position. This releases an article 29 and permits the same to drop by gravity onto an extension 48 of the slide means 28, where it is immediately engaged by the pusher bar 44 (passing through an opening 44' in slide 28) and advanced to banding position in contact with and immediately behind a previously banded article. In so advancing, the article forwarded by bar 44 engages said previously banded article to advance all the banded articles of the series, and since bar 44 has a predetermined and unvarying stroke it is evident that every article engaged thereby will unfailingly come to rest at the proper banding position, in which its trailing or rearmost surface is always located at exactly the same point as that of every other article with reference to a web tucker member, to be described.

The control members 33, 34 referred to above function to control the feed of articles, such as wieners, which vary substantially in diameter from time to time. These members both underlie the article slide 28, as illustrated in Figs. 1 and 5, and the extremities thereof are offset at 49 to enable them to project through elongated apertures 49', 49'', in the slide 28, as shown in Figs. 2 and 5. Members 33, 34 are individually and yieldably connected to the forked member 32, for actuation thereby and for this purpose I may employ a transverse pin 50 projecting from either side of the central pivot portion 35 of member 32, with coil tension springs 51 extending between pin 50 and similar transverse pins 52, 53 carried respectively by the pivot portions 36, 37 of the control arms 33, 34 respectively. Hence, as outer control member 32 is cam actuated to the dotted line, article release position thereof shown in Fig. 1, force is transmitted resiliently to the control arms 33, 34 tending to elevate the same.

Upward movement of members 33, 34 is governed by a slidable apertured shutter plate 54 guided in suitable ways 55 below the slide 28. This shutter plate is proportioned whereby in a forwardly advanced position thereof, i. e., to the left as illustrated in Fig. 5, it extends across the forwardmost control arm 34 and corresponding slide aperture 49' and prevents upward movement of the arm, while permitting upward movement of the arm 33 under the influence of its spring 51, by exposing the aperture 49'' in the slide. However, when shifted rearwardly, or to the right from the position shown in Fig. 2 the shutter covers aperture 49'' and prevents upward movement of arm 33, while permitting the other spring 51 to urge arm 34 upwardly in response to movement of the outer control member 40.

The movement of shutter plate 34 is governed by an article feeler 56 which is pivoted at 57 to the machine frame 10 and carries a downwardly depending actuating arm 58. This arm has a pin and slot driving connection at 59 to the shutter plate 54; accordingly, as feeler 56 is in an elevated position by reason of its contact with a relatively large diameter article, the plate 54 is shifted forwardly to mask aperture 49' and restrain arm 34. Hence the aforesaid large diameter article is restrained by control member 40 and is automatically separated from succeeding articles by arm 33 coincident with the elevation of member 40 to discharge said article onto the slide extension 48. The presence of a smaller article at the feeler results in depression thereof, under the force of a coiled actuating spring 56' (see Fig. 1), to the dotted line position of Fig. 5, with consequent masking of aperture 49'' and upward travel of arm 34 when member 40 rises. Thus succeeding articles are restrained by arm 34. In this way a selective automatic connection of the outer control member 40 with one or the other of the arms 33, 34 is effected, according to the size of the article present at the feeler, preventing discharge of said article until the proper phase of the cycle is reached for its advancement by pusher 44, and restraining forward travel of the succeeding articles.

When released by member 40 the forwardmost article drops onto slide extension 48 whence it is advanced by the pusher bar for the purpose of being associated with and banded between a pair of paper or like flexible webs 61, 62. These webs are drawn from appropriate spools (not shown) as banding proceeds and through suitable web guiding and/or idler means, here conventionally shown and designated 63, 64, which are of a well known type and require no further description.

Banding is performed by the multiple individual banding and sealing heads 16, each coacting with an oscillatory tucker 65 of the type shown in Fig. 1, and the stroke of pusher bar 44 is such that the article engaged thereby is advanced uniformly to a predetermined position relative to said tucker and a coacting head. In effecting advance of said article the same is brought into contact with the rearmost of the previously banded articles, so that the entire preceding series of banded articles is advanced by the pusher bar a distance corresponding exactly to the diameter or transverse width of the yet unbanded article at its rear, and no more. Hence unfailingly uniform relative positioning of the articles is achieved, regardless of their size. The sealing heads 16 are characterized by a novel independent floating mount to take advantage of this feature.

Tucker 65 is of a curved, flat, blade-like conformation, having a forked extremity 66 for a purpose to be described, and is appropriately pivoted on the machine frame at 67. It is normally urged downwardly in a clock-wise direction by a coil compression spring 68 which bears against a fixed frame support 69. At its other extremity the tucker carries a cam follower roller 70 which rides the surface of chain driven cam 27, whereby the tucker is given a uniform oscillatory movement in timed relation to the movement of article pusher bar 44 and the individual movements of the sealing heads 16. The timing is such that the uppermost web 61 is engaged and depressed by tucker 65 immediately following completion of the advancement of the unbanded article by pusher 44 into engagement with a previously banded article. Hence, tucker 65 draws web 61

downwardly into snug engaging relation to, and around the rear surface of, the last advanced article. Coincident with the movement of the tucker, and when it has reached the bottom of its downward stroke, the banding head 16 is brought into cooperative relation to the two banding webs in a manner now to be described, thereafter completing the banding operation.

Referring particularly to Figs. 3 and 4, wherein structural details of the banding heads and the control apparatus therefor are illustrated, in conjunction with Fig. 1 wherein the same are generally shown, the hub of spider 14 carries a multiplicity of laterally aligned pivot ears 71 between each of which the pivotal base 72 of one of the heads 16 is swingably mounted by a pin 73 carried by the ears 71. Base 72 has a flattened, plate-like upper section 74, of generally rectangular, O-shaped outline, which is radially telescoped in the rectangular sleeve portion 75 of a slide support 76, the latter having a laterally extending pivot ear 77 on which a latching dog 78 is adapted to be pivoted (see Fig. 3). Support 76 carries side shoulders or flanges 79 adapted to support the elongated side pieces 80 of a clamp member 81 for longitudinal sliding movement at right angles to the plane of rotation of the head 16. Member 81 is provided with an elongated clamping element 82 disposed centrally over and paralleling the side pieces 80 in spaced radial relation thereto, being connected to said pieces as a unitary part of member 81. The member 81 also carries a follower roller 83 on one side thereof for coaction with a fixed cam 84 suitably mounted on the machine frame 10, which roller is maintained in contact with the cam by means of a tension spring 85 extending between the slide support 76 and the clamping member 81.

In the operative condition of the head 16 the upper section 74 of the base 72 is fully telescoped in the sleeve 75 of support 76, which in turn slidably receives the side pieces 80 of the clamping member 81. The radially outermost portion of said section in this position is exposed outwardly of said sleeve and is receivable in an internal rectangular recess 86 of a platen member generally designated 87. So disposed, the platen rests on the side pieces 80 to hold the head in assembly, being secured relative to the platen member by set screws 88 fitted in aligned openings of the parts, shown as 89 on the platen and as 90 on the base section 74. A coil compression spring 91 is interposed between the slide support 76 and the base 72, being located in the central aperture of the latter, and said spring serves to maintain the support 76 and clamping member 82 in radially outwardly extended position relative to platen 87, yielding during engagement of the latter by clamping element 82 during the sealing phase of the banding operation.

Said platen is preferably provided with a row of web perforating elements 92 extending transversely thereof, for coaction with the clamping element to perforate the webs 61, 62 between each article of a series of banded articles, in a well known manner. Likewise, the platen has cushioning and web stripping pads 93 of resilient material on either side of the perforating elements, disposed flush with the latter or even extending radially somewhat beyond elements 92.

As stated, clamping element 82 has radial movement relative to the associated platen 87 to bring these parts into web sealing relation but prior to this movement element 82 is moved laterally on the support 76 sliding on the side shoulders 79 of the latter from the position shown in Fig. 3 to a position directly opposed to the platen, in the radial sense. Member 81 is normally held in the position of Fig. 3 by the engagement of pivoted latching dog 78 in a detent recess 94 on the member, the dog being urged counterclockwise by a torsion spring 95 surrounding its pivot. However, the dog 78 has an integral tail member 96 which slides on a surface cam 97 carried by a fixed cam plate 98 on frame extension 11, and at a predetermined point in the sealing cycle is rocked to release the dog from recess 94, whereupon member 81 slides under the force of coil spring 85 into radially opposed relation to the platen 87. The latter at this time underlies the lowermost web 62, as will be explained. Radial inward movement of the sealing member, when thus positioned, is brought about by the coaction of a cam follower roller 99 on said member with a fixed surface cam 100 on the machine frame.

As pointed out above it is desirable that the individual sealing heads 16 have a floating mounting on the spider 14 during the banding phase and to this end they are each freely pivoted on a pin 73 in the ears 71, and each is urged counterclockwise about this pivot by a torsion spring 101.

Assurance is had that each head 16 will be maintained in proper radial position to permit properly timed cam actuation of dog 78 and resultant inward travel of the clamping member, as described, by the provision of a locking pin 102 for each of the heads, slidably mounted in a radial extension 103 of the spider 14, to one side of the pivot ears 71. Pin 102 is urged to an outward, inoperative position, during the sealing phase of the operation, by means of a coil spring 104 encircling its shank between spider extension 103 and enlarged end 105 of the pin, thereby unlocking the head 16 from the spider during the sealing phase. Said sealing phase takes place throughout an approximately 75° arc in the 360° rotation of the head carrying spider, during which the head 16 floats on its pivot, subject to the action of spring 101. During the remainder of the rotation of the spider the pin is urged forwardly by a head lockup cam 106 for engagement in a recess 107 of the head base 72, thereby holding the head in a truly radial relation to the axis of the spider.

When head lockup pin 102 reaches a low point on cam 106 the spring 104 causes it to be disengaged from head 16, whereupon said head is rocked forwardly about its pivot by spring 101, as it is advanced bodily by spider 14. The parts are timed so that, in so rocking, the head will engage the tucker 65, and to this end the platen 87 of each head carries a pair of the laterally and radially outwardly extending registering ears 87' which engage in the forked end 66 of the tucker 65 as head 16 rocks forwardly about its pivot. Thus the tucker and head are unfailingly brought into proper radial register at the sealing point, the floating character of the mount for the head insuring this, even though the articles operated on should vary substantially in size. In Fig. 3 I illustrate a practical method for mounting on the machine frame the various fixed surface cams whereby the movements of the head components are governed, enabling the machine to be adapted to the banding of different articles, or to the performance of banding and sealing operations involving different timing or phase relationships, with a minimum of alteration of the machine. While illustrated particularly in relation to the latch dog release cam 97 and the head lockup

cam 106, it will be apparent that similar provisions may be readily resorted to for the mounting of the clamping member depressing cam 100 and the latch reset cam 84. Incidentally, the latter have been shown only in a most diagrammatic fashion in Figs. 1 and 3 for simplicity of disclosure, and no attempt has been made, other than in a general way, to illustrate the exact relationship or outlines of any of the cams.

Referring to Fig. 3 it will be noted that cams 97 and 106 are cast as integral parts of the cam plate 98, which has a central bore 108 fitted over the boss 13 of bracket 11. Arcuate openings 109 are formed in the plate 98 coaxial with the same and shaft 12 to receive lock screws 110, the latter being threaded into an external flange 111 on boss 13. Hence the cams may be properly adjusted rotatively in setting up the machine, or different cams, as necessitated by the banding operation to be performed, may be mounted on a comparatively standardized machine.

In operation, the various components of the apparatus derive their movement fundamentally from worm 20, which is driven in any appropriate manner. Spider 14 is rotated continuously and pusher bar 44 and tucker 65 are reciprocated in accurately predetermined relation to one another, the remaining parts being cam actuated in similarly accurate, timed relation to one another by the movements of the spider, pusher bar and tucker.

Let it be assumed that banding of an article 29 has been completed by the coaction of the tucker 65 and head 16, and that the second next succeeding article has in the meantime been subjected to feeler 56, whereby to ascertain its size and to position the shutter plate 54 accordingly, as described. Tucker 65 rises from the solid line position to the dotted line position of Fig. 1 as pusher bar 44 advances the immediately next succeeding article from the plate extension 48 (onto which it has been dropped by control member 40) toward the sealing point. At this time a sealing head 16 is also approaching the sealing point, being held in rigid radial relation to the spider 14 by the engagement of head lock-up pin 102 in recess 107 in the head, since the pin is at that time on a raised surface of cam 106.

The article to be banded is now rapidly advanced by bar 44 into engagement with the last banded article at the sealing point, upon a full forward stroke of the pusher bar, and the preceding series of banded articles is correspondingly advanced until the article to be banded is properly located relative to tucker 65, which is descending at this time toward the full line position of Fig. 1. The floating mounting of the head 16 enables some free movement thereof about its pivot point, after the clamping elements have been brought into operation, in the manner hereinafter described; hence the pusher bar 44 is the sole source of power for advancing the articles, the heads merely swinging idly on their pivots as such advance takes place.

As it has approached the sealing point, the platen 87 of the head has come into engagement with the lowermost banding web 62, said web resting on the platen between the lateral registering ears 87'. The head slides forwardly under the web 62 as the spider rotates, and also slips beneath said web under the force of spring 101 when the time comes for disengagement of lock-up pin 102 from the head, which occurs at the end of cam 106. The parts are radially positioned as shown in Fig. 3-A.

During all this time the sealing element 82 of the head is held in the retracted position to the right as shown in Fig. 3 by means of the latch dog 78. However, as the head is unlocked by the retraction of pin 102, being as a result rocked forwardly about its pivotal axis by spring 101 until the registering ears 87' engage tucker fork 66, the tail 96 of said dog rides onto a rise on the latch release cam 97, thereby disengaging the dog from detent notch 94 on the sealing member 81. This enables coil spring 85 to snap said member to the left, as viewed in Fig. 3, into radially overlying relation to platen 87 and the perforating elements 92 of the latter. Cam follower 99 is also brought into lateral alignment with the sealing member depressing cam 100, in the manner illustrated in dotted lines in Fig. 3, for ensuing actuation thereby.

In shifting to the left as described, the sealing element 82 enters between the tips of the forked end 66 of tucker 65 which, in shifting downwardly, has in the meantime engaged the upper web 61 and drawn the same downwardly into encircling relation to the article being banded as shown in Fig. 1. This is possible since the sealing element has been automatically aligned with the tucker by register ears 87'. Hence said element radially overlies the upper web 61, which is stretched across the tips of said forked tucker end, and the parts are properly positioned for sealing.

The tucker 65 immediately withdraws vertically to the dotted line position of Fig. 1 and the series of articles continues to travel forward, being accompanied by the spider and the several clamping heads which are in clamping engagement with webs 61, 62.

It should be understood that the engagement of registering ears 87' with tucker 65 and the inward travel of member 81 take place practically instantaneously, so that the angular advance of head 16 is not noticeably interrupted. However, the floating, spring urged mount of the head will permit some slight hesitation of member 81 at this time, if necessary, amply sufficient to enable element 82 to travel laterally into position for clamping the webs against its platen 87. Just as soon as this occurs the tucker retracts vertically.

As the head advances further the sealing element 82 in question is brought into radial clamping relation to said platen 87, and the webs stretched over the latter, by engagement of its associated follower roller 99 with depressing cam 100, see Fig. 3-B. Accordingly, the webs are sealed together as well as perforated between the articles, while the series of articles continues to feed forwardly. It is contemplated that a heat sealed bond of the webs shall take place, hence the latter are provided with an appropriate thermally fusible coating. The necessary heat for this purpose may be provided in any suitable manner, with the details of which this invention is not concerned. For example, this may be accomplished by the association of a suitable resistance or high frequency type heating unit in the head, i. e., in the sealing element 82 or by the provision of a heated surface or element over which the webs 61 and/or 62 may preliminarily pass to soften the sealing material, the pressure between the sealing element and platen completing the bond, or otherwise. Specific details of such instrumentalities have not been illustrated since, as stated, they are not a part of this invention.

The depressing cam 100 maintains the sealing element 82 depressed through an arc sufficient to insure a thorough fusion and setting of the sealing material on the webs, after which the roller 99 passes out from beneath said cam. At this point the element 81 is again elevated relative to the platen by coil spring 91. Immediately following elevation of the sealing element, cam follower roller 83 rides onto the surface of latch reset cam 84, with the result that sealing member 81 is retracted to the right (as in Fig. 3) against the force of spring 85, until latch dog 78 engages in detent notch 94 to secure the member in retracted position. When this movement is completed the series of banded articles is free to be stripped from the head 16 and may be delivered onto an adjacent discharge surface 112 for removal, the heads clearing beneath said surface as they travel forward.

As a final operation, head lockup pin 102 is again engaged with the cam 106, urging the same into recess 107 in the base 72 of head 16, whereby the head is rigidly sustained in a truly radial relation to the spider 14 for the remaining rotation of the latter. Re-engagement takes place unfailingly, inasmuch as said recess is of sufficiently large diameter to receive the pointed nose of the pin in any pivotal position in which the head may happen to be disposed.

It will be evident from the foregoing that in providing for some freedom of individual pivoting movement of the heads relative to the spider I insure automatic alignment of the sealing element 82 relative to the article to be banded, by engaging the element with the tucker 65, regardless of possible variations in the diameter of the article. The heads are individually released adjacent the sealing point to enable the aforesaid individual, floating movement but following sealing and retraction of the sealing element 82, are immediately restored to their locked relation to the spider in order that the cycle of operations of each head may originate at an unvarying point in the rotation of spider 14.

This apparatus is characterized primarily by the substantially increased output capacity thereof, as compared to previous machines of a similar class. Roughly a five fold increase in speed of operation is made possible, without sacrifice of effectiveness in any way. The relatively protracted period of engagement of the sealing element and platen with the webs insures an unfailingly strong, displacement-resisting bond between the webs. In other words, the use of a plurality of individual sealing heads enables a sealing period of the same duration as, or longer duration than, that taking place in similar present apparatus having but a fraction of the output of the herein described machine. The automatic self alignment of the heads relative to articles of variable size is also a feature of primary importance in such a high-speed apparatus, without which jamming and damage to or destruction of the product would be likely, if not probable.

Naturally, the provision of a simple, rapidly operable device for gauging variable size articles and feeding the same to the heads in a controlled accurately timed fashion is likewise of considerable importance in equipment of this type, since its speed would be meaningless in the event the articles were not unfailingly forwarded to each and every one of the heads. The article feeder exemplified in Figs. 2, 5 and 6 accomplishes this function admirably. Self alignment is made possible by the spring urged pivotal and floating mounting of the heads 16 on the spider. The independence of movement of said heads relative to the spider also enables the pusher bar 44 to be utilized as the means for advancing all the banded articles in series, as described above.

Those skilled in the art will readily perceive that many changes and substitutions are possible in connection with the above described apparatus, as well as in the character of the banding operation performed thereby, without in any way departing from the spirit of the invention. I therefore desire that the invention be construed, not in an unduly limited sense, but to include all such changes and substitutions, being limited only as reasonably indicated in the appended claims.

I claim:

1. In an article banding apparatus of the type including means to supply articles to be banded and banding material therefor at a sealing station, means to shape said material and seal the same in banding relation to the articles, comprising a traveling support carrying a plurality of similar, individual sealings heads, means engageable by said heads to register the same relative to an article at said sealing station, and means to effect sealing of said material by said heads at said station.

2. In an article banding apparatus of the type including means to supply articles to be banded and banding material therefor at a sealing station, means to shape said material and seal the same in banding relation to the articles, comprising a traveling support carrying a plurality of similar, individual sealing heads, means engageable by said heads to register the same relative to an article at said sealing station, each of said heads including relatively movable sealing members, and means to effect sealing of said material by said heads at said station, including means to cause relative sealing movement of said members.

3. In an article banding apparatus of the type including means to supply articles to be banded and banding material therefor at a sealing station, means to shape said material and seal the same in banding relation to the articles, comprising a traveling support carrying a plurality of similar, individual sealing heads, means engageable by said heads to register the same relative to an article at said sealing station, said last named means engaging said material to hold the same at said sealing point for engagement by said heads, and means to effect sealing of said material by said heads at said station.

4. In an article banding apparatus of the type including means to supply articles to be banded and banding material therefor at a sealing point, means to shape said material and seal the same in banding relation to the articles, comprising a traveling support carrying a plurality of similar, individual sealing heads past said point, each of said heads including relatively movable sealing members, means to hold said material at said sealing point for engagement by said members, and means to effect sealing of said material by said heads at said point, including means to cause relative sealing movement of said members.

5. In an article banding apparatus of the type including means to supply articles to be banded and banding material therefor at a sealing point, means to shape said material and seal the same in banding relation to the articles, comprising a traveling support carrying a plurality of similar, individual sealing heads past said point, and

means to effect sealing of said material by said heads at said point, said heads projecting from said support and being mounted thereon for individual floating movement relative to the support during at least a portion of the banding and sealing cycle.

6. In an article banding apparatus of the type including means to supply articles to be banded and banding material therefor at a sealing point, means to shape said material and seal the same in banding relation to the articles, comprising a traveling support carrying a plurality of similar, individual sealing heads past said point, each of said heads including relatively movable sealing members, and means to effect sealing of said material by said heads at said point, including means to cause relative sealing movement of said members, said heads projecting from said support and being mounted thereon for individual, floating movement relative to the support during at least a portion of the banding and sealing cycle.

7. In an article banding machine of the type including means for feeding articles to be banded and means for supplying web material to the articles to be banded, rotatively traveling banding means to secure said web material about said articles, including a head having relatively movable members engageable with said material to seal the same about an article, means mounting said head for rotative advancement as a unit with the articles during sealing of the web material by said members and means engageable with at least one of said head members during said rotative advancement to control the relative movement thereof.

8. In an article banding machine of the type including means for advancing articles to be banded and means for supplying a pair of webs on opposite sides of the articles, banding means to shape and secure said webs about said articles, including a reciprocable tucker engageable with one of the webs to position the same adjacent the other and in surrounding relation to an article, a sealing head having relatively reciprocable members engaging and securing the thus positioned webs together, and means mounting said head for rotary travel as a unit during securement of the webs by said members.

9. In a banding and sealing machine of the type including means to advance articles to be banded and means to supply banding material adjacent said articles, a reciprocable tucker engageable with said material to shape the same relative to an article, a rotary support having a plurlity of radially extending sealing heads pivoted thereon for floating movement relative to the support, each of said heads including a platen and a sealing member coacting with said platen, said sealing member being laterally shiftable relative to the platen and at an angle to the plane of rotation of the heads to align the member with the platen and being radially movable relative to the platen to clamp said material between the sealing member and platen, means shifting said sealing member laterally to position adjacent said tucker and material engaged thereby, and means to actuate the sealing member radially in timed relation to the lateral shifting thereof and into clamping relation to said material.

10. In a banding and sealing machine of the type including means to intermittently advance articles to be banded and means to supply banding material adjacent said articles, a reciprocable tucker engageable with said material to shape the same relative to an article, a support having a plurality of radially extending sealing heads pivoted thereon for floating movement relative to the support, each of said heads including a platen engageable with said tucker to thereby align the heads uniformly relative to the articles regardless of variations in the size thereof, and a sealing member coacting with said platen, said sealing member being laterally shiftable relative to the platen and at an angle to the plane of rotation of the heads to align the member with the platen, and being radially movable relative to the platen to clamp said material between the sealing member and platen, means shifting said sealing member laterally to position adjacent said tucker and material engaged thereby, and means to actuate the sealing member radially in timed relation to the lateral shifting thereof and into clamping relation to said material.

11. In a banding and sealing machine of the type including means to advance articles to be banded and means to supply banding material adjacent said articles, a reciprocable tucker engageable with said material to shape the same relative to an article, a continuously rotatable support having a plurality of radially extending sealing heads pivoted thereon for floating movement relative to the support, each of said heads including a platen engageable with said tucker to thereby align the heads uniformly relative to the articles regardless of variations in the size thereof, and a sealing member coacting with said platen, said sealing member being laterally shiftable relative to the platen and at an angle to the plane of rotation of the heads to align the member with the platen, and being radially movable relative to the platen to clamp said material between the sealing member and platen, means shifting said sealing member laterally to position adjacent said tucker and material engaged thereby, and means to actuate the sealing member radially in timed relation to the lateral shifting thereof and into clamping relation to said material.

12. In a banding and sealing machine of the type including means to advance articles to be banded and means to supply banding material adjacent said articles, a reciprocable tucker engageable with said material to shape the same in encircling relation to an article, a rotary support having a plurality of radially extending sealing heads pivoted thereon for floating movement relative to the support, each of said heads including a platen and coacting sealing member and being engageable with said tucker in the pivotal movement of the heads, to thereby align the heads relative to the tucker, said sealing member being laterally shiftable relative to the platen and at an angle to the plane of rotation of the heads into radial alignment with the platen, and being radially movable relative to the platen to clamp said material between the sealing member and platen, means shifting said sealing member laterally to align the same with the platen, and means to actuate the sealing member radially in timed relation to the lateral shifting thereof for sealing engagement with said material.

13. In a banding and sealing machine of the type including means to advance articles to be banded and means to supply banding material adjacent said articles, a reciprocable tucker engageable with said material to shape the same in encircling relation to an article, a rotary support having a plurality of radially extending

sealing heads pivoted thereon for floating movement relative to the support, spring means urging the heads in a common direction about the pivot points thereof, each of said heads including a platen and coacting sealing member and being engageable with said tucker in the spring urged pivotal movement of the heads, to thereby align the heads relative to the tucker, said sealing member being laterally shiftable relative to the platen and at an angle to the plane of rotation of the heads into radial alignment with the platen, and being radially movable relative to the platen to clamp said material between the sealing member and platen, means shifting said sealing member laterally to align the same with the platen, and means to actuate the sealing member radially in timed relation to the lateral shifting thereof for sealing engagement with said material.

14. In a banding and sealing machine of the type including means to advance articles to be banded and means to supply banding material adjacent said articles, a reciprocable tucker engageable with said material to shape the same in encircling relation to an article, said tucker having a forked material engaging element across which the material is disposed in being engaged by the tucker, a rotary support having a plurality of radially extending sealing heads pivoted thereon for floating movement relative to the support, each of said heads including a platen and coacting sealing member and being engageable with said forked element in the pivotal movement of the heads, to thereby align the heads relative to the tucker, said sealing member being laterally shiftable relative to the platen and at an angle to the plane of rotation of the heads into radial alignment with the platen, and being radially movable relative to the platen to clamp said material between the sealing member and platen, means shifting said sealing member laterally in the space between the ends of said forked element to align the same with the platen, and means to actuate the sealing member radially in timed relation to the lateral shifting thereof for sealing engagement with said material.

15. In a banding and sealing machine of the type including means to advance articles to be banded and means to supply banding material adjacent said articles, a tucker engageable with said material to shape the same in encircling relation to an article, said tucker having a forked end across which the material is disposed in being engaged by the tucker, a traveling support having a plurality of sealing heads mounted thereon, each of said heads including a platen and coacting sealing member, said sealing member being laterally shiftable relative to the platen and at an angle to the plane of rotation of the heads to bring the same into alignment with the platen in the space defined by said tucker end, and being radially movable relative to the platen to clamp the material disposed across said end between the sealing member and platen, means shifting said sealing member laterally, and means to actuate the sealing member radially in timed relation to the lateral shifting thereof.

16. In a banding and sealing machine of the type including means to advance articles to be banded and means to supply banding material adjacent said articles, a tucker engageable with said material to shape the same in encircling relation to an article, said tucker having a forked end across which the material is disposed in being engaged by the tucker, a traveling support having a plurality of sealing heads mounted thereon for floating movement relative to the support, each of said heads including a platen and coacting sealing member and being engageable with said forked tucker end by the floating movement of the heads, said sealing member being laterally shiftable relative to the platen and at an angle to the plane of rotation of the heads to bring the same into alignment with the platen in the space defined by said tucker end, and being radially removable relative to the platen to clamp the material disposed across said end between the sealing member and platen, means shifting said sealing member laterally, and means to actuate the sealing member radially in timed relation to the lateral shifting thereof.

17. In an article banding machine, means to secure continuous web material in encircling relation to individual articles of an advancing series, comprising a head having a pair of relatively movable clamping members, means to actuate at least one of said members in a direction at an angle to the direction of advance of said series to position the same between said articles with said members on opposite sides of the material, means to actuate the thus positioned clamping members in another direction into material clamping position and to maintain the same in said position during a sealing phase, and means to advance the heads in timed relation to the article advance during said phase.

18. In an article banding machine, a sealing head having relatively movable clamping members, means to advance said head comprising a traveling support and means to mount the head on said support for floating movement relative to the latter in the plane of advance of the head, and means operatively connected to at least one of said clamping members and actuable by the advance of said head to actuate the clamping members to material clamping and sealing position and to maintain the same in said position during at least a portion of the advance of the head.

19. In an article banding machine, a sealing head having relatively movable clamping members, means to advance said head rotatively, comprising a traveling rotary support and means to mount the head on said support for floating movement relative to the latter in the plane of advance of the head, and means to actuate the clamping members to material clamping and sealing position and to maintain the same in said position during at least a portion of the rotary advance of the head.

20. In an article banding machine adapted to secure web material in encircling relation to articles of an advancing series, a sealing head having relatively movable clamping members engageable with said material, a traveling support, means mounting said head on said support for floating movement in the direction of travel of the support during a portion of the cycle of operation of the machine, means locking the head in fixed relation to the support during another portion of said cycle, and means to actuate the clamping members of the head to material clamping position during said first named portion.

21. In an article banding machine adapted to secure web material in encircling relation to articles of an advancing series, a sealing head having relatively movable clamping members engageable with said material, a traveling support, means mounting said head on said support for

floating movement in the direction of travel of the support during a portion of the cycle of operation of the machine, means locking the head in fixed relation to the support during another portion of said cycle, means to actuate the clamping members of the head to material clamping position during said first named portion, and means engageable with said head to insure registry thereof relative to said series prior to operation of said actuating means.

22. In an apparatus for banding articles of variable size, a reciprocable article advancing member, article feeler means responsive to the size of said articles, means to position articles for engagement by said member, means controlled by said feeler means to control operation of said article positioning means in accordance with article size, means for imparting a predetermined constant stroke to said member effective to advance articles engaged thereby to predetermined relation to a sealing station, regardless of size, and a traveling sealing member having means engageable with banding material at said station to seal the same in banding relation to the article.

23. In an apparatus for banding articles of variable size, a reciprocable article advancing member, article feeler means responsive to the size of said articles, means to position articles for engagement by said member, means controlled by said feeler means to control operation of said article positioning means in accordance with article size, means for imparting a predetermined constant stroke to said member effective to advance articles engaged thereby to predetermined relation to a sealing station, regardless of size, a traveling sealing member having means engageable with banding material at said station to seal the same in banding relation to the article, and means adjacent said station engageable by said sealing member to register the latter relative to an article, regardless of its size.

24. In an apparatus for banding articles of variable size, a reciprocable article advancing member, means for imparting a predetermined constant stroke to said member effective to advance articles engaged thereby to predetermined position adjacent a sealing station, regardless of size, a reciprocable banding member engageable with banding material to position the same about an article at said station, a traveling sealing member engageable with the banding member to register the same and having means engageable with the thus positioned banding material at said station to seal the same in banding relation to the article, a continuously rotative traveling support for said sealing member, and means mounting the sealing member for floating movement on said support to enable unfailing engagement and registry with the banding member, regardless of article size.

25. In an apparatus for banding articles of variable size, a reciprocable article advancing member, article feeler means responsive to the size of said articles, means to position articles for engagement by said member, means controlled by said feeler means to control operation of said article positioning means in accordance with article size, means for imparting a predetermined constant stroke to said member effective to advance articles engaged thereby to predetermined position adjacent a sealing station, regardless of size, a reciprocable banding member engageable with banding material to position the same about an article at said station, a traveling sealing member engageable with the banding member to register the same and having means engageable with the thus positioned banding material at said station to seal the same in banding relation to the article, a traveling support for said sealing member, and means mounting the sealing member for floating movement on said support to enable unfailing engagement and registry with the banding member, regardless of article size.

26. In an apparatus for banding articles of variable size, a reciprocable article advancing member, article feeler means responsive to the size of said articles, means to position articles for engagement by said member, means controlled by said feeler means to control operation of said article positioning means in accordance with article size, means for imparting a predetermined constant stroke to said member effective to advance articles engaged thereby to predetermined relation to a sealing station, regardless of size, a reciprocable banding member engageable with banding material to position the same about an article at said station, and a traveling sealing member engageable with the banding member to register the same relative to the article, said sealing member having means engageable with the thus positioned banding material at said station to seal the same in banding relation to the article.

27. In an article banding machine, means to effect a controlled supply of articles to be banded regardless of size, including a reciprocable discharge element operable to and from a position for engagement with the forward article of a series to restrain the same and a withdrawn article-discharge position, a plurality of reciprocable article restraining elements operable rearwardly of said discharge element to restrain subsequent articles at the time of discharge of the forward article, article controlled means selectively governing the movement of said last named elements in response to article size, and a constant-stroke article advance member effective to forward discharged articles to position adjacent a banding station.

28. In an article banding machine, means to effect a controlled supply of articles to be banded regardless of size, including a reciprocable discharge element operable to and from a position for engagement with the forward article of a series to restrain the same and a withdrawn article discharge position, a plurality of reciprocable article restraining elements operable rearwardly of said discharge element in response to movement thereof to restrain subsequent articles at the time of discharge of the forward article, article controlled means selectively governing the movement of said last named elements in response to article size, and a constant-stroke article advance member effective to forward discharged articles to position adjacent a banding station.

29. In an article banding machine, means to effect a controlled supply of articles to be banded regardless of size, including a reciprocable discharge element operable to and from a position for engagement with the forward article of a series to restrain the same and a withdrawn article discharge position, a plurality of reciprocable article restraining elements operable rearwarly of said discharge element to restrain subsequent articles at the time of discharge of the forward article, article controlled means selectively governing the movement of said last named elements in response to article size, and a con-

stant-stroke article advance member effective to forward discharged articles to position adjacent a banding station.

30. In a article banding machine of the type including means to advance articles in series past a banding station and means to supply web banding material adjacent said station, means movable adjacent said station transversely of the direction of article advance to engage said material and shape the same in banding relation to an article at the station, and means traveling substantially in the direction of advance of the articles to engage and seal said material in said article banding relation.

31. In an article banding machine of the type including means to advance articles in series past a banding station and means to supply web banding material adjacent said station, means movable adjacent said station transversely of the direction of article advance to engage said material and shape the same in banding relation to an article at the station, and means traveling substantially in the direction of advance of the articles and at an angle to the path of movement of said material engaging means to engage and seal said material in said article banding relation.

32. In an article banding machine of the type including means to advance articles in series past a banding station and means to supply web banding material adjacent said station, means movable adjacent said station transversely of the direction of article advance to engage said material and shape the same in banding relation to an article at the station, and means traveling substantially in the direction of advance of the articles to engage and seal said material in said article banding relation, comprising a traveling sealing head having relatively movable material sealing members and means to advance the head and actuate said members in timed relation to the reciprocation of the material engaging means.

33. In an apparatus for banding articles of variable size, a reciprocable article advancing member, article feeler means responsive to the size of said articles, means to position articles for engagement by said member, means controlled by said feeler means to control operation of said article positioning means in accordance with article size, and means for imparting a predetermined constant stroke to said member effective to advance articles engaged thereby to predetermined relation to a sealing station, regardless of size.

34. In an article banding machine, means for serially feeding articles to be banded, means for feeding banding material to the articles, a plurality of devices for banding the articles with the material, each of said devices including a pair of relatively reciprocable members engageable with said material in performing a single banding operation, and means for serially presenting said devices in operative relation to the articles and material.

35. In an article banding machine, means for serially feeding articles to be banded, means for feeding banding material to the articles, a plurality of devices for banding the articles with the material, each of said devices including a pair of relatively reciprocable members engageable with said material in performing a single banding operation, and means for serially presenting said devices in operative relation to the articles and material, comprising a rotary support and means mounting the devices thereon in radial relation thereto.

36. In a packaging machine, means for serially feeding units of the commodity to be packaged, means for simultaneously feeding sheet material, a plurality of devices for securing the material about each of the units, each including a pair of members and means mounting the same for relative reciprocable movement, each of said devices being adapted to act upon but one of the units at a time, means for moving said devices serially in a circuit in synchronization with the feeding movement of the units to bring each of said devices into operative association with one of the units, and means for causing each device to secure the material about the associated unit.

37. In a packaging machine, means for serially feeding units of the commodity to be packaged, means for simultaneously feeding sheet material, a plurality of devices for securing the material about each of the units, each including a pair of members and means mounting the same for relative reciprocable movement, each of said devices being adapted to act upon but one of the units at a time, means for moving said devices serially in a circuit in synchronization with the feeding movement of the units to bring each of said devices into operative association with one of the units, and means for causing each device to secure the material about the associated unit without interrupting the movement of either the devices or the unit.

EDWARD C. SLOAN.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,986,422	Zwoyer	Jan. 1, 1935
2,083,617	Salfisberg	June 15, 1937
2,379,937	Sloan	July 10, 1945