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[31] **106 A/69**

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[54] **APPARATUS FOR TRANSPORTING AND WORKING PIECE GOODS AND THE LIKE**
8 Claims, 14 Drawing Figs.

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53/182, 198/102
[51] Int. Cl..... B65b
[50] Field of Search..... 198/19,
135, 102; 33/182

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ABSTRACT: An apparatus for transporting and working piece goods comprising a driven endless conveyor mechanism and a work station displaceable substantially parallel to the feed direction of said conveying mechanism. The conveying mechanism provides at the region of the work station an in-feed section and an outfeed section. Deflecting roller means rotatable by the conveying mechanism serve to rotatably mount the infeed section and the outfeed section. A brake mechanism prevents rotation of at least a deflecting roller means associated with the outfeed section relative to the work station during the time that a working operation is carried out upon one of the piece goods. There also being provided a return mechanism for the work station actuated in opposite phase relationship to said brake mechanism that is when the latter is rendered inoperable, for returning the work station back into its starting position.

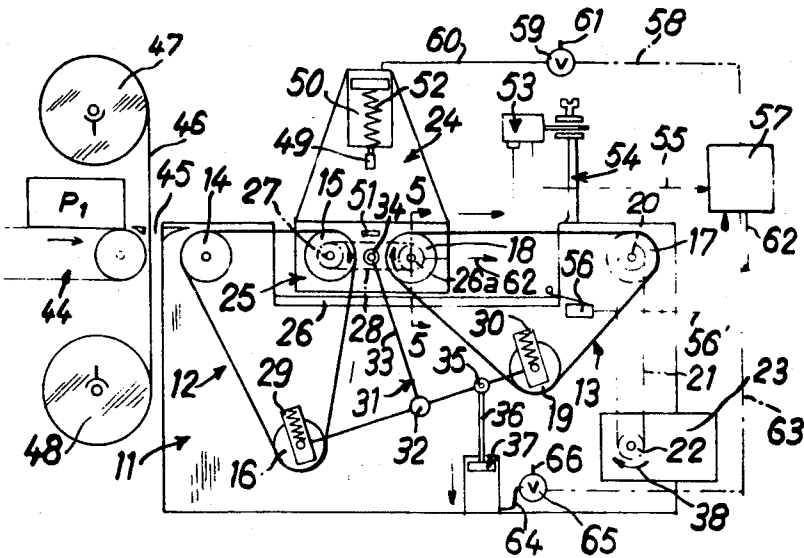


Fig. 1

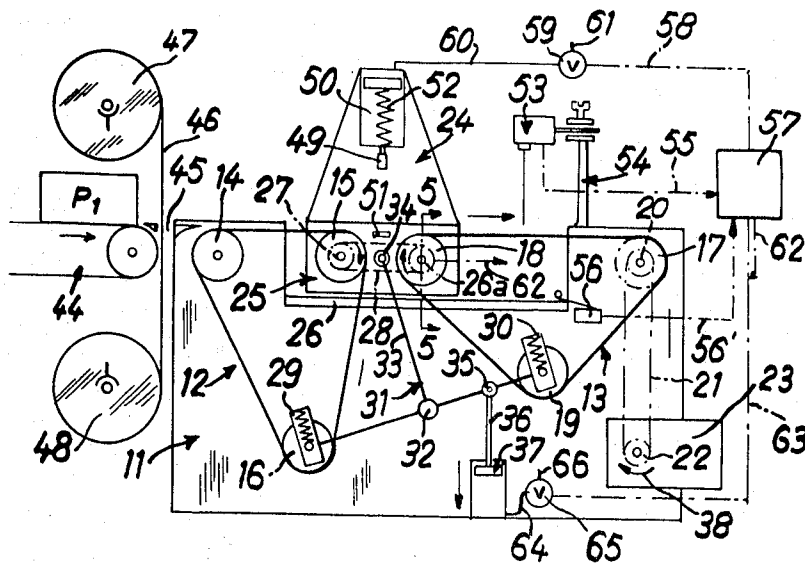
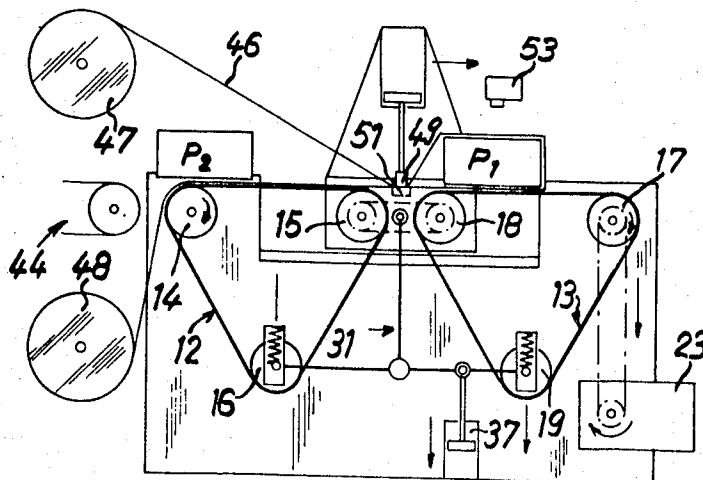


Fig. 3



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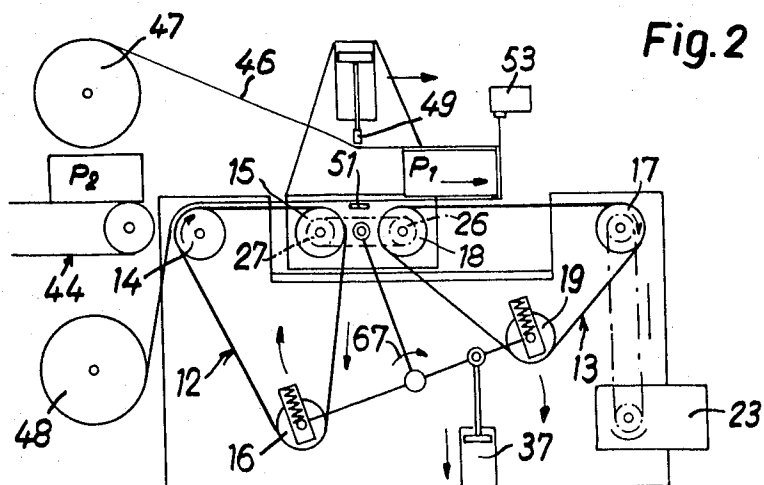


Fig. 2

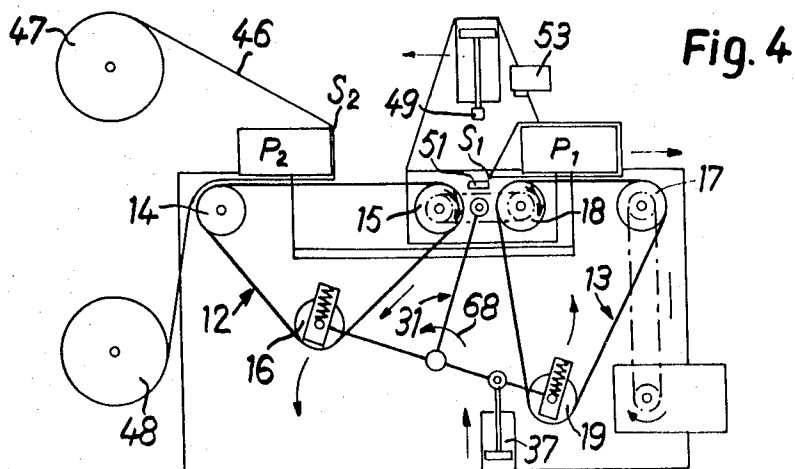


Fig. 4

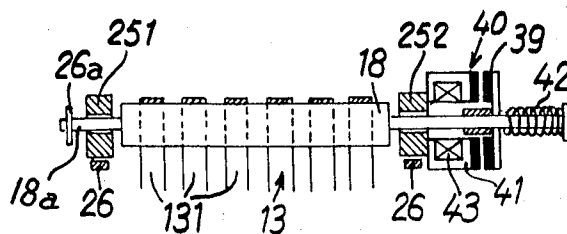


Fig. 5

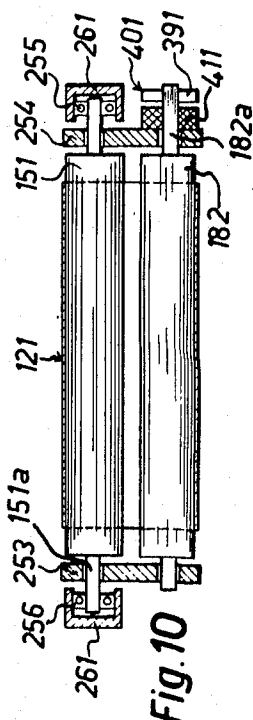
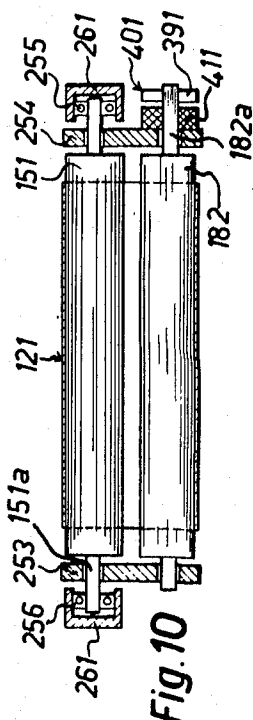
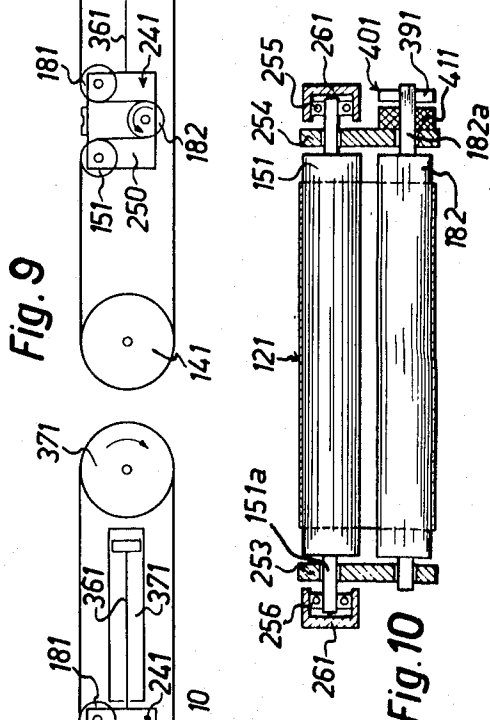
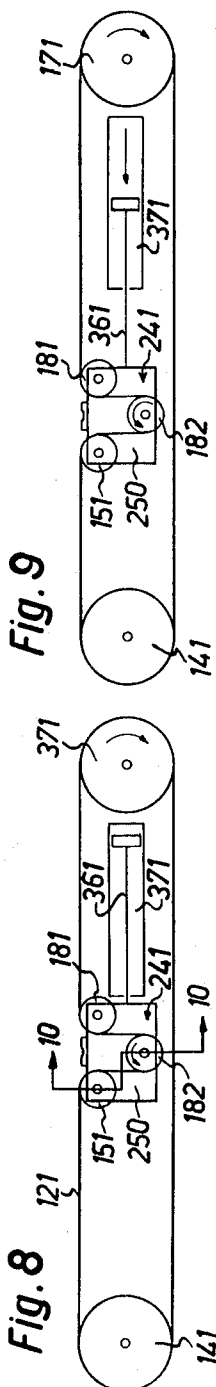
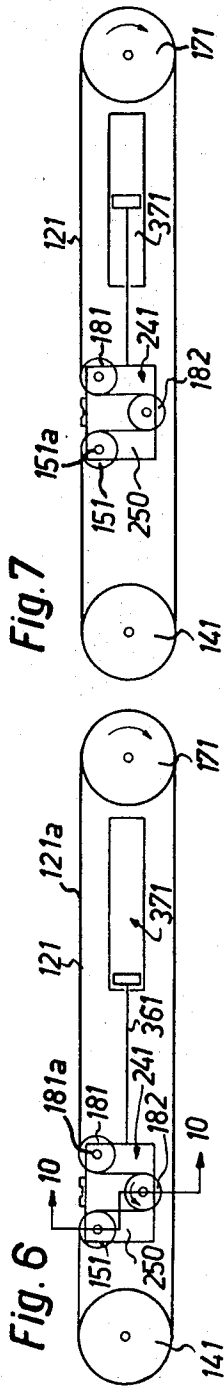


Fig. 12

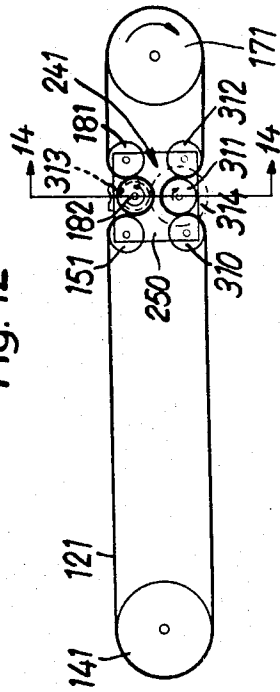


Fig. 11

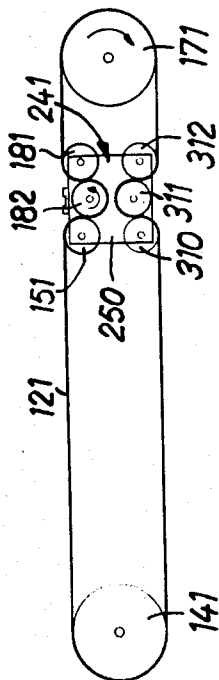


Fig. 14

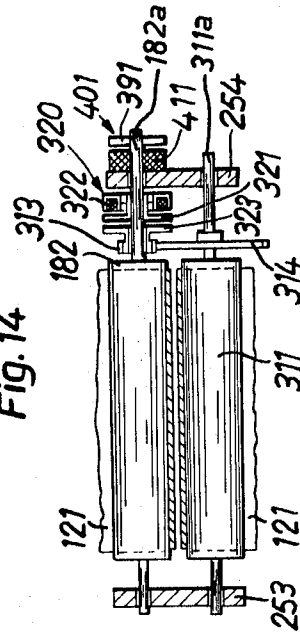
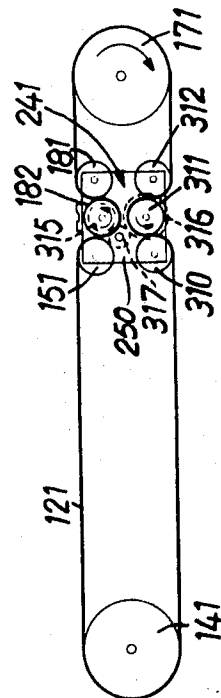


Fig. 13



APPARATUS FOR TRANSPORTING AND WORKING PIECE GOODS AND THE LIKE

BACKGROUND OF THE INVENTION

The present invention relates to a new and improved apparatus for transporting and working so-called piece goods, by means of a driven endless conveyor mechanism and a work station which can follow along and displaceable parallel to the feed direction of the conveying mechanism.

In the context of this application, the expression "working" or "processing" is intended to convey the concept of a treatment or manipulative operation, in the broadest sense of such term, which is required during the course of manufacturing or otherwise handling such piece goods. Furthermore, the expression "working" or "processing" is intended to encompass, among other things, a forming-, a coating- or covering-, a connection- and/or a packing-operation, following which any one of the properties or characteristics of the piece goods are changed. Additionally, the expression "piece good," used both singularly and in the plural, is employed herein for the purpose of only differentiating from loose or bulk materials, and furthermore is intended to designate goods or materials which individually constitute pieces separated from one another and which are similar or the same with respect to their type and dimensions.

The proposed type of equipment is, therefore, of the species where the working or processing of a piece good(s) occurs during transportation, in contrast to that basic different type of equipment which possesses stationary work stations with intermediate disposed conveying devices and wherein the piece goods are alternately transported and worked.

It is already known to the art for equipment of the aforementioned type to provide a special feed drive mechanism for the work stations. This feed drive mechanism is rendered operable upon the arrival of a piece good at the conveying mechanism, in order to displace the work station synchronously together with the conveying mechanism during the duration of the working operation, so that there does not occur any relative movement between the conveying mechanism and the piece goods and work station, respectively. However, it should be recognized and understood that such type equipment requires, first of all, a quite complicated construction and engineering design in order to insure for the synchronous travel of the conveying mechanism together with the work station. Furthermore, with a great many of the known apparatuses of the aforementioned type a basic drawback exists in that, the surface with which the piece good bears upon or acts upon the conveying mechanism is no longer accessible for carrying out a working operation thereat, unless the conveying mechanism itself is equipped with revolving work stations or components thereof.

SUMMARY OF THE INVENTION

Accordingly, a real need exists in the art for equipment for transporting and working goods of the aforementioned classification which is not associated with the drawbacks explained above prevailing in the prior art constructions. Therefore, a primary object of this invention is to provide equipment which will effectively fill this need.

Another, more specific objective of the invention relates to the provision of an apparatus of the aforementioned type which is constructed in such a fashion that the work station forms, for a certain period of time, to a certain extent a component of the conveying mechanism, but still can be displaced with respect to such conveying mechanism, that is to say, can again be displaced to the input side of the conveying mechanism.

Now, in order to implement these and still further objects of the invention, which will become more readily apparent as the description proceeds, the proposed apparatus of the present invention is generally manifested by the features that both an infeed section and an outfeed section of the conveying mechanism is associated with the work station and rotatably

mounted in deflecting rolls which can be placed into rotation by such conveying mechanism. Furthermore, a brake mechanism is provided in order to prevent rotation of at least the deflecting roll associated with the outfeed or delivery section with respect to the work station during the duration of the working operation, there further being provided a return mechanism for the work station which can be actuated in opposite phase to the brake mechanism.

According to a preferred manifestation of the inventive equipment, the work station is preferably constructed in the form of a carriage or slide displaceable along a guide track, this guide track extending in the same manner or direction as the conveying mechanism. As a result, during direct or indirect braking of the deflecting roll associated with the outfeed or delivery section the carriage or slide functions as a component of the conveying mechanism, that is, moves together with such conveying mechanism, whereas during free rotation of such deflecting roll the return mechanism can displace the carriage or slide opposite to the conveying or feed direction, without considerably impairing the conveying capability of the conveying mechanism.

According to one preferred form of the invention, the conveying mechanism can be constructed as two separate conveying bands or chains which however are coupled with one another via the work station, one such band or chain constituting the infeed or supply section and the other the outfeed or delivery section. It is, however, also possible to construct the conveying mechanism in the form of a single conveyor or chain arranged and designed such to provide the aforementioned infeed and outfeed sections.

Various exemplary embodiments of the inventive apparatus will be more fully described hereinafter in conjunction with the drawings, wherein the first embodiment exemplifies the use of the inventive equipment at a packaging machine for encasing the aforedefined piece goods in a heat sealable foil, particularly a shrinkage or tight foil. It should however also be clearly understood that the described enclosing of the piece goods only depicts one type of work operation which can be performed with the inventive equipment. Yet, such work procedures can also, as previously explained, be manifested in the form of a forming operation, for instance, a cutting or non-cutting metal working, a coating operation, for instance, by means of a fiber layer, a connection operation, for instance, in the form of a threading, riveting or bonding operation, by way of example. Depending upon which working procedure is carried out, then, only the relevant tools at the work station would be changed.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be better understood and objects other than those set forth above, will become apparent when consideration is given to the following detailed description thereof. Such description makes reference to the annexed drawings wherein:

FIGS. 1 to 4 inclusive are respective schematic front views of a packaging machine designed according to the invention, showing the different stages of a complete operating cycle;

FIG. 5 is an enlarged cross-sectional view of a component of the equipment depicted in FIGS. 1 to 4, taken substantially along the line 5-5 of FIG. 1;

FIGS. 6 and 9 inclusive are schematic front views of the essential components of a modified version of inventive equipment, with certain of the control portions being omitted for the sake of clarity;

FIG. 10 is an enlarged sectional view through a component of the equipment depicted in FIGS. 6 to 9, taken substantially along the line 10-10 of FIG. 6 or FIG. 8;

FIGS. 11, 12 and 13 inclusive once again represent schematic front views of the essential components of further respective embodiments of inventive equipment; and

FIG. 14 is an enlarged sectional view of a component of the embodiment of equipment depicted in FIG. 12, taken substantially along the line 14-14 thereof.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Describing now the drawings, in the exemplary embodiment of inventive apparatus for transporting and working piece goods as defined herein, there will be recognized two conveyor bands 12 and 13 arranged at a machine frame 11. The conveyor band 12 is guided about three deflecting rolls or rollers 14, 15 and 16, the other conveyor band 13 likewise being guided about three deflecting rolls or rollers 17, 18 and 19. Deflecting rollers 14 and 17 are rotatably mounted in any suitable fashion at the machine frame 11, deflecting roller 17 being rigidly connected for rotation with a sprocket wheel or gear 20 about which there is trained a chain 21 which, in turn, is coupled with the drive gear or wheel 22 of a suitable drive motor 23. The deflecting rolls or rollers 15 and 18 are rotatably secured to a work station 24, designed in the form of a carriage or slide 25, displaceable along guides 26 provided at the machine frame 11. Furthermore, the deflecting rolls 15 and 18 are rigidly connected for rotation with a respective sprocket gear or wheel 27 and 26a which, in turn, are coupled with one another by a chain 28.

The remaining deflecting rolls or rollers 16 and 19 are each mounted by means of a respective resilient support or mounting device 29 and 30 with two free ends of a three-arm rocker beam arrangement 31, possessing the configuration of an inverted "T." This rocker beam arrangement 31 is pivotably mounted at its junction point 32 of the three arms at the machine frame 11 in the manner of a balance beam. The third arm 33 of the rocker beam arrangement 31 is articulated at location 34 with the carriage or slide 25. The hinge joint or connection between the junction point 32 and the hinge point 34 is constructed in such a manner that the length of the arm 33 between both of these points 32, 34 can be freely changed. For instance, to achieve this the arm 33 can be formed of two telescopically displaceable components or, however, can be constructed as a single-piece member which at the same time is lengthwise displaceable at the hinge location 34. Furthermore, at the arm member appearing at the right of the junction point 32 of FIG. 1 there is articulated at location 35 a piston rod 36 of a fluid-actuated, typically a pneumatic piston-cylinder arrangement 37 serving as a return mechanism for the carriage or slide 25, as will be more fully described hereinafter.

From what has previously been described, it will be apparent that during operation of the drive motor 23 in the direction of rotation indicated by the arrow 38, the horizontally extending portion of the conveyor band 13 between the rollers 17 and 18 will carry out a conveying action from the left towards the right, and similarly the portion of the conveyor band 12 extending between the rollers 14 and 15, because rollers 15 and 18 are coupled in driving relationship with one another by means of the chain 28 with the transmission ratio 1:1. The carriage or slide 25 and with it the entire working station 24 is not caused to undertake any displacement along the guide track 26 if only the drive motor 23 is in operation.

Referring now to FIG. 5, which for the purpose of clarifying the construction of the roller arrangement 18, has been shown on an enlarged scale, the details of such deflecting roller arrangement 18 will be recognized, about which there has been trained the conveyor band 13 embodying a plurality of belts 131. Deflecting roll 18 is rotatably mounted in side plates 251 and 252 of the carriage 25, which are displaceable in sliding fashion or by means of nonillustrated wheels upon the guide rails 26. On one end of the shaft member 18a for the deflecting roll 18 there is arranged the sprocket gear or wheel 26a which, by referring FIG. 1 and 2, serves to transmit the driving force to the conveyor band 12. At the opposite end of this shaft 18a of the roller 18, there is arranged rigidly for rotation therewith the movable component 39 of an electromagnetic brake mechanism 40 which is axially displaceable against the action of a tension spring 42. The stationary component 41 of the brake mechanism 40 which incorporates the excitation

coil 43 is rigidly connected for rotation in any appropriate manner with the side plate 252. It will thus be apparent that on excitation of the coil 43 there is prevented rotation of the deflecting roll 18 with respect to the carriage or slide 25. Details concerning this phase of operation of the equipment will be referred to again more particularly hereinafter.

Referring now once more to FIGS. 1 to 4 inclusive, then, there will be observed the terminal portion of a further conveyor band 44 arranged in front of the previously discussed conveyor band 12. A web 46 of suitable wrapping or enclosing material, for instance a shrinkage foil simultaneously drawn off of an upper supply roller 47 and a lower supply roller 48, extends through the gap or space 45 between the conveyor band 44 and the conveyor band 12.

At the processing or working station 24, there is provided a foil-, heat sealing-and separation or cutting arrangement, the essential components of which constitute a movable heating welding- and separation-electrode 49 which can be moved up and down by a pneumatic cylinder 50 against the action of a pressure spring 52, and further a stationary counterelectrode 51 arranged at the carriage 25 and directly beneath the conveying plane of the transport or conveyor bands 12 and 13. Counterelectrode 51 cooperates in the usual fashion with the aforementioned electrode 49.

Although the actual details of the control mechanism for the equipment do not constitute a part of the inventive subject matter since the workings and construction thereof would be well recognized and understood by those versed in the art, still, for the sake of elucidating the more important overall operation of the inventive system, there has been schematically depicted in FIG. 1 a control mechanism. Such control mechanism encompasses a light barrier or photoelectric device 53 responsive to the infed of a piece good P and adjustable and fixable at the console 54 parallel to the transport direction of the conveyor bands 12 and 13. Light barrier 53 is coupled by means of a schematically indicated conductor 55 with the control circuit components in the control box 57. The terminal position of the carriage 25, at the right of FIG. 1, is determined by a terminal switch 56 electrically coupled by a conductor 56' with the control box or mechanism 57. Furthermore, a control conductor or line 62 leads from the control mechanism 57 to the electric coil 43 of the brake mechanism 40 (FIG. 5). Further, a control conductor 58 leads from the control mechanism 57 to a valve unit 59 which selectively connects the pneumatic unit 50 of the work station 24, via a pneumatic conduit 60, with a conduit 61 leading to a nonillustrated pressure source or with the ambient air. The same holds true for the control conductor 63 controlling a valve unit 65, which, in turn operatively couples the return cylinder 37 via a conduit or line 64 with a line 66 leading to a pressure source or with the ambient air.

The construction, the type as well as the electrical interconnection of the circuit components of the control mechanism 57 do not, as already explained above, constitute part of the present invention, and, therefore, have not here been further discussed. Yet, upon understanding the hereinafter described sequence of the work cycle, those versed in the art will be quite capable of recognizing the type of construction and requirements placed on such control mechanism.

For purposes of explaining the operation of the heretofore disclosed embodiment of inventive apparatus, it is to be assumed that the apparatus is located in the starting position of FIG. 1. Hence, the drive motor 23 is now switched in, and the conveyor bands 12 and 13 begin to revolve, likewise also the conveyor band 44.

The brake mechanism 40 is deenergized and the pneumatic unit 37 is subjected to pressure. The carriage 25 is therefore located in its terminal position at the left side of FIG. 1. Now a piece good P₁ is delivered to the conveyor band 44, which is just about to contact the foil web 46. Upon reaching the gap 45 this piece good P₁ entrains the foil web 46 which, then, has approximately three-quarters of its peripheral area encased by such foil web during the time that this piece good P₁ is further

conveyed upon the conveyor band 12 and the conveyor band 13.

This condition is represented in FIG. 2. During further transport, the leading end of the piece good P_1 which is encased over three-quarters of its peripheral surface now reaches the operable zone of the light barrier 53, causing such to respond. The pulse (s) delivered by the light barrier 53 having the following effect: The electric coil 43 of the brake mechanism 40 is energized, the valve unit 65 is switched so that pressure is no longer delivered to the pneumatic unit 37, the valve unit 59, on the other hand, applies pressure to the reciprocating piston 50, voltage is delivered to the terminal switch 56, and the bundle of light rays of the light barrier 53 is interrupted. Drive motor 23 remains unaffected so that the conveyor band 13 continues to be further driven. Since the brake mechanism 40 is energized the deflecting roll 18 as well as the reflecting roll 15 are prevented from rotating. Hence, conveyor band 13 pulls the carriage or slide 25 from the left to the right of FIG. 1, resulting in the balance beam or rocker arm arrangement 31 being pivoted in the direction of the arrow 67. Although at this moment of time the conveyor band 12 is no longer revolvingly driven, it still is pulled off to a certain extent from the deflecting roller 14 due to the displacement of the carriage 25 together with its work station. Conveyor band 12 therefore still carries out its feed activity and the next interval of time further conveys the subsequent piece good P_2 .

This phase of the operation is illustrated in FIG. 3, from which it will be observed that the work electrode 49 has lowered behind the trailing end of the piece good P_1 , and in cooperative working relationship with the counterelectrode 51 fuses or welds together and separates the foil web 46. It is to be understood that this operation constitutes, in known manner, a separation welding of both webs, that is, both web sections leading to the supply rolls 47 and 48 are welded together or heat sealed, as indicated by the welding seam S_2 of FIG. 4, as are also heat sealed the upper and lower web sections extending about the piece P_1 as indicated by the welding seam S_1 , during such time as the separation occurs between the welding seams S_1 and S_2 . As a result the web 46 is again rendered coherent or, in other words, continuous.

As will be recognized by referring to FIG. 4, this heat-sealing and separation operation occurs without interruption of the feed or conveying motion and continues for such a length of time until the carriage 25 has reached its terminal position, indicated at the right-hand side of FIG. 4. This causes the terminal switch 56 (FIG. 1) to respond, having the following result: The brake mechanism 40 is deenergized, the valve unit 59 relieves the pressure from the reciprocating piston 50, the valve mechanism 65 again applies pressure to the pneumatic unit 37, and the light barrier 53 is furnished with current once again.

Now by continuing to refer to FIG. 4, it will be recognized that as a result of the foregoing operation, the rollers 15 and 18 can again rotate, and therefore the carriage or slide 25 is no longer subjected to the tensional force of the conveyor band 13. Quite to the contrary, owing to the lifting action of the pneumatic drive unit 37, the rocker arm arrangement or balance beam 31 is pivoted back in the direction of the arrow 68 of FIG. 4, causing the carriage 25 to return to the left into its starting position where, in the meantime, the next successive piece good P_2 is already in a preparatory position to be enclosed by the foil web 46. It is important at this time, to clearly recognize that all of these operations have been able to take place without the slightest interruption of the conveying operation. Further, the return of the work station 24 likewise does not bring about any interruption of the conveying movement. During return of the work station 24 the deflecting rollers 15 and 18 automatically rotate at a higher rotational speed than the rollers 17 and 14, since there must be taken into account, apart from the peripheral speed transmitted by the drive roller 17 to the conveyor band 13 also the displacement speed of the carriage 25, which collectively determine the peripheral velocity or speed of the rollers 15 and 18.

Instead of using the balance beam arrangement 31 it would also be possible to provide a return mechanism which is directly articulated to the carriage 25. The tensioning rolls 16 and 19 could then be constructed as so-called "dancer" rolls which maintain the conveying or transport bands 12 and 13 in a tensioned state due to their own weight.

A more simplified version of the equipment of the invention has been illustrated in FIGS. 6 to 10, wherein there is only necessary a single conveyor band devoid of any tensioning rollers. To preserve clarity in illustration in the drawings, there has here been omitted the machine frame 11 and all of the components of the control mechanism, heretofore discussed in connection with the embodiment of inventive equipment illustrated in FIGS. 1 to 5.

By referring to FIGS. 6 to 9 inclusive, there will be recognized a conveyor mechanism here constituted by the single conveyor band 121 trained about a roller 141 and a driven roller 171. Rollers 141 and 171 are stationarily rotatably mounted and approximately correspond to the rollers 14 and 17 of FIG. 1.

A carriage or slide 250 is threaded through the upper run of the conveyor band 121, carriage 250 constituting part of a work station 241. Now these components can be considered equivalent to the components 25 and 24, respectively, of FIG. 1. Carriage 250 rotatably mounts three deflecting rolls or rollers 151, 182 and 181, about which there is guided in the form of a "U" the band 121. The substantially U-shape portion of conveyor band 21 defines a space which is not traversed by this band 121 at the region of the carriage 250, which space can serve to accommodate a suitable work tool. Once again, by making the analogy with the arrangement of FIG. 1, the roller 151 can be considered comparable to the roller 15, whereas the rollers 181 and 182 can be considered to correspond in function to the roller 18.

As will be recognized by referring to FIG. 10, the rollers 151 and 182, also the roller 181 although not visible in FIG. 10, are mounted in the side plates 253 and 254 of the carriage 250. The shafts 151a and 181a of the rollers 151 and 181, respectively, extend through the side plates 253 and 254, carrying at their respective ends the ball bearings 255 and 256 traveling in substantially U-shape guide rails 261, as shown particularly for the roller arrangement 151. The right-hand appearing end of the shaft 182a of the roller 182 also extends through the side plate 254 and supports the movable component 391 of an electromagnetic brake mechanism 401, the fixed portion or component 411 thereof being secured to the side plate 254. Finally, directly hingedly connected with the carriage 250 is the piston rod 361 of a pneumatic return piston-cylinder arrangement 371.

In consequence of what has been described and discussed above, it will be apparent that the variant embodiment disclosed in FIGS. 6 to 10 is extensively similar to the initially discussed embodiment of inventive equipment described in conjunction with FIGS. 1 to 5.

Thus, as long as the roller 182 is not braked, then, with the band 121 revolving the carriage 250 remains stationary, the conveying band 121 so to speak "passing through" the carriage 250. On the other hand, if the roller 181, from which there leads the outfeed or delivery section 121a of the conveying band 121, is braked and therefore prevented from rotating, then, the carriage 250 so to speak becomes a component of the conveyor band 121 and travels along therewith, as shown in FIG. 7. If the carriage 250 has reached its terminal position at the right of FIG. 8, then, the brake mechanism is deenergized, the carriage 250 remains stationary, and as soon as the piston-cylinder arrangement 371 is subjected to pressure then the carriage or slide 250 is displaced back toward the left into its starting position without having to stop the conveyor band 121.

It is here mentioned that the return mechanism need not directly engage the carriage 25 or 250 of the embodiments of FIGS. 1 and 6, respectively. A further possibility of returning the carriage into its starting position, is rendered possible with the arrangement of FIG. 1 by braking the roller 14 whereas

the rollers 15 and 18 are not braked. This variant form of construction is indeed quite simple, yet has the consequence that during the return movement of the carriage the infeed section of the conveyor band is not effective to carry out a conveying action. In this embodiment, there must also be provided in the connection between the conveyor band 13 and the roller 15 an element capable of slipping, for instance, a slip-coupling, whereas the roller 15 must be slip-free with respect to the conveyor band 12.

FIGS. 11 to 14 inclusive depict further possibilities for returning the slide or carriage of the embodiment of inventive apparatus according to FIGS. 6 to 10 inclusive. Because of the similarities between this arrangement and that of the prior embodiment of FIGS. 6 to 10, the same reference characters have generally been used in FIGS. 11 to 14 inclusive to denote similar or analogous components.

Just as was the case with the equipment structure of FIGS. 6 to 10, here also there is provided only a single conveyor band 121 which is trained about two rollers 141 and 171, roller 171 being suitably rotatably driven in clockwise direction. The carriage 250 is "threaded" between both runs of the conveyor band 121, carriage 250 constituting part of the work or processing station 241. The upper run of the transport or conveyor band 121 is guided in the form of a substantially U-shaped loop about three reflecting rollers 151, 181 and 182 rotatably mounted at carriage 250. In a similar fashion the lower run of conveyor band 121 is likewise guided about three return rollers 310, 311 and 312 rotatably mounted at the carriage 250 to provide, in this instance, a likewise substantially U-shaped loop which, however, is inverted with respect to the previously formed loop.

Seated upon the shaft member 182a of the deflecting roller 182 as well as upon the shaft member 311a of the return roller 311 are the respective gears 313 and 314 which mesh with one another, as best shown by referring to FIGS. 12 and 14.

In the slightly modified version of equipment represented in FIG. 13 a gear 313 is mounted at the shaft of the deflecting roller 182, whereas a gear 316 is seated upon the shaft of the return roller 311. Both gears 315 and 316 mesh with an intermediate gear 317 rotatably secured to the carriage or slide 250.

FIG. 14 denotes a cross-sectional view of the apparatus shown in FIG. 12, taken substantially along the lines 14-14 thereof. It will be seen that the deflecting roller 182 and the return roller 311 have their shaft members 182a and 311a, just as is also the case with the nonillustrated rollers 151, 181, 310 and 312, mounted in sideplates 253 and 254 of the carriage 250. Mounting of the nonillustrated rollers 151, 181, 310 and 312 corresponds to the mounting of the roller 151 of the embodiment of FIG. 10. The right-hand end of the shaft 182a of the roller 182 extends through the sideplate 254 and, similar to the arrangement of FIG. 10, here also carries the movable component 391 of an electromagnetic brake mechanism 401, the fixed portion 411 of which is secured to the sideplate 254, as shown. At the same end of the shaft 182a, yet at the opposite face of the sideplate 254 there is mounted a magnetic coupling 320. The one disc member 321 of this coupling 320, together with the actuation magnetic 322, are fixed to the shaft 182a, while the other disc member 323 is connected with the gear 313 and is axially displaceable upon shaft 182a. The gear 314 which meshes with the gear 313 is fixedly seated upon the shaft 311a of the return roller 311.

The arrangement shown in FIG. 14 employing an electromagnetic brake mechanism 401 and a magnetic coupling 320 is analogously provided for also with the embodiments shown in FIG. 13, wherein the axially displaceable coupling disc 323 is fixedly connected with the gear 315, cooperating through the agency of the intermediate gear 317 with the gear 316 mounted at the shaft of the return roller 311.

On the other hand, in contrast to the embodiments shown in FIGS. 12, 13 and 14, the modified version of equipment represented in FIG. 11 has both the deflecting roller 182 as well as the return roller 311, just as was also the case with the

roller 182 of FIG. 10, only equipped with an electromagnetic brake mechanism 401.

The advancing or forward movement of the embodiment of equipment shown in FIG. 11 occurs similar to the embodiment depicted and described in FIGS. 6 to 10. As long as the rollers 182 and 311 are not braked, then during revolving motion of the conveying or transport band 121 the carriage 215 remains stationary.

If the roller 182 is braked, thereby preventing rotation of the deflecting roller 181, then, the carriage 250 travels along with the transport or conveying band 121. Upon the carriage 250 reaching its terminal position at the right side of FIG. 11, the brake mechanism for the roller 182 is deenergized and the carriage 250 remains stationary. Now as soon as the return roller 311 is braked, the carriage 250 moves back with the same velocity as it moved during its forward motion, yet in the opposite direction. By deenergizing the brake associated with the return roller 311, the carriage 250 is again stopped.

In the arrangement of inventive equipment depicted in FIGS. 12 and 13, the carriage 250 performs its forward movement with the coupling 320 inactivated and by braking the roller 182, the carriage 250 as previously described, being entrained by the conveyor band 121. In the terminal position at the right of the figures under discussion, the brake mechanism 401 is deenergized, the carriage 250 remaining stationary. Now if the coupling 320 is switched-in, then, with the band 121 revolving, the deflecting roller 182 drives the return roller 311 via the gearing 313, 314 (FIG. 12) or 315, 316, 317 (FIG. 13).

With the arrangement shown in FIG. 12, the return roller 311 rolls upon the revolving conveyor band 121 in its direction of movement. Consequently, a return speed is imparted to the carriage 250 which is greater than the conveying speed, and accordingly, also greater than the advancing or forward speed of the carriage.

In contrast thereto, with the arrangement of FIG. 13, the return roller 311 rolls upon the revolving conveyor band 121 in a direction opposite to its advancing direction, and the return speed of the carriage 250 is therefore smaller than the conveyor band speed and also smaller than the advancing speed of the carriage 250.

By appropriate selection of the transmission ratio of the gears 313, 314 and 315, 316, 317 respectively, it is possible to optionally vary the driving rotational speed of the return roller 311, and, therefore, to obtain any desired carriage return speed.

In all of the embodiments herein disclosed, it will be observed that the conveying mechanism, whether such be a pair of conveyor bands as shown in the arrangement of FIG. 1, or a single conveyor band as shown in the arrangements depicted in FIGS. 6 to 14, possesses an infeed or supply section for the piece goods to one side of the carriage as well as an outfeed or delivery portion or section at the opposite side of the carriage. Furthermore, as mentioned during the description of the invention, it is of significance to again recognize that during performance of the work operation, it is not necessary to interrupt the conveyance of the piece goods, inasmuch as the carriage constituting part of the work station at one point during operation of the system becomes part of the conveying mechanism. Continuous performance is further insured through the return feature provided for by the specific return mechanism cooperating with the carriage to displace such back into its starting position upon the termination of the requisite work step.

The foregoing description also should make it quite apparent that the specific objectives of the invention are realized in a very efficient and relatively simple manner, wherein the equipment is designed such that it is not only relatively inexpensive to manufacture, but further requires very little maintenance inasmuch as it is not readily subject to breakdown.

While there is shown and described present preferred embodiments of the invention, it is to be distinctly understood that the invention is not limited thereto but may be otherwise

variously embodied and practiced within the scope of the following claims.

What is claimed is:

1. An apparatus for transporting and working piece goods comprising a driven endless conveyor mechanism, means defining a work station displaceable substantially parallel to the feed direction of said conveying mechanism between a starting terminal position and a final terminal position, said conveying mechanism providing at the region of said work station an infeed section and an outfeed section, deflecting roller means rotatable by said conveying mechanism for rotatably mounting said infeed section and said outfeed section, a brake mechanism for preventing rotation of at least a deflecting roller means associated with said outfeed section relative to said work station during the duration of time that a working operation is carried out upon one of the piece goods, and a return mechanism for said work station actuated in opposite phase relationship to said brake mechanism for returning the work station back into its starting position.
2. The apparatus as defined in claim 1, wherein said conveying mechanism comprises a respective conveyor band for each said infeed section and said outfeed section, said deflecting roller comprising a pair of deflecting rollers mounted at said work station, one of said deflecting rollers being associated with said infeed section and the other said deflecting rollers with said outfeed section, and means for coupling both said deflecting rollers with one another to rotate in the same direction with the same circumferential velocity.
3. The apparatus as defined in claim 2, wherein said brake mechanism serves to block at least said deflecting roller as-

sociated with said conveyor band defining said outfeed section.

4. The apparatus as defined in claim 2, further including drive means operatively associated with said conveyor band defining said outfeed section, said conveyor band defining said infeed section being driven via said pair of deflecting rollers coupled with one another at said work station.

5. The apparatus as defined in claim 1, wherein said conveying mechanism comprises as endless revolving conveying element providing both said infeed section and said outfeed section, said deflecting roller means comprising at least three deflecting rollers arranged at the region of said work station, said conveying element being guided in slip-free manner about said three deflecting rollers, said brake mechanism serving to block at least one of said deflecting rollers.

6. The apparatus as defined in claim 5, wherein said return mechanism incorporates at least three return rollers rotatably mounted at said work station, said conveying element having a return run portion guided about said return rollers, said brake mechanism serving to block at least one of said return rollers.

7. The apparatus as defined in claim 5, wherein said return mechanism comprises at least three return rollers rotatably mounted at said work station, said conveying element incorporating a return run portion trained about said return rollers, a controllable gearing arrangement for coupling one of said return rollers with one of said deflecting rollers.

8. The apparatus as defined in claim 7, further including coupling means cooperating with said gearing arrangement.

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