March 25, 1952 R. TRAMBLAY 2,590,802

PUSHER CONVEYER WITH SECTIONAL TROUGH

Filed Sept. 27, 1948 5 Sheets-Sheet 1

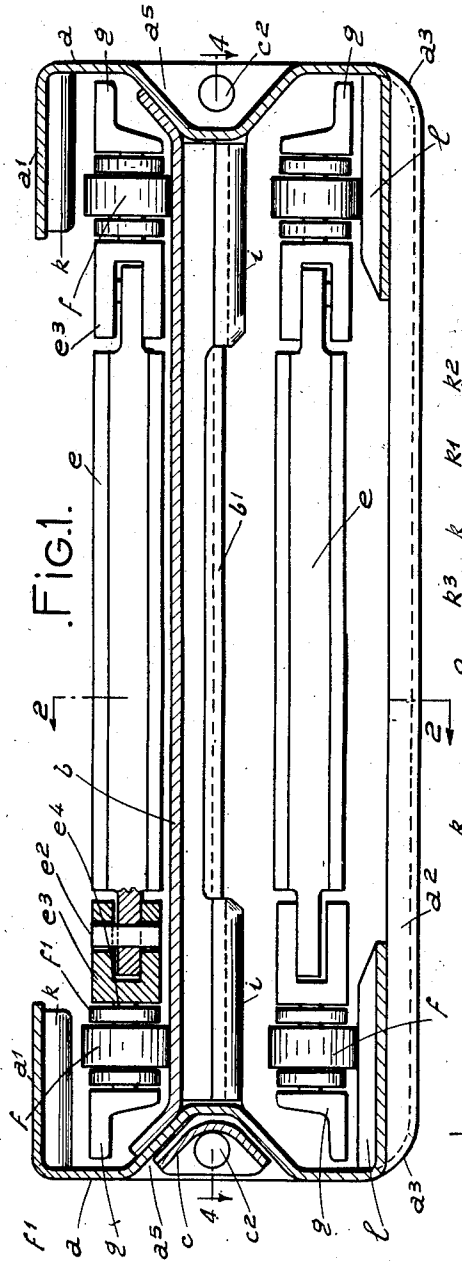

FIG. 1.

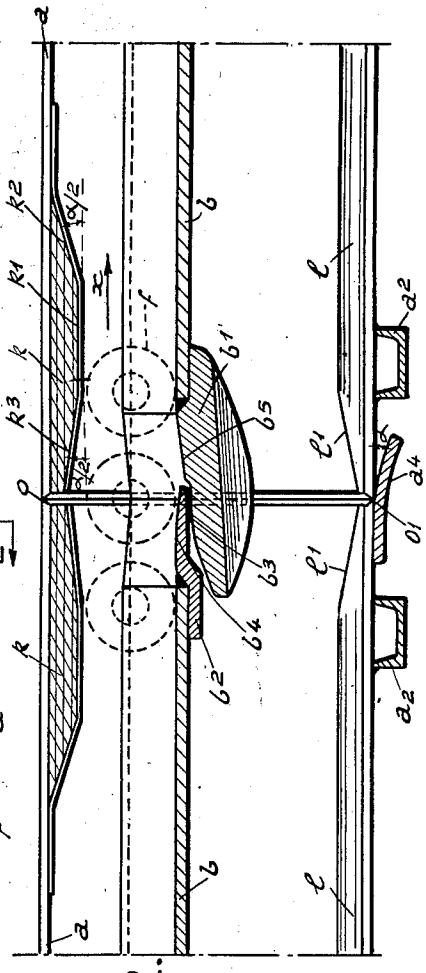

FIG. 2.

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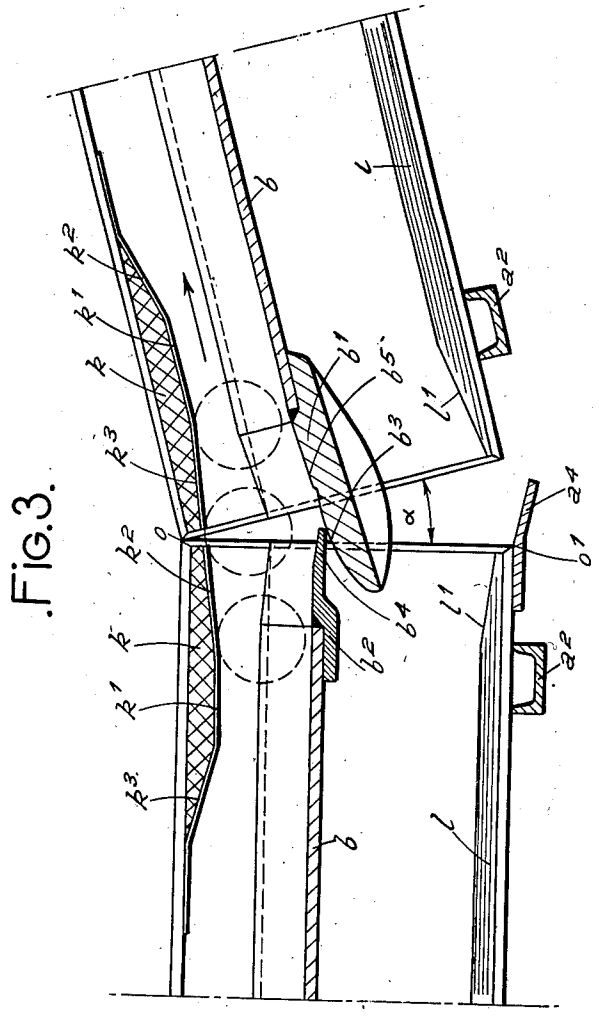

Fig.3.

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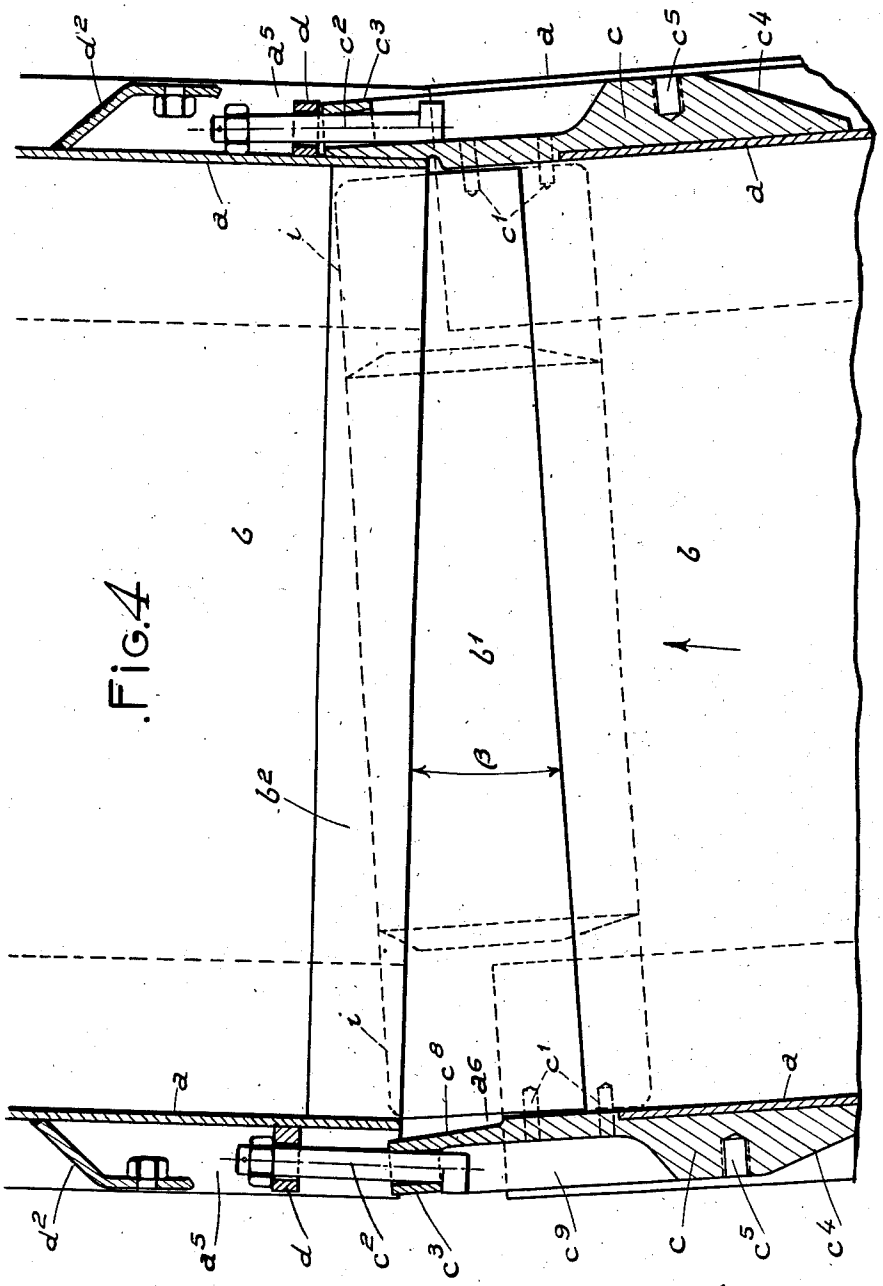

Fig. 4

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FIG. 5.

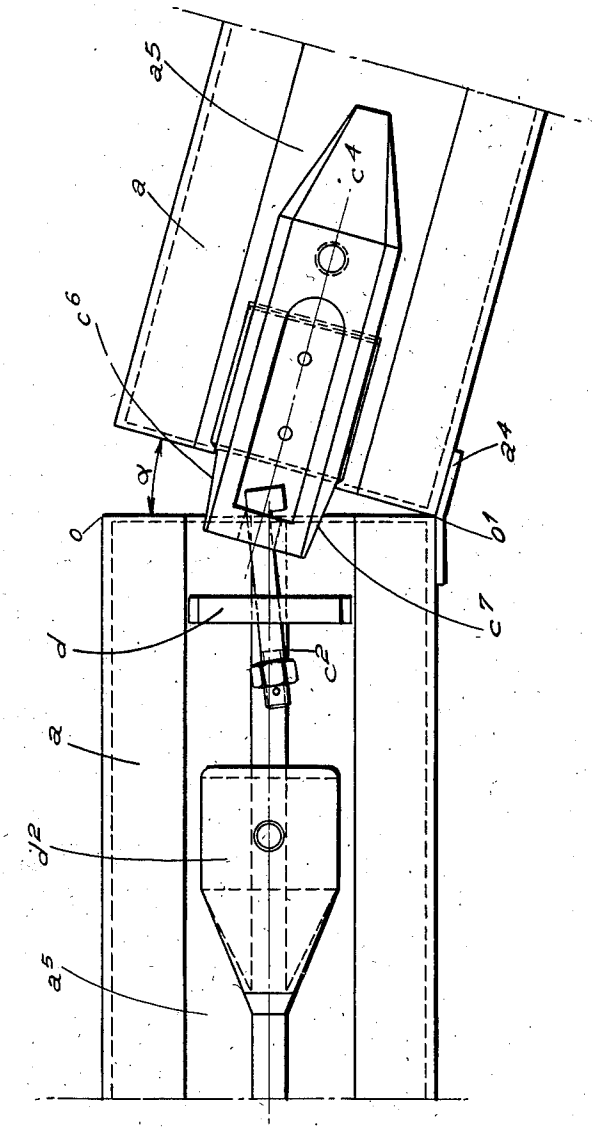

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Fig. 8.

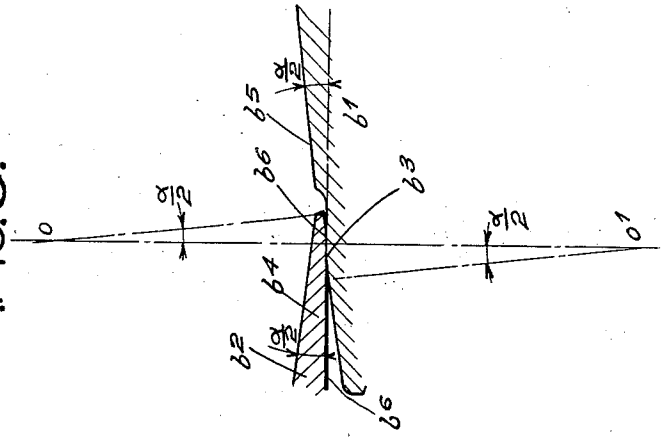


Fig. 6.

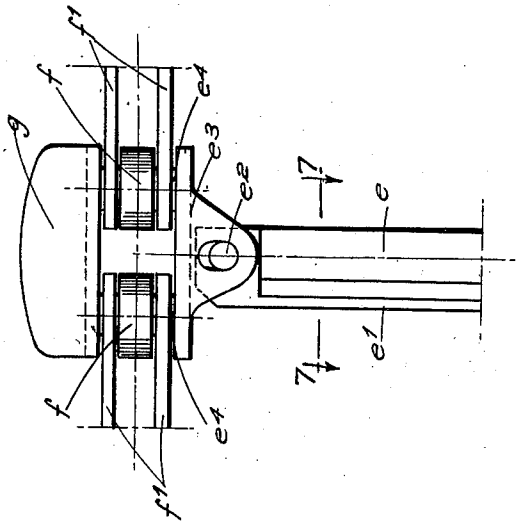
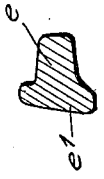


Fig. 7.



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2,590,802

UNITED STATES PATENT OFFICE

2,590,802

PUSHER CONVEYER WITH SECTIONAL TROUGH

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3 Claims. (Cl. 198—168)

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This invention relates to conveyors of the type adapted to convey the broken-down products, from a mining stope for example, to a railroad track over which they are to be removed.

More particularly, the invention relates to such conveyors wherein the products to be conveyed are advanced through chain or similarly driven scraper elements or vanes, and which comprise a plurality of similar serially-arranged elements, each element comprising two flanged side members interconnected at an intermediate level thereof by a generally horizontal sheet member, so as to define, in each said element, two compartments, an upper compartment through which the products are conveyed, and a lower compartment through which the scraper elements and the drive chains therefor are returned.

The invention provides a scraper-conveyor of the above-disclosed character wherein the serially-arranged elements are interconnected with a predetermined degree of freedom so as to allow for the occurrence, between two adjacent elements of the conveyor, of an angle of misalignment of e. g. about 15° in a vertical plane and about 5 to 7° in a horizontal plane.

The invention further provides a scraper conveyor of the above-defined character, including means for positively preventing dislocation or uncoupling between the adjacent conveyor elements during the above-defined angling movements thereof, and means insuring that the scraper-chains will at all times remain in an efficiently guided condition, without impacts between any of the operating parts, during those angling movements or in the misaligned state of the conveyor elements, thereby making for an efficient and comparatively noiseless operation of the conveyor.

The above and other objects, features and improvements of the invention will clearly appear from the ensuing description and accompanying drawings disclosing a preferred embodiment of a scraper conveyor according to this invention, it being understood that none of the details described and shown hereinafter are to be construed as imposing limits on the invention, the scope of which is explicitly defined in the claims.

In the drawings:

Figure 1 is a transverse vertical cross-section of a conveyor element;

Figure 2 is a longitudinal section on the line 2—2 of Figure 1 through the adjacent ends of two conveyor elements located in a common horizontal plane.

Figure 3 is a view corresponding with Figure 2,

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but showing the adjacent elements in angled mutual relationship, forming therebetween a downwardly open angle.

Figure 4 is a horizontal cross-section substantially on line 4—4 of Figure 1, in the case of a horizontally-angled pair of adjacent conveyor elements.

Figure 5 is a view relating to two conveyor elements forming an upwardly open angle.

Figure 6 is a detail view in plan of a scraper element and its connection with the driving roller-chain therefor.

Figure 7 is a transverse cross-section on line 7—7 of Figure 6, and

Figure 8 is a fragmentary view showing a constructional detail.

As shown in Fig. 1, each conveyor element comprises two flanged side member a each in the general form, in cross-section, of the Greek letter Σ, produced by bending or stamping or rolling. Said side-members are interconnected intermediate the top and bottom ends thereof by a generally horizontal sheet member b, riveted or welded thereto, thus defining a pair of vertically-arranged compartments, including an upper compartment through which the materials are advanced under the action of the scrapers e driven at the opposite ends thereof by roller chains f in the general direction of the arrow x (Fig. 2), and a lower compartment through which the scraper-supporting chains are returned.

Cross-members a^2, having rounded ends as shown at a^3 in Fig. 1, are secured between the members a adjacent the longitudinal ends and the middle of said members (see Fig. 2) in order to stiffen the conveyor elements in a transverse plane.

At the upstream or "male" end of each conveyor element, the medial sheet member b supports a flap member b^1, the end of which underlies a tapered member b^2 secured to the medial sheet member b at the downstream or "female" end of the adjacent element (Fig. 2); the tapered member b^2 projects slightly beyond the contact plane $o—o^1$ of the two adjacent elements; this tapered member b^2 has its lower face in engagement with the upper face of the flap b^1 of the adjacent element; this upper face of the flap b^1 comprises, as shown in Fig. 12, a rounded portion b^3 centered on o^1, and the lower face of the part b^2 similarly comprises a rounded or arcuate portion b^6, centered on o (Fig. 8).

The downstream or female end of each conveyor element further carries a strip steel member a^4 extending throughout its width, said strip

being bent as shown at o^1 to the maximum angle (α) which the conveyor elements may assume with respect to each other in the misaligned condition thereof in a vertical plane.

In the recess or the inwardly directed medial portion a^5, externally of the side members a of the elements, there is mounted the means for interconnecting the conveyor elements with each other, while allowing relative angling movements thereof both in a vertical and in a horizontal direction.

As more particularly illustrated in Fig. 4, each element at the upstream or male end thereof has secured to it at each side thereof, a shoe-like block member c, e. g. by means of pins c^1 screwed into the end portions of the flap b^1; the medial portion of the related side member a is for this purpose formed with a suitable cut-out, as shown at a^6. The shoe c is extended beyond the contact plane o—o_1 of the elements and carries a bolt c^2, projecting into the hole of a gusset-plate d, welded, as shown at d^1, or otherwise secured to the downstream or female end of the adjacent element, in the recessed or inwardly directed medial portion a^5 of the member a thereof. The bolt c^2 is provided with a sufficient degree of clearance within the holes formed therefore in the gusset plate d and in the end portion c^3 of the shoe c, to allow for the desired relative angling displacements of the conveyor elements.

Each shoe c of a conveyor element presents at the end thereof opposite to that which carries the bolt c^2, a ramp or incline c^4 forming a deflecting surface for any tools such as coal-cutters, planes, scrapers and the like, which might in operation happen to frictionally engage or graze the sides of the conveyor, thus preventing the possibility of such tools running foul of or getting caught with the conveyor. A similar deflecting member d^2 having a similar purpose is welded, as shown at d^3, or otherwise secured to the female extremity of the adjacent conveyor element, in the re-entrant medial portion a^5 of the member a thereof.

Screw-threaded holes, formed as at c^5 in the shoes c and at d^4 in the deflector members d^2, provide the fixation, by means of suitable pins, of metal extension members serving to increase the useful vertical height of the conveyor and thus increase the effective capacity thereof, and/or of pipe supports with which it may be necessary to fit the conveyor.

Fig. 4 illustrates in horizontal cross section, the end portions of two adjacent conveyor elements which form between each other an angle β of misalignment in a horizontal plane.

Fig. 5 shows, in side elevation, the end portions of two adjacent conveyor elements forming between each other an upwardly open angle α in a vertical plane, as a result of relative pivotal displacement about the axis o^1.

To permit of such various relative angular displacements of the conveyor elements, that portion of each shoe c, which projects beyond the plane of contact o—o^1 of the elements, should comprise an upper face c^6 and a lower face c^7 of a curvature such that said faces will not impinge on the outer surface of the side member a, thus causing dislocation or uncoupling between the elements of the conveyor, when said elements swing relatively to each other about the axes o and o^1 (Fig. 5); in a like manner, the inner face c^8 of the end portion of the shoe c should be suitably rounded or arcuate to allow for the relative

angular displacements in the horizontal plane (Fig. 4).

As shown in Fig. 4, each shoe c is formed with a recess c^9 opening in an outward direction, making it possible to disengage the related bolt c^2.

The roller chains f are guided in and through the upper compartment by means of parts k secured to the internal face of the horizontal upper arm or wing of each sigma-formed side member a. The guide members k are formed with a peculiar contour: thus the under face of each part k includes a horizontal medial portion k^1 between two end portions k^2 and k^3, sloping in opposite directions from each other, as clearly shown in Fig. 2; each of the above-mentioned three portions has a length corresponding with the center-to-center spacing between the rollers f of the drive chains for the scapers e; moreover the end portions k^2, k^3 of the guide members k are formed with an incline equal to $\alpha/2$, α being the angle corresponding with the maximum relative angular displacements in a vertical plane between the adjacent conveyor elements. As a result of the above arrangement, a smooth impact-free guiding action is provided for the roller chains f as they pass from one to an adjacent conveyor element. This is true for the following reason: the rollers f are not separate from each other, but are interconnected with a chain; when the adjacent conveyor elements are aligned in a common horizontal plane (as in Fig. 2), at the time such passage occurs, there is a roller f still riding on the medial sheet member b of the upstream element, while the next roller is riding on the tapered member b^2 which terminates the sheet member b of the said element, and a third roller is already riding over the sheet member b of the next element. When the adjacent conveyor elements are angled with respect to each other at a downwardly open angle, as in Fig. 3, the chains are stretched upwardly, and the tension thus exerted on the roller chains is operative to apply the rollers against the parts k, k, over which they will thus be caused to ride without impact. Assuming, in such misaligned or angled position of the elements, that it is the upstream or left-hand element which rests on the ground through its cross-member a^2 (as shown in Fig. 3), then the downstream or right-hand element will be supported by said first-mentioned element through the medium of its end shoes c. If, on the other hand, it is the downstream or right-hand element which rests on the ground through its cross-member a^2, then the upstream (left-hand) element is supported by it through the medium of its tapered end-piece b^2, resting on the flap b^1 of the downstream (right-hand) element. When the two adjacent elements together form an upwardly-open angle α, the rollers f of the scraper drive chains ride on the flap b^1 and the tapered end-member b^2. Impacts on crossing the plane o—o_1 are avoided due to the fact that the upper face of the projecting portion b^4 of the end member b^2 (see Fig. 8) forms an angle $\alpha/2$ with respect to the horizontal plane; the upper face of the flat portion b^5 of the flap b^1 also forms an angle $\alpha/2$ from the horizontal, whereas the portion b^3 of said flap b^1 is a cylindrical surface, centered on the axis o^1 (Fig. 8) as previously stated.

To avoid the escape of fines from the upper compartment in the event the adjacent elements of the conveyor form a downwardly-open relative angle, as in Fig. 3, the tapered projecting portion b^4 of the upstream end member b^2 is

made to project slightly beyond the plane of contact o—o_1 between the adjacent elements (Fig. 8), when those elements are aligned in a common horizontal plane (as shown in Fig. 2); thus, in the relative angular displacement resulting in a downwardly opening angle (as in Fig. 3), this projecting end of the portion b^4 will slide over the cylindrical portion b^3 of the flap b^1 (see Fig. 8).

When the adjacent elements form a downwardly opening angle relative to each other, as in Fig. 3 for example, the tension of the roller-chains f of the scrapers e tends to carry those chains upwards, applying the roller f against the guide members k; the scrapers e are thus raised above the sheet members b, the flap b^1 and the tapered end member b^2; there is formed between the flap b^1 and said end member b^2 a gap of triangular form in cross-section, which is not swept through by the scrapers; it is desirable however to scrape the sheet members b to the greatest possible degree, in order to avoid clogging or jamming of materials under the scrapers. To prevent the danger of material particles building up within this triangular space, the parts k are made of a resilient material, such as rubber or the like, so as all times to present a tendency to urge the rollers f and consequently the scrapers e in a downward direction. It will be understood that such resiliency will only come into play in the case the scrapers become jammed, as a result of material accumulating in the triangular gap defined by the flap b^1 and the end-member b^2, when the adjacent conveyor elements form a downwardly opening angle with respect to each other. Instead of forming the guide members k in a resilient material, spring-plates of suitable configuration and strength could alternatively be substituted therefore.

The return flight (generally slack) of the roller chains driving the scrapers is guided in the lower compartment of each conveyor element by members l secured to the inner face of the lower horizontal arm or wing of each side member a. To further avoid shocks or impacts, the portion l^1 of said guide members l, which portion is adjacent the contact plane of the conveyor elements, is inclined towards said plane, over a distance corresponding with the center-to-center spacing of the rollers, at an angle $\alpha/2$, α being the maximum angle which the adjacent conveyor elements may assume relatively to each other in a vertical plane. Said guide members l preferably extend over the entire length of each element and thus form a runway for the drive-chain rollers.

Guide-members i for the rollers of the return flight of the chain are provided, at the transverse extremities of the sheet member b, on the under face thereof, adjacent the upstream end of each conveyor element; said parts i may be integral with the flap b^1, as shown in the accompanying drawings, or they may be secured thereto. The parts i are formed with a suitable curvature.

Lateral guiding of the roller-chains f is provided for by means of parts g carried by the transverse ends of the scraper-carrying chains and co-operating with the inner face of the vertical arms of the sigma-shaped side-members a (Fig. 1). The guide parts g serve to allow smooth impact-free passage of the chains at any change in direction of the conveyor.

Each scraper e comprises a unitary element and is formed in transverse cross-section as clearly shown in Fig. 7, with an inclined face e^1 which operates to push in front of it the material to be conveyed in and through the upper compartment of each conveyor element, along the surface of the sheet member b thereof. The scraper, at each of its ends, is pivoted, with a certain degree of freedom, on a pin e^2, to a part e^3 channel-shaped in cross-section. The part e^3 is connected through pins e^4 and e^4 carrying rollers f and links f^1, f^1, with the guide member g. The guide member g has a curved external surface which may come in contact with the inner face of the vertical arms of the sigma-shaped side members a.

It will of course be understood that various modifications, alterations and improvements may be made in and to the preferred form of embodiment described without exceeding the scope of the invention.

What is claimed is:

1. A conveyor of the type described, which comprises in combination a plurality of similar elements, each including a pair of side-members each generally in the form of an inwardly-directed Greek letter Σ having a top and a bottom horizontal inturned flange, a top and a bottom vertical web and an outwardly opening horizontal inwardly directed recess separating said webs, and a horizontal sheet-member interconnecting said side-members substantially intermediate the top and bottom ends thereof, so as to define a top and a bottom substantially channel-shaped compartment, means for serially interconnecting said elements, said means comprising a shoe-like block secured in said inwardly directed recess of each side-member of each element at the upstream end thereof, said shoe having a perforated wall projecting towards the adjacent end of an adjacent element, and a perforated transverse gusset-plate secured in said inwardly directed recess of each side-member of each element at the downstream end thereof, and a bolt of substantial length extending through each said perforated wall of said shoe in each element and through the adjacent perforated gusset-plate in an adjacent element so as to interconnect said elements with a certain amount of angular freedom both in a vertical and a horizontal direction, and conveying means including a pair of drive-chains and a plurality of scraper members extending across said chains to be driven thereby in product-conveying relation over said sheet-member through said upper compartments and in idle condition back through said lower compartments in the assembled elements.

2. A conveyor as in claim 1; wherein said interconnecting means allow for relative angular displacements between adjacent elements of about 5° to 7° right and left in a horizontal plane and of about 15° up and down in a vertical plane.

3. A conveyor of the type described, which comprises in combination a plurality of similar elements each comprising a pair of side members and a generally horizontal sheet member interconnecting the side members of each element intermediate the top and bottom thereof to form an upper and lower compartment of generally channel-shape cross section, means for serially interconnecting said elements with a certain amount of angular freedom between consecutive elements both in a horizontal and a vertical plane, and conveying means, including a pair of drive chains and a plurality of scraper members extending across said chains to be driven thereby

through said assembled elements, in product-conveying condition through said upper compartments and in idle condition back through said lower compartments of said assembled elements, wherein each of said elements has secured to said sheet member, at the downstream end thereof, a strip member having a tapered portion projecting in a downstream direction from said elements slightly beyond the plane of joint between said element and the next adjacent element, and each of said elements has secured to said sheet member, at the upstream end thereof, a flap member projecting in an upstream direction substantially beyond the plane of contact between the last-mentioned element and the adjacent element in upstream relation therewith, the upper face of each of said flap members having a suitable curved configuration to co-operate with the under face of an adjacent tapered element in underlying overlapping relationship therewith so as to allow for substantial angular displacements between said adjacent elements in a vertical plane, while preserving a substantially smooth continuous runway surface for the rollers of said conveyor chains in the upper flights thereof.

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