United States Patent [19]

Brummett et al.

[11] **3,734,027**

[45] **May 22, 1973**

[54] **INTRA-FACTORY SYSTEM AND METHOD FOR UTILIZING POWERED AND FREE CONVEYOR SYSTEMS**

[75] Inventors: **Paul L. Brummett; Sigmund G. Isley**, both of Smithfield, N.C.

[73] Assignee: **Amerel Company, Inc.**, Smithfield, N.C.

[22] Filed: **Feb. 18, 1971**

[21] Appl. No.: **116,493**

[52] **U.S. Cl.** .....**104/172 S,** 104/88, 104/96

[51] **Int. Cl.** **B65g 17/12,** B65g 17/42

[58] **Field of Search**.....104/172 S, 178, 88, 104/96; 198/177

[56] **References Cited**

UNITED STATES PATENTS

3,048,123	8/1962	Burmeister et al.	104/172 S
3,045,609	7/1962	Brown, Jr.	104/172 S
3,180,279	4/1965	Thibault	104/172 S
3,257,963	6/1966	King	104/172 S
3,314,378	4/1967	Potter et al.	104/172 S
3,565,012	2/1971	Nearman	104/172 S

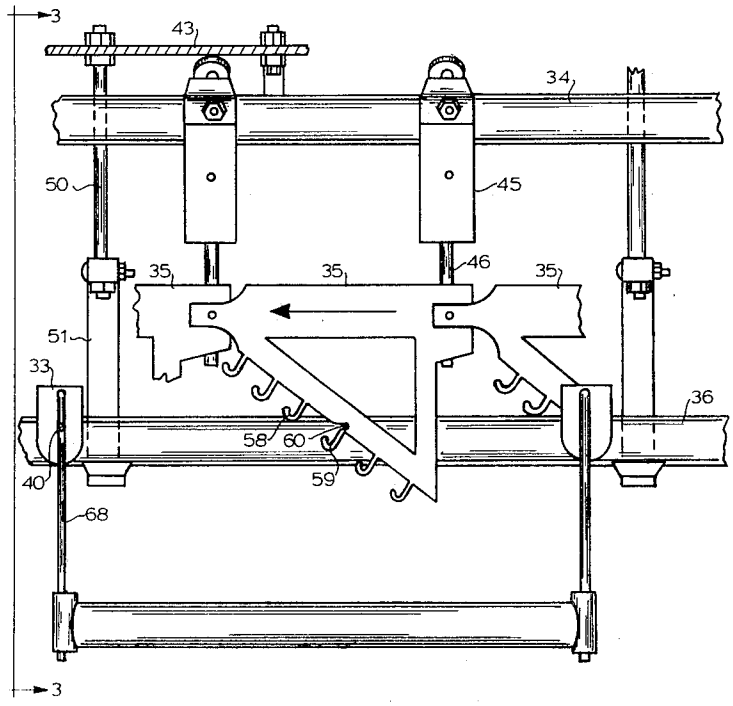
Primary Examiner—Drayton E. Hoffman

Attorney—B. B. Olive

[57] **ABSTRACT**

An intra-factory system and method adapted generally to conveying non-uniform articles but especially to garment manufacture and to conveying non-uniform, hanger hung garments such as coats, shirts, blouses, jackets and the like, are based on the employment of a powered, continuously moving, coding type, e.g. a "Railex" type, conveyor to intermittently and selectively engage and move garment loading trolleys which roll on an adjacent but completely separate non-powered, monorail, e.g. a "Speedrail" type, conveyor whereby manual pushing of the trolleys on the monorail between stations is eliminated without interfering with the normal coding, conveying, pickoff and loading operations on the powered conveyor.

9 Claims, 19 Drawing Figures



PATENTED MAY 22 1973

3,734,027

SHEET 1 OF 5

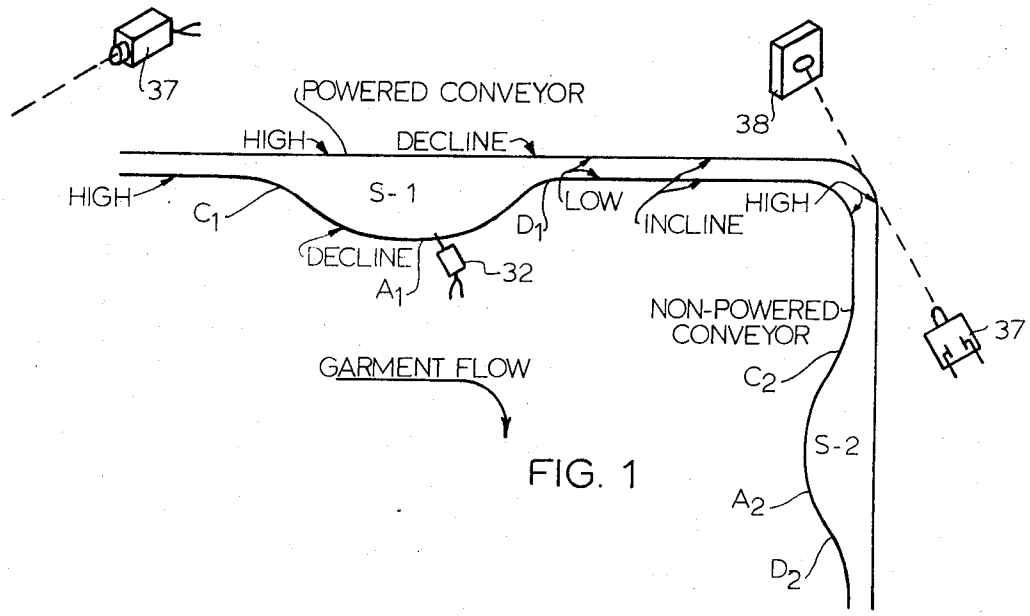


FIG. 1

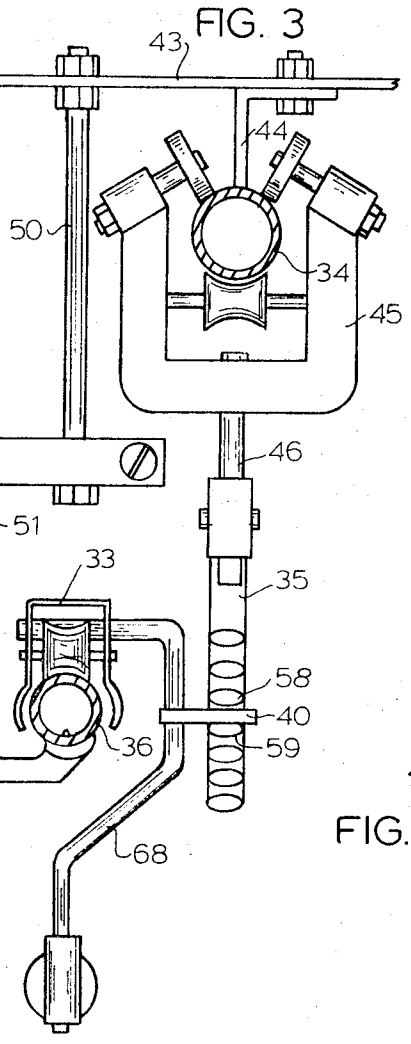


FIG. 3

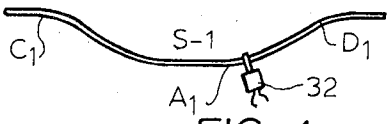


FIG. 4

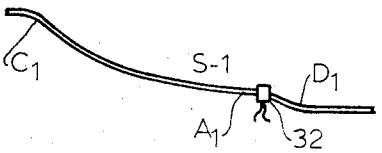


FIG. 5

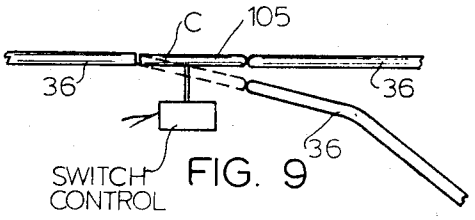


FIG. 9

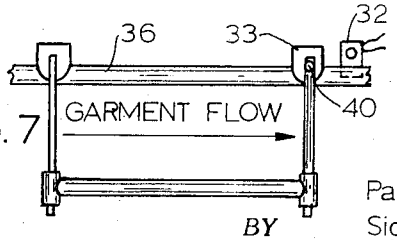


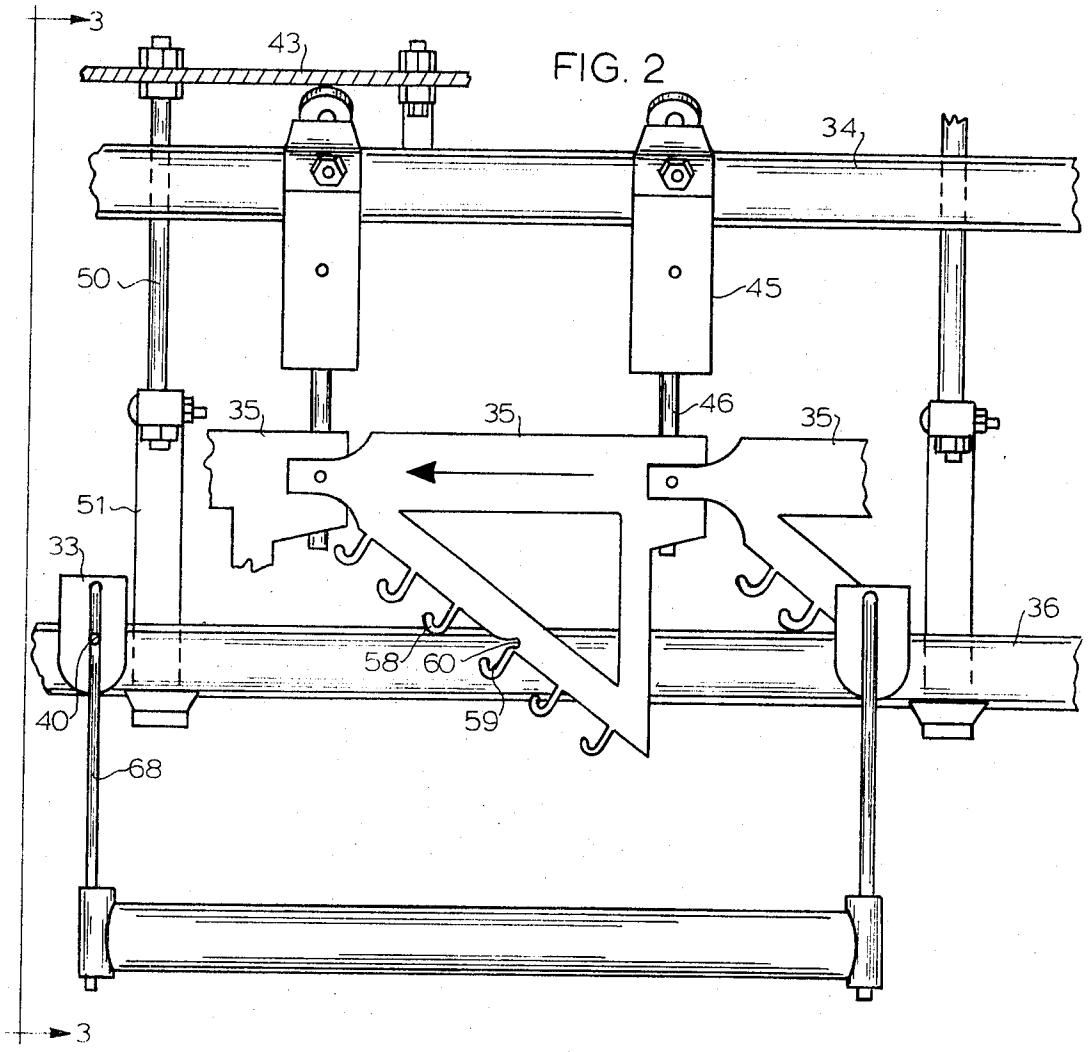
FIG. 7

INVENTORS
Paul L. Brummett
Sigmund G. Isley

BY

B. B. Dore
ATTORNEY

FIG. 2



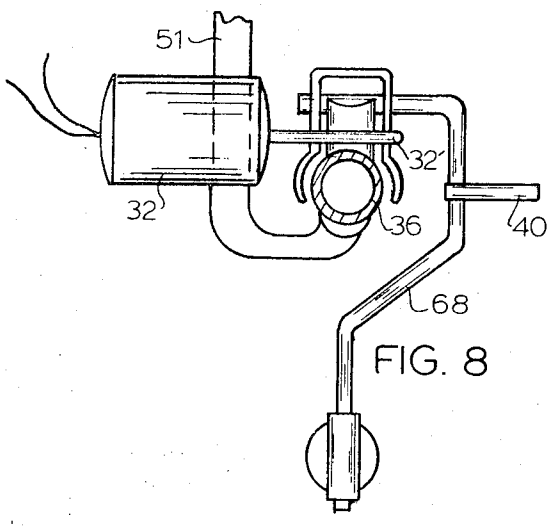


FIG. 8

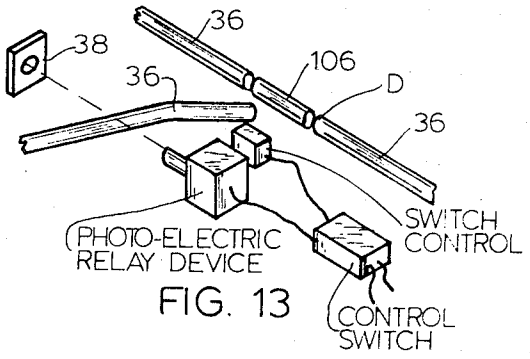


FIG. 13

INVENTORS
Paul L. Brummett
Sigmund G. Isley

BY B. B. Olive

ATTORNEY

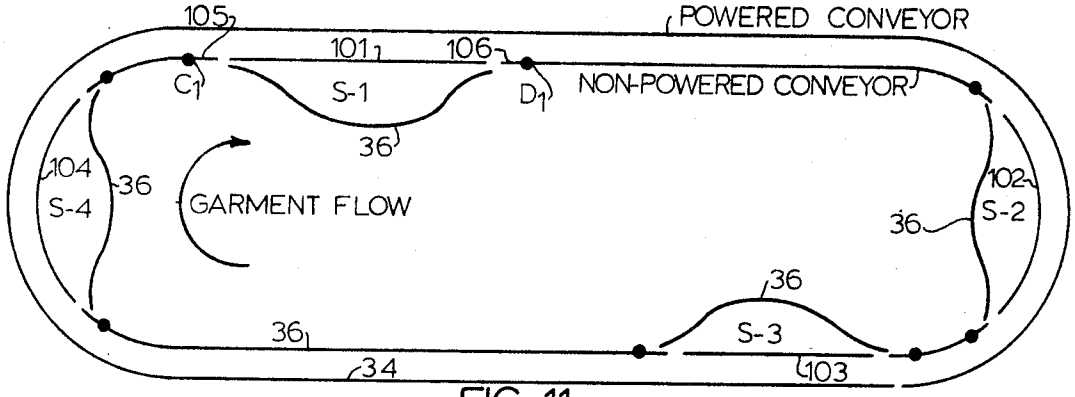


FIG. 11

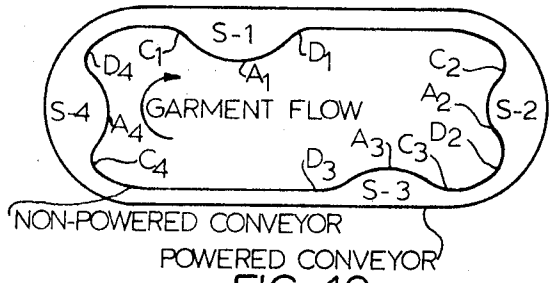


FIG. 10

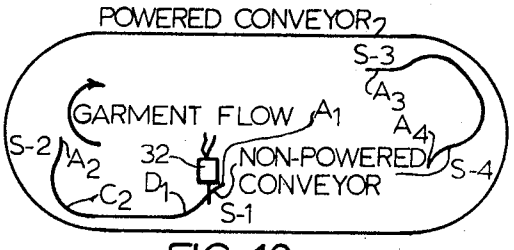


FIG. 12

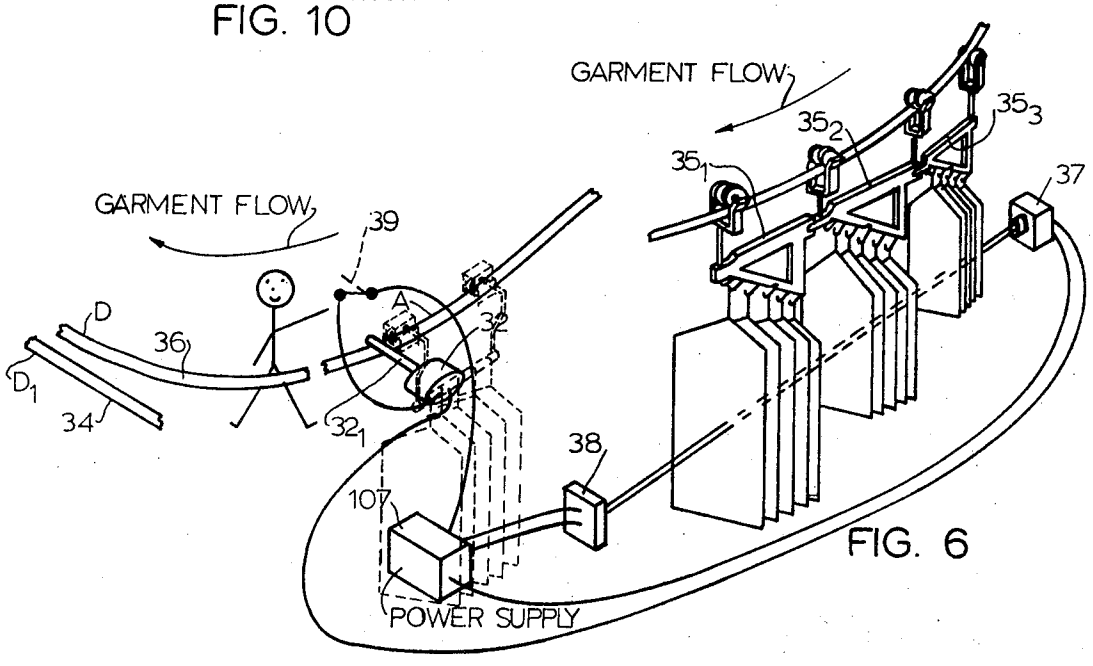


FIG. 6

INVENTORS
Paul L. Brummett
Sigmund G. Isley

BY

B.B. Olive
ATTORNEY

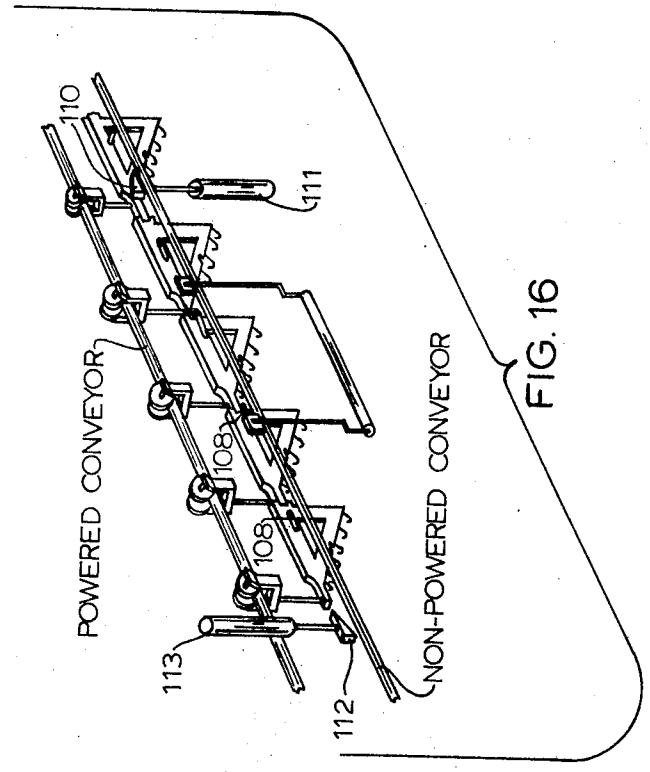


FIG. 16

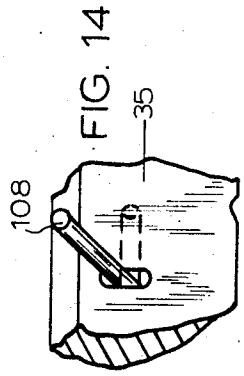


FIG. 14

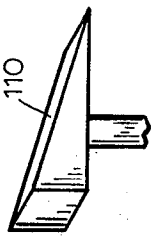


FIG. 15

INVENTORS
Paul L. Brummett
Sigmund G. Isley

BY

B. B. Olive
ATTORNEY

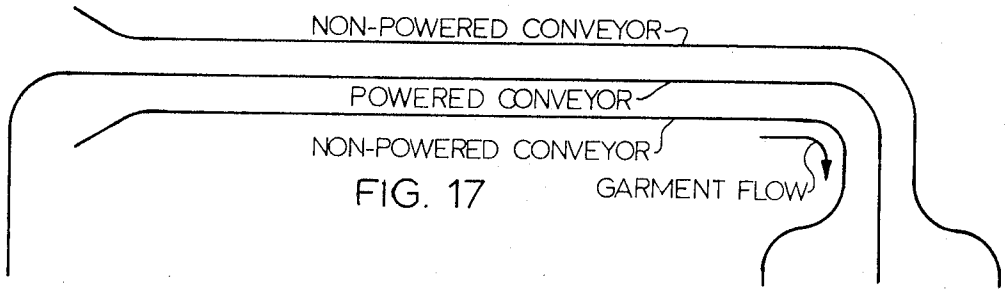


FIG. 17

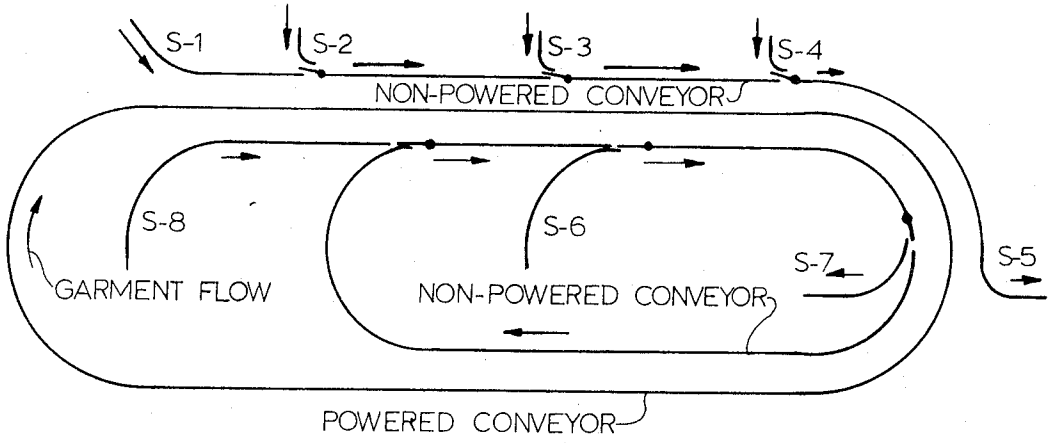
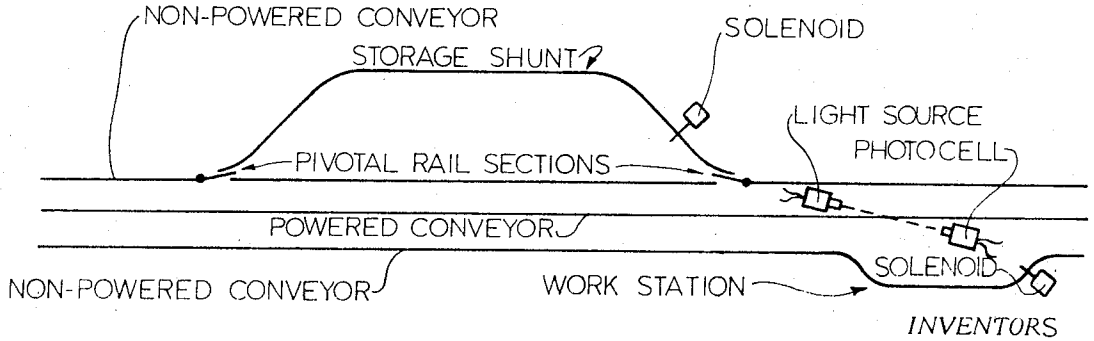


FIG. 18

FIG. 19



INVENTORS
Paul L. Brummett
Sigmund G. Isley

BY

B. B. Olive
ATTORNEY

INTRA-FACTORY SYSTEM AND METHOD FOR UTILIZING POWERED AND FREE CONVEYOR SYSTEMS

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates to methods and systems for conveying and segregating articles, to conveyor systems and particularly to apparatus for intermittent dispatch of garment loaded, non-powered conveyor trolleys into and from powered conveyor traffic.

2. Description of the Prior Art

Two types of conveyor systems are basically used in conveying non-uniform articles within a factory: powered conveyor systems and non-powered rail systems. Using the garment industry as an example, these two systems are illustrated by the "Railex" and "Speedrail" systems respectively. The powered system is a moving one based on using a slow but continuously moving overhead horizontal conveyor loop comprised of coding brackets in series which continuously moves around various factory stations, such as lining, sleeving, cuffing, buttoning, collaring, pressing, inspection, tagging, intransit storage and the like. The system may be operated at different height levels. Pick off and conveying operations may be conducted at one level and loading may be conducted at a lower level. This allows for more practical, efficient utilization of floor space. The other system utilized is non-powered, consisting essentially of a supported tube or pipe rail, essentially a monorail mounted at a single level, along which a garment hanger or hanger "trolley" may be pushed by hand. A "trolley" as referred to in the art is simply a bar adapted to hang a large number of garments and which is supported from wheels that roll on the monorail. The "Contin-U-rail" system is one such non-powered conveyor system employing the "E-Z Action" hanger trolleys. Such systems are useful since temporary non-moving rack or conveyor space is needed. Nevertheless, as conveyors, the hand-powered mode of operation prohibits practical utilization of the non-powered conveyor at various elevation levels and consumes much needed floor space and manhours devoted to pushing. Use of a hanger trolley on the non-powered conveyor does eliminate hand pushing of individual garments and allows the non-powered rail to be used with little energy as the trolleys are mounted on the rail such that their only contact therewith is through low friction rollers. The hanger trolley also provides some coding to the extent that all garments placed on a particular trolley are moved as an entity and thereby segregated from articles on all other trolleys.

Comparing the powered conveyor, it will be noted that each coding bracket of the powered "Railex" system may have up to six hooks. With six bracket hooks, for example, each at a different level, there are then twelve possible choices for classifying by style or color or size or station destination. The factor of two is introduced by multiplication into the six hook factor to arrive at the coding possibilities per bracket because the garment hanger may be placed on a predetermined hook at a predetermined level with the hanger opening either to the right or left. Pick off by either of two appropriately oriented pick off bars will occur depending upon whether the hanger opening is facing right or left. To overcome the disadvantages of the non-powered monorail or "free rail" system and at the same time increase operating capacity and versatility presently requires relatively high dollar investment in purchasing an additional powered conveyor system. The two basic conveyor systems, powered and non-powered, are old and well known to one skilled in the art and as previously pointed out both systems offer advantages. An example of a powered conveyor system is found in U.S. Pat. No. 3,002,635. However, such powered conveyor systems have not been employed to drive trolleys on non-powered systems so as to provide a combined powered system utilizing the coding capability of both for cheaper, more flexible increase in plant operating capability. As previously mentioned, the non-powered conveyor system is illustrated by the "Speedrail" systems, one adaptation of which is the "Contin-U-rail" trolley system manufactured by the White Machine Company, Inc., of Kenilworth, New Jersey. Another type of free rail conveyor is found in U.S. Pat. No. 2,998,136.

SUMMARY OF THE INVENTION

The invention embodiments shown provide a system and method for conveying, pick off and dispatch of non-uniform garments between and among several operating stations such as pressing, inspection, tagging, and the like and provides for increased in-transit storage of the garments. A non-powered conveyor system such as the "Speedrail" or "Contin-U-rail" system is located adjacent a powered conveyor system such as a "Railex" system. The powered conveyor is adapted to engage selected loaded trolleys on the non-powered conveyor, move the trolleys selected distances and then effect disengagement of the trolleys. The powered conveyor drives or pushes the selected trolleys on the non-powered conveyor either by having a drive pin on the trolley engage a particular coded bracket on the powered conveyor or by having a drive pin on a coded bracket engage the particular trolley.

Loading and pick off of garments on the powered conveyor system occurs as usual with pick off bars located in the proximity of any particular operating station at which normal loading and unloading operations on the powered conveyor may proceed as usual. Engagement of the trolleys with the powered conveyor takes place by merging the monorail with the powered conveyor at any selected station. After the engaged trolley has been moved, pick off and disengagement of the trolley from the powered conveyor system occurs automatically by gravity slide in the proximity of selected operating stations along the route of travel by having the free rail curve outwardly and downwardly and around the operating station within convenient distance therefrom and extending in the same downward manner until once again located adjacent the powered trolley route of travel. At this point, whenever desired, the free trolley may be re-engaged into the combined power mode of operation. From the point of disengagement to the engagement point, the free rail is in effect a "shunt" relative to the combined power system. The free trolley is stopped or parked along the shunt by a solenoid armature which extends across the free rail shunt at some predetermined point and blocks the path of travel of the trolley whenever the solenoid is non-energized. When the solenoid is energized, the armature is drawn into the solenoid thereby releasing the free trolley for moving back towards the powered conveyor where it may be engaged and moved to the next

station. Whenever a trolley is parked on the free rail shunt at the solenoid location, the station operator may remove either individual garments or the entire trolley or the operator may elect to disregard the parked trolley. If he elects to remove the garments or the trolley he may place them on a stationary tubular garment rack. Then, whenever the operator is ready to transfer the free trolley garments to the next station he insures that the trolley is placed in its normal parked position on the rail shunt adjacent the solenoid armature. In order to synchronize engagement of the trolley with the powered conveyor, a photocell relay device, upon detecting a suitable vacancy on the powered conveyor, energizes the solenoid, thereby releasing any adjacent trolley for free glide to the engage point and engagement with the powered conveyor.

In one embodiment of the invention the powered conveyor and non-powered conveyor systems are intermittently located adjacent one another in a closed loop fashion with divergence of the non-powered system from the powered system occurring between the disengage point to the engage point of the non-powered system where "shunting" of the non-powered system occurs. In a second embodiment, the powered and non-powered systems are configured as in the first embodiment, and additional free rail is provided the non-powered system so that it is continuously located adjacent the powered conveyor system loop. Short pivotal sections of free rail integral to non-powered system are pivoted to connect the "shunts" of the first embodiment to the non-powered system of the second embodiment. Automatic "shunting" of free rail trolleys thus occurs around each and every operating station in the first embodiment whereas the second embodiment provides selective "shunting." In a third embodiment, the non-powered system is located adjacent to the powered system along a portion thereof only and connects two or more operating stations but less than that required to form a closed loop with the non-powered system. In a fourth embodiment, a pair of non-powered conveyors are employed between which is located a powered conveyor and which is adapted to drive free rail trolleys on either of the non-powered conveyor rails.

Thus, an object of the invention is to provide a method and system for handling non-uniform articles requiring, as in the example of garments, distribution among several operating stations which utilize the energy of a powered conveyor system to engage and move trolleys on a non-powered free rail conveyor. Other objects will become apparent as the description proceeds.

BRIEF DESCRIPTION OF DRAWINGS

FIG. 1 is a schematic plan view of a section of the combined powered mode system between, and free rail shunts around, each of two operating stations.

FIG. 2 is an elevation view of a section of the adjacently positioned powered and non-powered conveyor systems.

FIG. 3 is an end view of FIG. 2 taken generally in the direction of line 3—3 of FIG. 2.

FIG. 4 is a plan schematic view of a free rail shunt.

FIG. 5 is an elevation schematic view of a free rail shunt.

FIG. 6 is a schematic representation of the photoelectric and solenoid circuitry employed to coordinate engagement of a trolley on the non-powered conveyor with a coding bracket on the powered conveyor.

FIG. 7 is an elevation view of a typical trolley and solenoid alignment.

FIG. 8 is an end view of a typical trolley and solenoid alignment.

FIG. 9 is a plan schematic view of the disengagement selective "shunt" switch.

FIG. 10 is a schematic and simplified plan view of the first embodiment of the invention.

FIG. 11 is a schematic and simplified plan view of the second embodiment of the invention.

FIG. 12 is a schematic and simplified plan view of the third embodiment of the invention.

FIG. 13 is a plan schematic and simplified view of the engagement selective "shunt" switch.

FIG. 14 is a sectional perspective view of a portion of the coded bracket to show the two pivotal drive pin positions for engagement with or by-pass of a trolley.

FIG. 15 is a perspective view of the wedge member used to place the coded bracket drive pin in a trolley by-pass position.

FIG. 16 is a perspective view of sections of the powered and non-powered conveyor showing pivotal drive pins mounted on the powered conveyor brackets, a drive pin selective positioning means and an engaged garment trolley.

FIG. 17 is a schematic plan view of a fourth embodiment of the invention.

FIG. 18 is a schematic plan view of an intrafactory configuration utilizing the fourth embodiment.

FIG. 19 is a schematic plan view of the in-transit storage configuration for the fourth embodiment.

It should be understood that in connection with all of the foregoing figures the drawings have been illustrated very much in schematic form. Thus, in the actual practical apparatus various supports, fastening devices and the like would appear. Since such components are well known in the art and are extraneous to an understanding of the invention they have been eliminated to simplify the drawings.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

A general description of the power and free rail system as applied to garments will first be given in reference to FIG. 1 which shows a "tagging station," S-1, and an "inspection station," S-2, as representative stations in a typical garment factory, and denotes a powered conveyor with coding brackets providing a path of conveyance between S-1 and S-2. This powered conveyor system may be of the "Railex" type manufactured by the Railex Corporation of Queens, N.Y. Located adjacent hereto is a non-powered conveyor system such as the "Speedrail" or "Contin-U-rail" systems. The non-powered conveyor is only intermittently located adjacent to the powered conveyor, being divergent therefrom at points "C" (C_1 and C_2 being shown) and convergent at points "D" (D_1 and D_2 being shown) which points are described below. The powered conveyor is at a convenient height, around head level, in the proximity of the two operating stations and lower at each respective point "D." Otherwise, it is at a higher level to allow full utilization of the floor space underneath and inclines and declines proximate point "D" in an appropriate manner so as to connect its high level with its low point "D" level. Located proximate a suitable curve or other shaped section is photocell relay device 37 and located on the non-powered con-

veyor rail 36 hereinafter referred to as free rail 36 between points "C" and "D" is solenoid 32. Free rail trolleys (not shown) are positioned on free rail 36 and may be of the "E-Z Action" type made by the White Machine Company, Inc. of Kenilworth, New Jersey. The coding brackets of the powered system selectively engage the trolleys and provide any predetermined trolley with motion along free rail 36.

In operation, for example, garments are received at the tagging station, S-1, by utilizing either the apparatus of the invention or by manual delivery, to have tags placed on them. After completion of the tagging operation, the garments are hung by regular garment hanger on a free rail trolley which may be located at either position "A" as described below or on a fixed temporary horizontal rail (not shown) within the operating station. When the tagging station operator desires to transfer lined garments to the inspection station, S-2, he insures that the free rail trolley is located on the free rail "shunt," described below, adjacent solenoid 32 at position "A_1." Upon detection of a suitable vacancy in the powered system either visually or by photocell relay device 37, the solenoid 32 is energized to release the free rail trolley to gravity glide along the "shunt" and to engage point "D" of rail 36 where a suitably adapted coding bracket in the powered system engages the trolley and thereafter pushes it until the trolley reaches point "C_2" in the proximity of inspection station S-2. At point "C_2" the trolley disengages from the coded bracket and gravity glides along the S-2 "shunt" until reaching position "A_2" where it is halted and retained by solenoid 32. The inspection station operator may then proceed in a manner identical to that of the lining station operator with respect to garment and trolley handling and transfer.

By way of definition and with reference to FIG. 1, point "C," the disengagement point, is that point along free rail 36 of the non-powered system where the free rail trolley becomes disengaged from the coding bracket of the powered system due to outward and downward curvature of the free rail. Point "D," the engagement point, is that point along free rail 36 of the non-powered system where the free rail trolley first becomes engaged by the coding brackets of the powered system. The free rail "shunt" is that portion of free rail 36 confined between disengagement point "C" and engagement point "D." Position "A_1, A_2, etc." is that position of the "shunt" where a free rail trolley is parked when restrained by a solenoid 32.

As shown by FIGS. 2 and 3, the powered conveyor system and the non-powered conveyor system are substantially close when in an adjacently located configuration. Both are suspended from a common support 43, the powered conveyor rail by rod 44 and the non-powered conveyor rail by rod 50. The configuration of both the power and non-power conveyor systems are well known to those familiar with the art and therefore will not be described in detail. It is sufficient for purposes of the present invention to simply note that the powered conveyor system comprises a rail 34, bracket support members 45 and 46, and coding bracket 35 with plural hooks such as hooks 58 and 59. Each coding bracket is pivotally connected with an identical coding bracket before it and another behind it. Each coding bracket is also provided with a notch 60 between hook 58 and hook 59 and in alignment with drive pin 40 of free rail trolley 33. It is likewise sufficient to simply note that the non-powered conveyor system comprises support member 51, rail 36 and trolley 33. Trolley 33 is provided with a drive pin 40 which is on trolley support rod 68 and in alignment with notch 60 of coding bracket 35 in the powered conveyor system. Alternatively, each coded bracket 35 is provided with a pivotal drive pin 108 which when pivoted upward as shown in FIG. 14 will pass by a garment trolley on the free rail without contact and which when pivoted downward will contact and engage the garment trolley at a notch 109 as shown in FIG. 16. Pivotal drive pin 108 is pivoted upwardly by wedge 110 of FIG. 15 which is placed inclining upwardly in the path of travel of drive pin 108 and is withdrawn from said path of travel, selectively, by selective positioning means 111 of FIG. 16. A solenoid, air cylinder or similar device is suitable for use as the selective positioning means 111. In like manner, pivotal drive pin 108 is pivoted downwardly by wedge 112 which is placed declining downwardly in the path of travel of drive pin 108 and selectively positioned into and out of said path of travel by selective positioning means 113.

FIGS. 4 and 5 show the plan and elevation view, respectively, of any given free rail "shunt" around the lining operations station denoted by "S-2." Note that the "shunt" is curved outwardly, downwardly and around station "S-2" so as to facilitate disengagement of the free rail trolley at point "C_2" and engagement thereof at point "D_1" with respect to the coding bracket of the power conveyor system.

As previously mentioned, the two conveyor systems are adjacently located except where "shunting" of the non-powered system occurs. Where the two systems are merged at a point "D" it is necessary to synchronously insert each free rail trolley to be moved by the powered system. Either by visual observation or automated means, a suitable vacancy on the powered system coding brackets must be detected and free rail trolley gravity glide initiated and timed for engagement at point "D" to occur properly. FIG. 6 shows one manner of achieving the required synchronous engagement comprising utilization of a photocell-solenoid circuit and a light source circuit. In the former circuit, photocell relay device 37 with normally opened contacts, power supply 107, solenoid 32 and operator over-ride switch 39 are electrically connected in series. The light source circuit consists of light source 38 electrically connected to the power supply 107. Solenoid 32 is located on free rail 36 at a predetermined point on the "shunt" whereby the time required for a free rail trolley to travel from parked position "A" to disengage point "D" is just slightly less than the time required for the detected coding bracket 35_1 to travel to point "D_1" on powered conveyor rail 34 which is parallel to point "D" on free rail 36. The vacancy required within brackets in the powered conveyor has previously been referred to as a "suitable" one. To be "suitable" the vacancy must be of sufficient length to avoid damage to garments hung on a free rail trolley by either the power conveyor bracket or any garments hung thereon while the bracket is engaging and pushing the adjacently located free rail trolley. The brackets required to constitute a suitable vacancy when no garments are hung thereon are shown in FIG. 6 as brackets 35_1, 35_2, and 35_3. These brackets are isolated from other brackets in the powered conveyor system by use of a suitably shaped conveyor section, e.g., a substantially sharp

curve below which the light source **38** is directed. Alternatively, the suitable vacancy is detected by directing the light beam along a path which traverses the powered conveyor system such that it diagonally covers the space occupied by garments hung on brackets 35_1, 35_2, and 35_3. This light beam alignment is schematically shown in FIG. **19.** Light source **38** and photocell relay device **37** are arranged such that the light beam will strike the smallest garment to be hung on any of the power conveyor brackets 35_1, 35_2, or 35_3, when such garments are hung on the leading hook thereof. This insures that every other garment on either of the brackets would be intercepted by the light beam and also insures that the light beam reaches the photocell relay device **37** only when a "suitable" vacancy occurs within the powered conveyor system.

In operation of the FIG. **6** circuitry, a light beam from source **38** strikes photocell relay device **37** whenever a "suitable" vacancy appears on the powered system curve, thereby closing the contacts of photocell **37** and completing the circuit between power supply **107** and solenoid **32.** As shown in FIGS. **7** and **8** portions of the trolley hang freely over the rail sides when contacted along its leading edges by an obstruction will cease gravity slide and maintain a stationary position. When the circuit between power supply and solenoid **32** is completed solenoid **32** is energized and withdraws armature **32'** into solenoid **32.** Accordingly, FIGS. **6, 7** and **8** show one manner of achieving synchronous merging of a free rail trolley with a coding bracket.

Another manner of achieving the merging is by visual detection of a "suitable" vacancy and manual release of the free rail trolley. Furthermore, the required vacancy may be programmed into the powered conveyor system by the use of blank coding brackets without hooks, by the use of spacing bars possessing the required dimension, or by instructions to workers to not use predetermined coding brackets identified by markings thereon. Also, it should be recognized that the unique operations and flow through any particular garment factory or portion thereof will dictate what other options are required for optimum work performance by the employees. For example, should there be a need to keep a free rail trolley in position "A" without releasing it to gravity glide and engagement with the powered system at any time a "suitable" vacancy might appear in the powered system along the powered system curve, the operator can be provided with an over-ride switch **39** as shown in FIG. **6** which will break the photocell-solenoid circuit, thereby insuring that solenoid armature **32'** remains extended over free rail **36** and retains the free rail trolley at position "A."

The above described apparatus, configuration and procedures apply to all three embodiments of the invention mentioned above. For example, if the configuration of FIG. **1** is repeated in cycles until a closed loop of both conveyor systems is formed one would have the first embodiment as schematically shown in FIG. **10.** A slight modification to the first embodiment will yield the second embodiment whereby selective shunting may occur as schematically shown in FIG. **11.** To achieve the second embodiment from the first embodiment requires only the insertion of short pivotal sections **105,** actuated by switch control means as depicted in FIG. **9,** at the disengage point "C" and short pivotal sections **106** actuated by switch control means as depicted in FIG. **13,** adjacent the engage point "D" of every "shunt," together with sections of free rail **101, 102,** etc. located adjacent the power conveyor rail **34** between the points "C" and "D." By this modification one can achieve selective "shunting" of free rail trolleys around any given operating station. Depending again upon the requirements of any given garment factory or portion thereof, various devices and circuitry could be employed to achieve the degree of selectivity desired. Assuming by way of example that all trolleys on free rail **36** must at some time go to each station and the selectivity desired is simply one of giving the station operator the choice as to when he will receive any given trolley, the operator can be provided with a circuit switch which will energize a solenoid pivotally connected to short rail sections **105.** In other words, the switch control of FIG. **9** is a solenoid with armature normally extended but which upon being energized will draw in the armature and simultaneously wind a timed armature retaining spring thereby pulling section **105** into its alternate position as depicted in FIG. **9** and retaining it in said position until the entire trolley has been diverted. Likewise the short rail section **106** may be actuated into position as schematically depicted in FIG. **13** by a suitable switch control which may be the same type solenoid and which may be timely energized by a photoelectric device positioned as in FIG. **13.** That is, the photocell device closes switch control of FIG. **13,** i.e., the solenoid circuit, only when a gravity glide free rail trolley interrupts the light beam.

Proceeding now to the third embodiment schematically shown in FIG. **12** it is seen that the FIG. **1** configuration is employed to connect only two operating stations and that the "shunts" around each are terminated at their respective trolley parking positions "A_1, A_2 etc." Referring to FIG. **12** it is seen that this third embodiment conveys articles in one direction only, i.e. a one way trip, without provision for return to the dispatching station. In operation the "S-1" operator places a free rail trolley at "A_1" where it is retained by solenoid **32.** After that follows the above described sequence of events such as photoelectric detection, energizing of solenoid **32,** gravity glide of the trolley, engagement with the powered coding brackets at point "D," powered travel to point "C," disengagement, gravity glide to position "A_2" and retention there by another solenoid **32.**

A fourth embodiment of this invention that increases the effectiveness of the combined powered conveyor and free conveyor is to utilize two separate free conveyor systems that merge to a position in the close proximity and on each side of the powered conveyor as shown in FIG. **17.** One use of this configuration of conveyors allows for the free entrance of additional spur track sections of free conveyor without the need for crossing the path of the powered conveyor. With the double free conveyor it is possible to intermix a variety of products requiring different routings as shown in FIG. **18.** Another application for this fourth embodiment is the increasing of capacity for in-transit storage by permitting one free conveyor to be shunted away from the power conveyor as described in the second embodiment of this invention while normal transportation of goods continues as shown in FIG. **19.** While no trolley solenoid controls, i.e. controls **32,** are shown in the schematic FIGS. **10, 11, 17, 18** and only representative controls **32** are shown in FIGS. **12** and **19,** it

should be understood that other such controls 32 would appear in any complete system.

As is evident from the above description the disclosed method of utilizing powered and free conveyor systems comprises the steps of adapting a powered conveyor system and a non-powered conveyor system trolley so as to engage the non-powered system trolley with the powered conveyor system, intermittently loading garments on a powered conveyor system in the conventional manner at selected stations adjacent the powered conveyor system, intermittently loading garments on a non-powered conveyor system trolley in the conventional manner at selected stations adjacent the non-powered conveyor system, as a vacancy appears in the powered conveyor system adjacent the selected stations, engaging the non-powered system trolley with the powered conveyor system for movement thereby, and proximate a selected station, disengaging the non-powered system trolley from the powered conveyor system and diverting said trolley to said station.

To summarize the invention as applied to intra-factory garment handling, it will be seen that a common coding type, powered conveyor system having an endless chain of conveyors can be located adjacent a free rail system, either closed loop or sectional, and used to power individual and appropriately adapted trolleys upon the free rail, in a combined powered mode of operation. The free rail trolleys may be disengaged from the combined powered mode and routed to operating stations by gravity glide. There, they may be temporarily detained until a suitable vacancy in the powered conveyor is detected whereupon they may be released for gravity glide engagement into the combined power operating mode with the powered conveyor at the detected vacancy or may enter additional areas serviced by the free conveyor system. While temporarily detained at the operating station, the operator has many choices available to him. He may allow the trolley to undergo engagement, he may hang garments thereon, he may remove the trolley or may just remove certain garments coded for his attention. The temporary detention of trolleys may be achieved by manually operated mechanics, as may be their release for engagement into the combined powered mode of operation.

In whatever mode or embodiment employed it may be seen from the foregoing that the system and method of the invention offers a novel, simple and practical way for eliminating the time and labor conventionally employed in moving articles between stations on the free rail non-powered type conveyor.

Having described the invention, what is claimed is:

1. A system for handling hung articles between work stations, comprising, in combination:
   a. a continuously moving powered conveyor moving past selected work stations associated with such powered conveyor in a closed loop configuration and having bracket means thereon for coding and transporting articles, a sufficient number of said bracket means being provided such that vacant bracket means appear randomly dispersed with other bracket means having articles hung thereon;
   b. a non-powered conveyor having a rail with at least one section thereof running substantially parallel and adjacent to said powered conveyor and extending between at least a first and a second work station associated with said non-powered conveyor;
   c. a wheeled trolley positioned on said non-powered conveyor rail and adapted while loaded with hung articles to be guided thereon during movement between said first and second stations; and
   d. connecting means enabling said trolley while on said non-powered conveyor rail to be detachably and synchronously secured to selected said vacant powered conveyor bracket means at a position proximate said first station and to be powered on said non-powered conveyor rail by said vacant powered conveyor bracket means to said second station and at said second station enabling said non-powered conveyor trolley to be unsecured from said vacant powered conveyor bracket means thereby enabling said loaded trolley to be moved between said first and second stations on said non-powered conveyor rail while utilizing the power of said powered conveyor vacant bracket means.

2. The system of claim 1 wherein said non-powered conveyor rail is in a closed loop configuration.

3. The system of claim 1 wherein said non-powered conveyor rail is in multiple discontinuous sections.

4. The system of claim 1 wherein said non-powered conveyor rail includes pairs of rail sections running on opposite sides of said powered conveyor and with a said trolley on each member of such pair.

5. The system of claim 2 wherein said non-powered conveyor rail closed loop configuration includes at each station associated therewith a shunt section of rail shaped to diverge away from and then converge towards said powered conveyor and said connecting means is provided at each such shunt section and is adapted to automatically shunt each arriving trolley onto the respective said shunt section.

6. The system of claim 2 wherein said non-powered conveyor rail closed loop configuration includes at selected said stations associated therewith a first section of rail which continues the said non-powered conveyor rail loop adjacent the powered conveyor and a second section of rail which provides a shunt shaped to diverge away from and then towards said powered conveyor and a third pivotal section of rail with means to control positioning of said third pivotal section such that any arriving trolley may be shunted onto said second section or continued past the selected station on said first section.

7. The system of claim 1 wherein said connecting means includes electrical means for detecting the presence of vacant said bracket means on said powered conveyor and for synchronously releasing a loaded said trolley for movement on said rail to be secured to said vacant bracket means.

8. A method for handling hung articles between work stations, comprising the steps:
   1. locating a powered coding bracket type conveyor having excess coding and conveying capacity in a closed loop passing the work stations;
   2. locating a non-powered trolley and rail type conveyor with the rail thereof passing two of the same said stations and having sections between the said two stations positioned adjacent the said powered conveyor;
   3. while operating the powered conveyor continuously in a conventional manner utilizing some of the powered conveyor brackets to code and hang articles moving between selected said stations while leaving other brackets vacant;

4. intermittently loading garments on selected trolleys on the non-powered conveyor in the conventional manner and while such trolleys remain stationary at selected said stations;

5. as vacant brackets appear on the said powered conveyor adjacent a selected one of the two stations selectively releasing a loaded trolley at such selected station for movement on the said non-powered conveyor rail section positioned adjacent said powered conveyor and selectively engaging such released trolley with a selected said vacant bracket whereby such bracket may drive said selected loaded trolley on said non-powered conveyor rail; and

6. then disengaging said loaded trolley from said vacant bracket as the trolley arrives at the other of said two selected said stations.

9. The method of claim **8** including locating the operating levels of said powered and non-powered conveyors relatively high between and relatively low at said two stations and curving said non-powered conveyor rail outwardly from the powered conveyor at each said two stations and shunting selected said loaded trolleys arriving at a station on said curved rail and utilizing gravity to move such shunted trolleys back towards powered conveyor.

* * * * *