

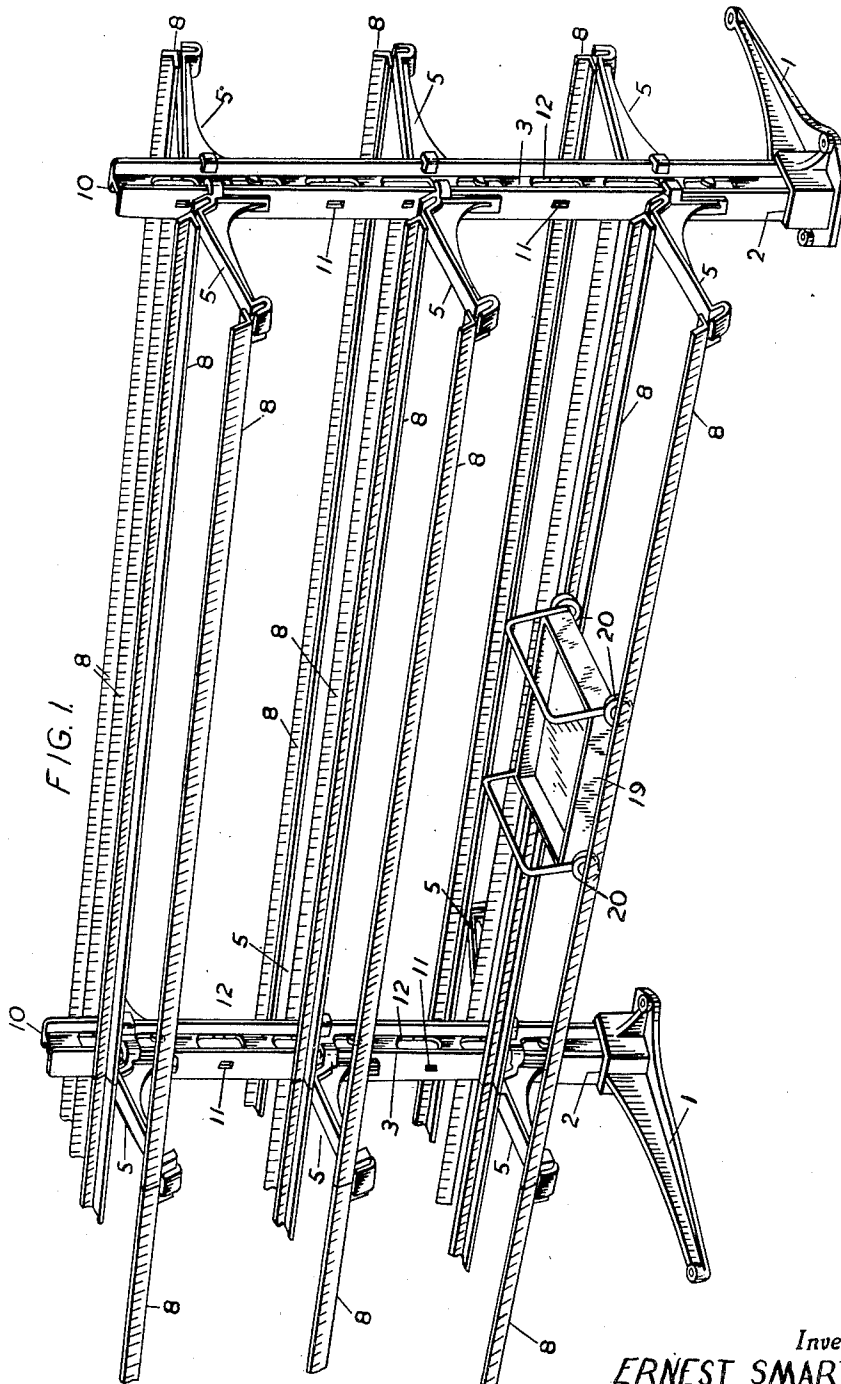
Dec. 23, 1952

E. SMART
CONVEYER APPARATUS

2,622,541

Filed Sept. 16, 1949

3 Sheets-Sheet 1



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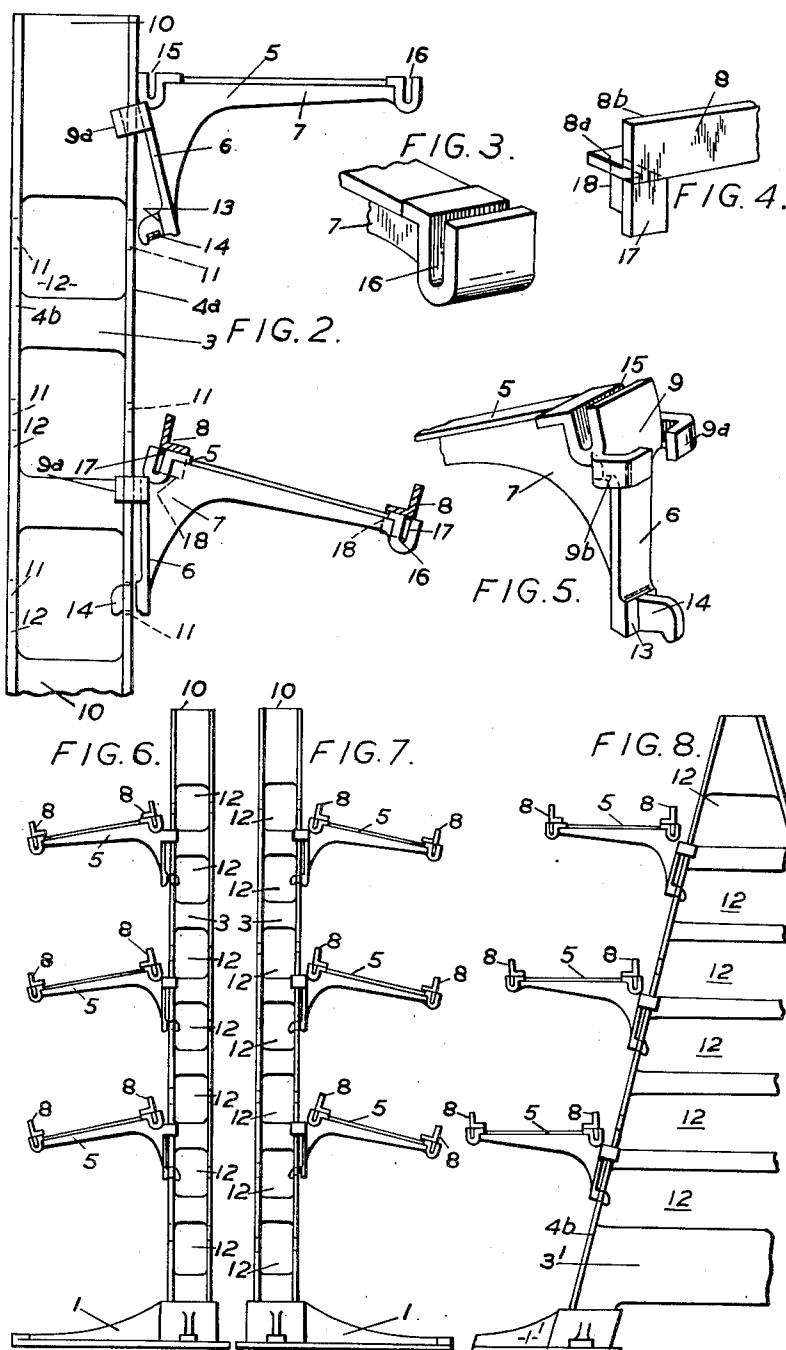
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3 Sheets-Sheet 2



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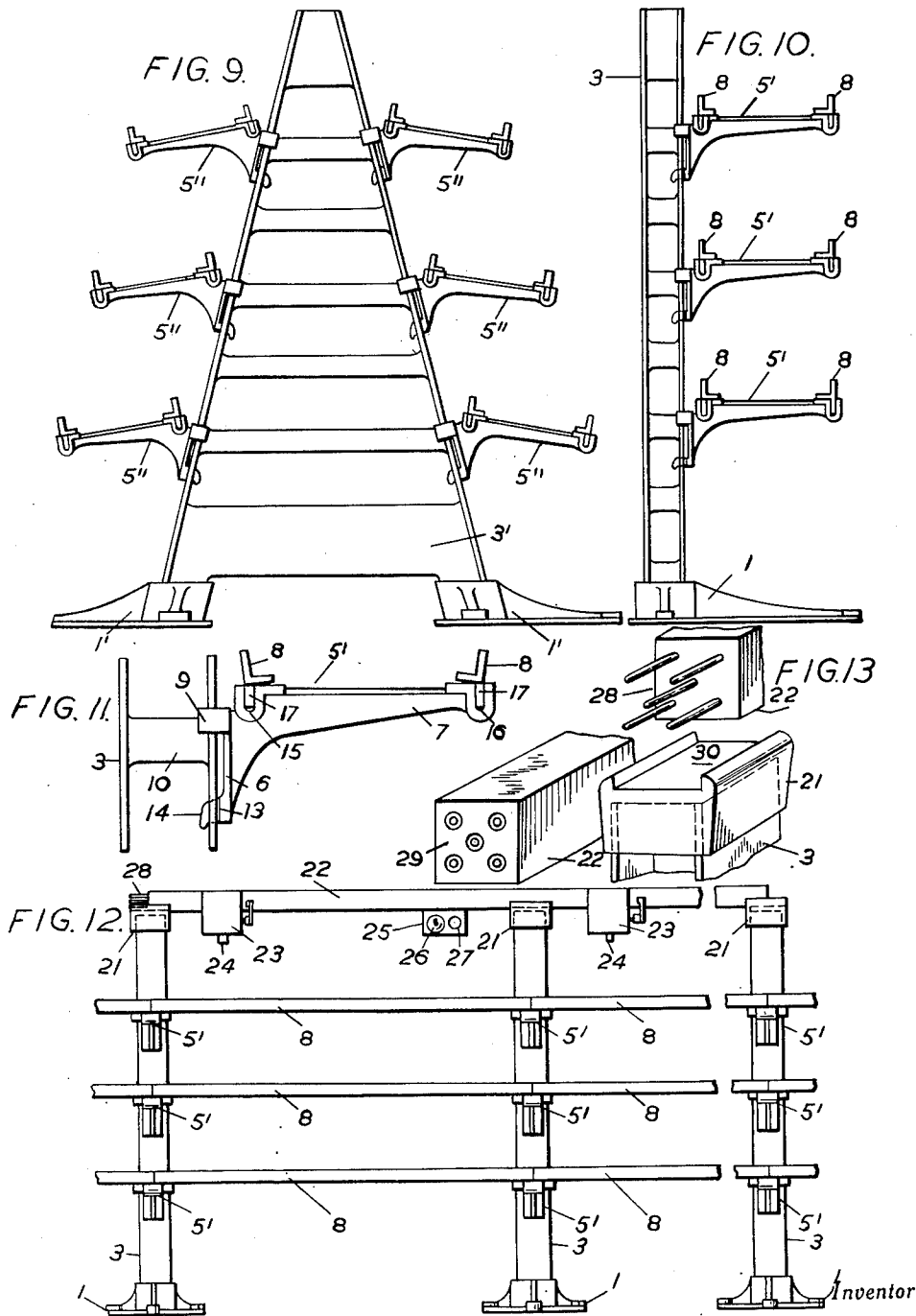
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UNITED STATES PATENT OFFICE

2,622,541

CONVEYER APPARATUS

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Application September 16, 1949, Serial No. 116,136
 In Great Britain September 18, 1948

2 Claims. (Cl. 104-126)

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This invention concerns improved conveyor apparatus and is particularly concerned with the provision of a line production apparatus that is especially suitable for use in boot and shoe factories and in other light industries. Specifically the invention is concerned with facilitating and speeding up the production of articles of footwear, upon a semi-continuous flow or line production system, and with effecting such improvements in mechanisms and factory lay-out as will render such methods of production more elastic. It is of course well known in many different trades to convey, by a single-track conveyor, the articles in the course of manufacture along a production line at different points in the length of which they are removed from the conveyor, have manufacturing operations performed thereon, and are replaced to travel on to the next point. Such a system is effective where all the articles have exactly the same manufacturing operations performed on them, but is not sufficiently elastic to accommodate a variety of articles. Hence these conveyor, or semi-continuous flow, systems of production have not attained a great vogue in boot and shoe factories, in which it is usual for batches of boots or shoes of differing kinds (i. e. differing in that, while the various kinds may be subjected to certain operations in common, yet one or more operations is or are not applied to articles of all the kinds) to be going through the same departments of the factory at the same time, and in which factories it is often necessary (for example owing to seasonable changes in the character of the goods required to be produced) to change the manufacturing processes, after a quantity of boots or shoes having certain characteristics has been completed, to those appropriate to the different characteristics of a further quantity of boots and shoes, although single-track belt-conveyors and single-track roller-conveyors are not unknown in such factories, and use has been made of the apparatus described in Patent specification 438,123.

However, all these systems involve the use of conveyor apparatus that is installed as a permanent fixture, whereas it has been found that such permanence is undesirable and is a distinct handicap in many factories, for it restricts scope, and is a factor in deterring the installation of line production systems in most factories.

In boot and shoe factories the time occupied in effecting a change in the sequence of produc-

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tion operations is of importance, and careful investigation of line production systems in boot or shoe factories has shown that apparatus that is capable of being readily erected and dismantled, and of being built up to any required length would have considerable advantage as permitting the apparatus readily to be adapted to conduct the production flow past those selected machines the use of which is necessary in the production of that particular type or variety of footwear to which the factory or work-room must temporarily be devoted.

The present invention provides conveyor or line production apparatus of the type arranged to employ work-holding receptacles (e. g. trays or trucks) propelled along it, which apparatus is capable of being readily erected from and dismantled into its component parts and comprises a plurality of identical and interchangeable uprights for erection on a floor in such manner that a line of spaced uprights may be erected, a plurality of identical and interchangeable support brackets constructed and arranged for readily removable attachment to the uprights in such manner that a row of such brackets may be applied to the line of uprights at a selected height or at each of selected heights, means on each bracket member for the readily-removable connection of a pair of spaced track bars in such manner that successive pairs of track bars form a continuous track extending from each bracket member to the next, and a multiplicity of identical and interchangeable track bars each provided at its ends with means for readily releasable connection with the said means of the bracket members which track bars are so constructed that when positioned on the bracket members in two parallel lines they form a continuous track. It will therefore be appreciated that this apparatus incorporates a minimum of parts, and may readily and quickly be built up along any desired path or line by comparatively unskilled labour, and may be dismantled or taken down into its component parts with equal facility. For these reasons the apparatus is particularly suitable for use in boot and shoe factories, for its path may readily be adjusted to run past certain machines or to avoid other machines as required by the manufacturing operations involved in the production of the particular type or variety of footwear that constitutes a production run or batch; moreover the number of tracks may be varied as required and indeed may be varied at differ-

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ent regions in the length of the production line. Other reasons why the apparatus is particularly suitable for use in such factories will be apparent, to one skilled in the art, from the ensuing description but it will further be appreciated that the flexibility or adaptability of the apparatus renders it widely useful, for example in the light engineering industry.

While the uprights may be so constructed that they can stand directly on or be attached directly to the floor, it is preferred to provide a plurality of identical and interchangeable pedestals or sockets capable of standing on the floor and each arranged for the readily-removable attachment of an upright.

The connection between each bracket member and its upright preferably comprises interengaging parts on upright and bracket member which when engaged prevent separation in a horizontal direction but are capable of permitting the bracket member being moved up and down its upright; together with releasable stop means for positioning the bracket at the selected height. In a specific and advantageous construction each upright has a vertical flange, rib, or equivalent lateral enlargement extending continuously or discontinuously up it, and each bracket member has a clearance slot for receiving this enlargement.

According to an important subsidiary feature of the invention, each upright is constructed to have a bracket attached to it in either or both of two mutually opposite attitudes (e. g. at the same level or at different levels). This permits a track to be assembled at either selected side of the line of uprights or at both sides of that line.

The foregoing and other features of the invention set out in the appended claims are incorporated in the conveyor or line production apparatus that will now be described as examples with reference to the accompanying drawings in which:

Figure 1 is a perspective view of a short portion in the length of one apparatus.

Figure 2 illustrates the manner in which the brackets are applied to an upright;

Figure 3 is a perspective view of the extremity of a bracket and Figure 4 is a perspective view of the end of a track bar;

Figure 5 is a perspective view of the root end of a bracket;

Figure 6 is an elevation of an upright showing brackets protruding from its left hand face, and Figure 7 is a like view showing the brackets protruding from the right hand face of the upright; these figures jointly illustrate the fact that two single lengths of conveyor apparatus may be located back to back with a gangway between them;

Figure 8 is an elevation showing a modified form of upright;

Figure 9 is an elevation showing an upright as in Fig. 8 but with downwardly inclined brackets;

Figure 10 shows an upright as in Figs. 6 and 7 but with horizontal brackets;

Figure 11 is a view illustrating a modified form of the track bars;

Figure 12 is a side elevation of a length of the conveyor apparatus when incorporating electric conductors for power and/or light, while

Figure 13 is a perspective view illustrating a pocket, and the ends of a length of rigid trunking, for use in the arrangement shown in Fig. 12.

The apparatus according to this invention comprises a plurality of identical and interchangeable pedestals or sockets 1 constructed to stand

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on the floor. Each pedestal or socket is of elongated form and is intended to protrude across the line of the conveyor from one side of the latter towards the other. At one end, the pedestal is provided with a vertically extending hole 2 of such size and shape as to receive removably the lower end of an upright 3. All the uprights 3 are identical and they are of such a sectional shape as to provide at least one flange that lies on a plane extending parallel to the line of the conveyor and a web protruding from the flange. For example, they may be of T section, but are preferably of H section so that there are two of these flanges (numbered 4a and 4b). While the provision of two flanges permits the insertion of an upright into its socket in either of two attitudes, yet its chief utility is that it permits support brackets 5 or 5', hereinafter described, to be attached to either or both of the flanges.

The support brackets 5 are all identical; brackets 5' are identical with one another and closely resemble brackets 5. Each bracket consists of a root member 6 which is arranged to be detachably fastened to a flange 4a or 4b of the upright 3 and a protruding arm 7 which is arranged to support horizontal track bars 8 extending from it to the adjacent brackets 5 or 5' along the line of the conveyor. The root member 6 is provided with jaws 9a, 9b defining a vertical slot 9 which is T-shaped in plan so that the said root member may slide downwards on to an upright 3, a flange 4a or 4b of the latter and a part of the web 10 being accommodated within the slot. In order that the brackets 5 or 5' may be positioned securely at the required heights, vertically spaced holes 11 are provided in each flange of the uprights 3, which holes 11 break through into apertures 12 in the web 10. Each aperture 12 extends slightly below the lower margin or lip of the associated hole 11. Each bracket 5 or 5' is provided, some distance below the jaws 9a, 9b, of the root member 6, with an abutment face 13 arranged to bear against the outer face of a flange of the upright and with a downwardly-directed hook 14 arranged to be inserted through the selected hole 11. A part of this hook may therefore rest on the lip of the hole 11 while the downwardly-directed extremity of the hook lies at the inner face of the lip (within the aperture 12 in the web). Thus a bracket 5 or 5' may be slid downwards until its hook 14 is opposite the selected hole 11, and the hook then inserted through the latter to hook over the lip, whereby further descent of the bracket is prevented. These operations are shown in the upper part of Fig. 2. The slot 9 in the root member 6 is sufficiently large to permit the bracket 5 or 5' being moved up and down the upright 3 while being held at such an angle to the latter that the hook 14 is outside the flange, but the play in the slot 9 permits the bracket member being tilted downwards (after the hook has been brought opposite the selected hole) to pass the hook into the hole to engage over the lip thereof, the abutment face 13 then bearing against the outer face of the flange. The weight of the bracket 5 or 5', and of parts supported on it, tends to cause it to adopt this position so that there is no fear that the bracket will subsequently slip down the upright 3. The bracket may be substantially triangular in side elevation with a strut portion extending diagonally upwards and outwards from the abutment face to its extremity.

It will be seen that in Figs. 1, 2, 6 and 7 the brackets 5 are so constructed that they are

slightly inclined, downwards and outwards. This inclined arrangement has the advantage that the trucks or trays 19 are inclined at such an angle that their open tops are accessibly presented in an inclined plane to an attendant standing by the side of the apparatus. Alternatively brackets 5', Figs. 10 and 11, may be employed which resemble the brackets 5 in all material respects except in that they are arranged to protrude horizontally. It will be understood that each of a succession of uprights may be provided with at least one bracket 5 and at least one bracket 5'.

At each of two locations spaced apart along its length, the bracket 5 or 5' is formed in its upper surface with a slot or groove (15, 16 respectively) which extends completely across it from side to side. These grooves 15, 16 are intended to receive and locate parts of longitudinal track bars 8 (or 8') which are thereby positioned in parallel dispositions. Each track bar 8 has one end supported on the bracket attached to one upright and the other end supported on the bracket attached to the next upright. Each track bar 8 is of L section angle-bar so as to provide a base flange 8a directed inwards towards the other track bar of the pair and an upwardly projecting outer flange 8b. The base flange 8a rests upon the surface of the bracket 5 and a downwardly protruding tongue 17 secured to the end of the track bar fits within the slot. The track bars 8 may be positioned lengthwise by means of stops 18 attached to the under-side of their lower flanges 8a a short distance inwards from each end, which stops 18 are intended to bear against the faces of the associated brackets 5 or 5'.

It will therefore be appreciated that uprights 3 may be erected in the pedestals 1 at spaced intervals that are determined by the length of the track bars 8. Any desired number of brackets 5 or 5' may be attached at the required heights or levels to the uprights 3 and the successive brackets at each level are connected by the track bars. At each level the successive pairs of track bars 8 therefore form a track that extends along the line of the uprights 3. This track is arranged to receive trucks or trays 19 provided with castors or other runners 20 that travel along the track bars 8 so that the trucks may be pushed along the track by hand. It is a great advantage in the construction provided by this invention that the apparatus may be erected from interchangeable parts by unskilled labour with extreme rapidity, and that it may be caused to follow any prescribed route, for example among machines in a boot and shoe factory (in order to permit of curves in the route, arcuate track bars may be provided). Furthermore, the apparatus may readily be dismantled, for example overnight, and re-erected with extreme rapidity on a different route when a change in the character of the product intended to be conveyed by it involves a change in the manufacturing processes and necessitates the transport of the articles past a different series of machines.

The conveyor or line production apparatus may be single, in which case the brackets 5 or 5' aforesaid are attached to one flange of each upright 3 (as shown in Fig. 2 and in Fig. 6 or Fig. 7), or it may be double in which case the brackets 5 or 5' are attached to both flanges 4a, 4b of the uprights so that the uprights 3 in effect stand between two conveyor lines as shown in Fig. 1. Furthermore, an otherwise-continuous line may be interrupted at any desired place for the introduction of branch lines, vertical conveyors, driers, and

other mechanisms that may be desirable at certain stages in the manufacturing process.

It may in some instances be desirable to arrange two sets of apparatus, whereof one has the brackets protruding from flanges 4a and the other has them protruding from flanges 4b, back to back with a space between them which serves as a gangway. Figs. 6 and 7 conjointly illustrate this arrangement.

It may be found desirable to arrange runners or castors 20, by which the trucks or trays are supported on the track bars 8, to engage both the lower flanges 8a and the outer flanges 8b of these bars so that there is no danger of the trucks going off the track. This may be effected by a suitable disposition of the castors, but as shown in Fig. 11 it may be effected by tilting the track bars 8.

In a modification illustrated in Fig. 8, the uprights 3' are tapered in width so that the distance between the two flanges increases from the top downwards. As a result the tracks are not vertically above one another, but are staggered in an inclined tier. This facilitates access to the lower tracks and to the trays thereon. The degree of taper, and the extent to which the tracks are staggered may be as described and that shown is by way of example only.

Figure 9 shows a similar upright 3' equipped with brackets 5'' arranged to incline outwards and downwards. The uprights 3' employ suitably modified pedestals 1' the construction of which will be apparent from Figs. 8 and 9.

The conveyor apparatus may carry electric current-conducting means for power and/or light with suitable tapping points. Thus in Figs. 12 and 13, the top ends of the uprights 3 fit in caps 21 constructed with channels 30 to receive, removably, trunking 22 containing the electric wiring and provided at appropriate intervals with switch-and-fuse units 23 (having power-plug sockets 24) and with heating or lighting points 25 (having switches 26 and plug sockets 27). The trunking 22 may be constructed in identical unit lengths, each unit being provided with connecting plugs 28 at one end and complementary sockets 29 at the other, so that successive units may be connected together.

I claim:

1. Conveyor apparatus comprising a plurality of identical and interchangeable uprights of H section with smaller openings at the same selected heights in each flange and larger openings at those heights in the web, a socket for each upright to lie on a floor and hold the upright erect in simple pull-out fashion, a plurality of identical and interchangeable brackets dispersed at least one on each upright, each bracket having at its upper end a slot to slide loosely along a flange of an upright and having at its lower end a downwardly-extending hook to enter a selected opening in that flange, and each bracket having a forwardly-extending arm with parallel grooves across it, one at each end, and a plurality of identical, interchangeable track rails of L-section, each rail at each end having a longitudinal web to enter a groove in a bracket arm, and a transverse web to abut against the same bracket arm, the track rails thereby forming a continuous track from upright to upright, in sequence.

2. A portable conveyor apparatus comprising a plurality of substantially identical and interchangeable uprights to be disposed in a line representing the intended direction of conveyance, each of said uprights having a double flange and

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web providing a T-cross section therefor, each upright having a series of openings provided in the flange longitudinally of said upright, said uprights also having openings provided in the web thereof with each opening positioned behind one of said flange openings, a plurality of substantially identical and interchangeable supporting brackets with each bracket having substantially an L-shaped configuration, each bracket having an opening provided in the heel portion thereof capable of slidably and loosely receiving one of said uprights therethrough and allowing said bracket to tilt to and from said upright, each bracket having a hook extending from the toe portion of its base for entering any one of said flange openings and thereby preventing the downward movement of said bracket, the arm of each bracket having parallel transverse grooves formed in the upper side thereof, a plurality of substantially identical and interchangeable track rails

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each having a projection for entering one of said bracket grooves and providing continuous tracks from upright to upright, a plurality of stop members carried by each track with a stop member adjacent each track projection for engaging a bracket and preventing movement longitudinally of said track and a supporting base for each of said uprights.

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