M. SKLOVSKY & G. W. MIXTER.

CONVEYER.

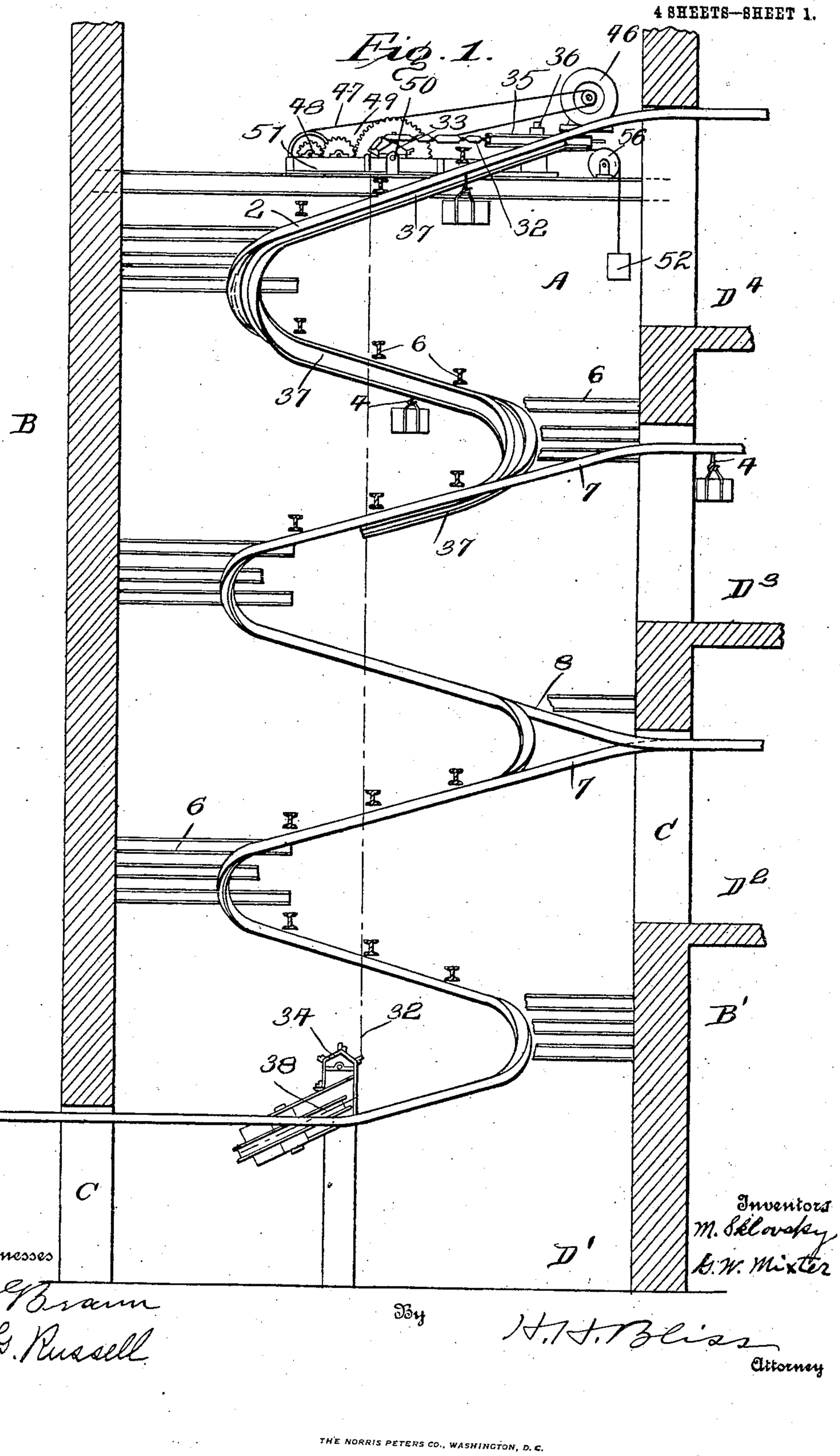
APPLICATION FILED APR. 27, 1908.

969,415.

Patented Sept. 6, 1910.

4 SHEETS—SHEET 1.

Fig. 1.



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4 SHEETS—SHEET 2.

Fig. 2.

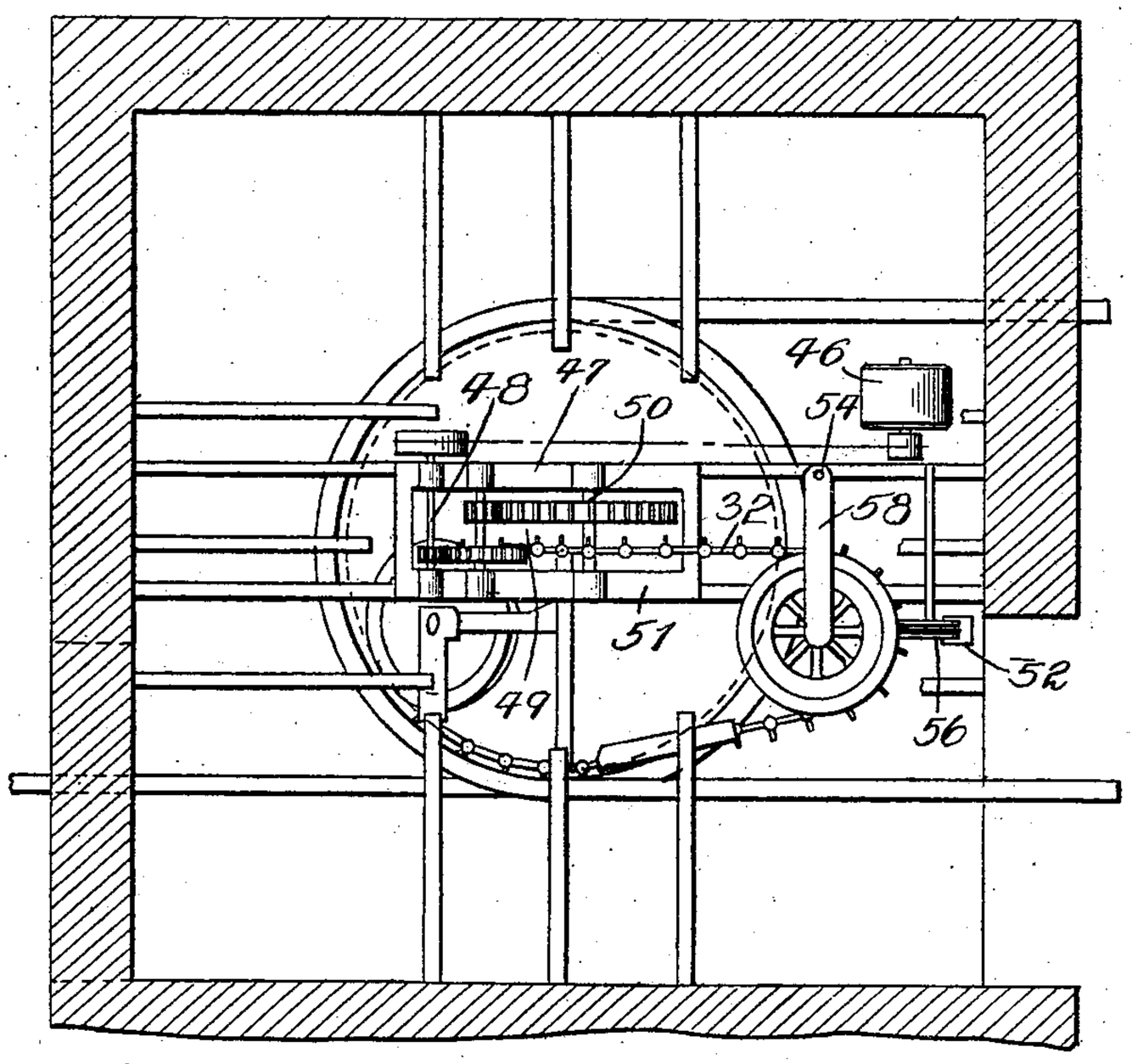
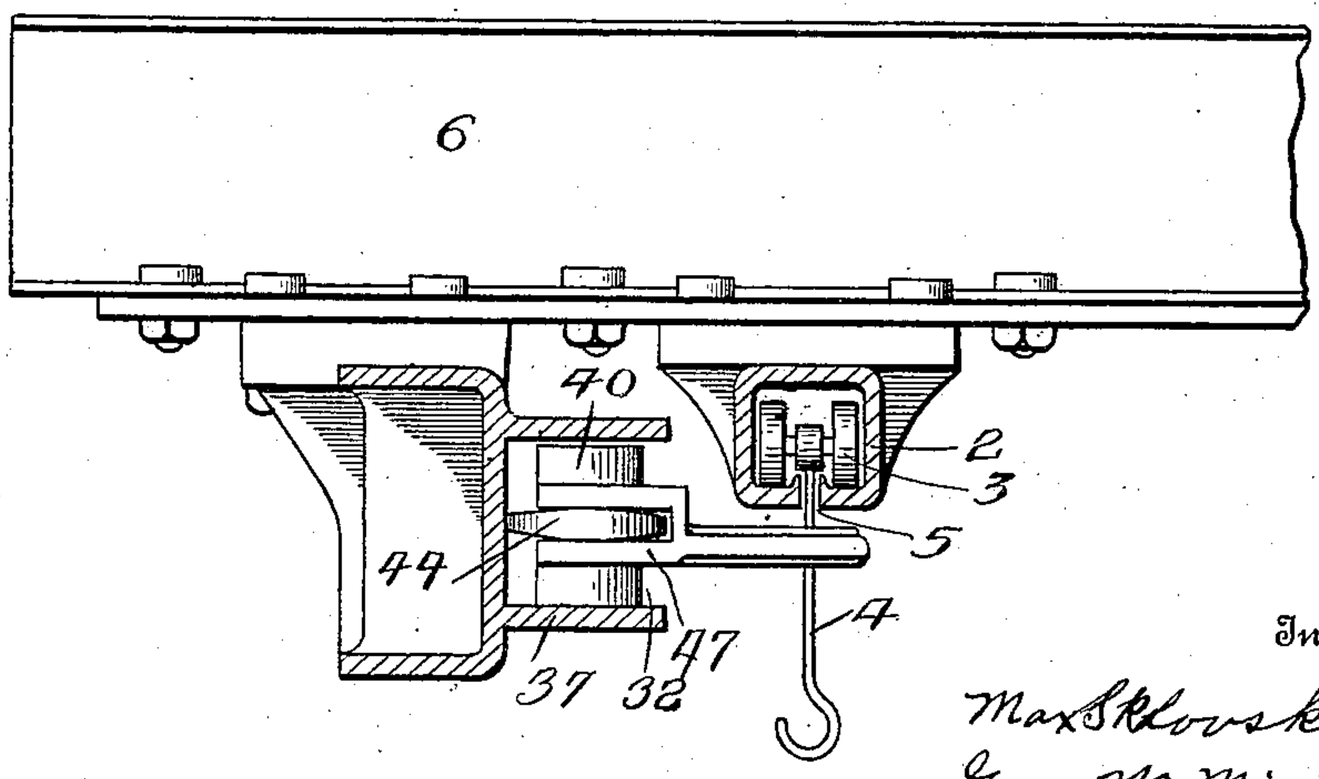


Fig. 3.



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4 SHEETS—SHEET 3.

Fig. 4.

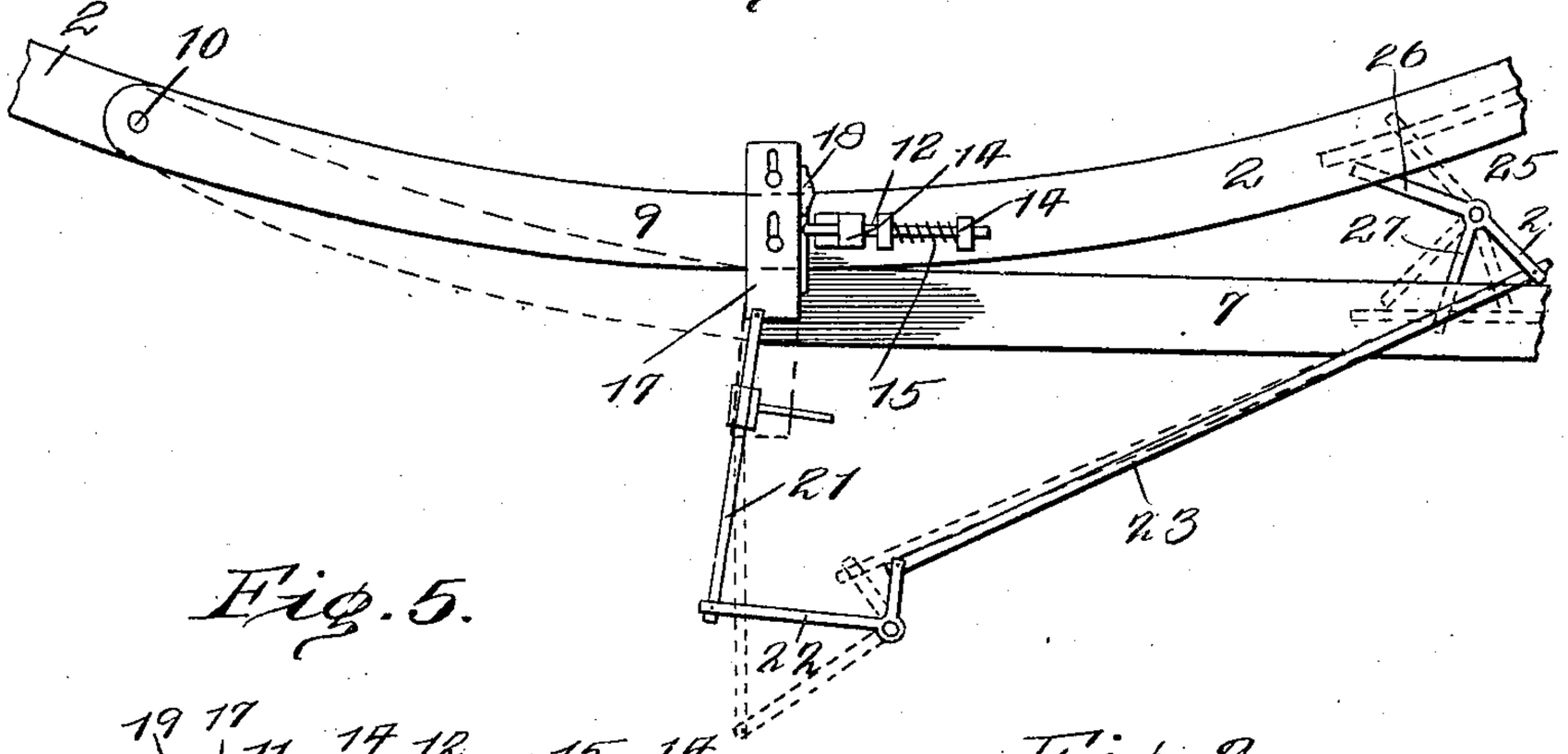


Fig. 5.

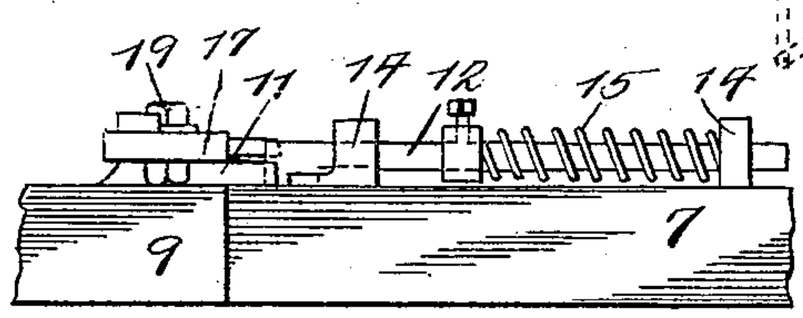


Fig. 9.

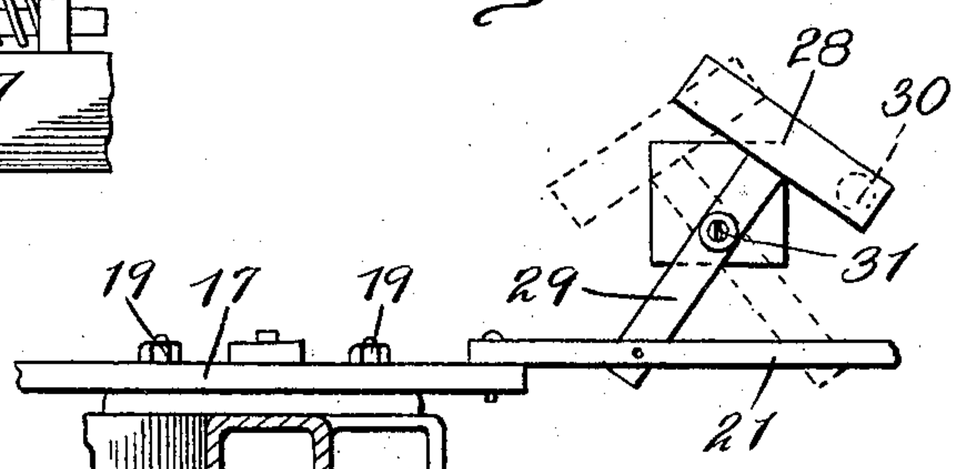
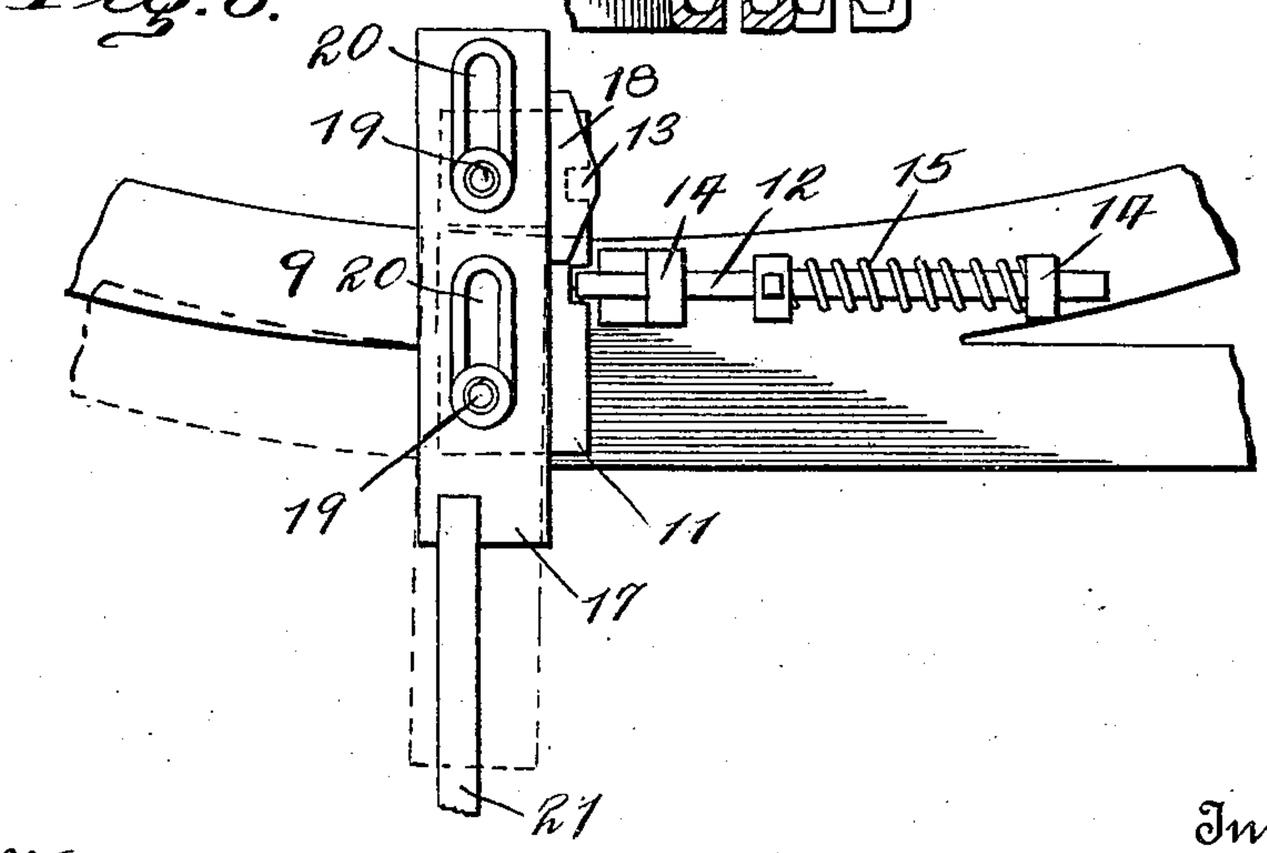


Fig. 6.



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4 SHEETS—SHEET 4.

Fig. 7.

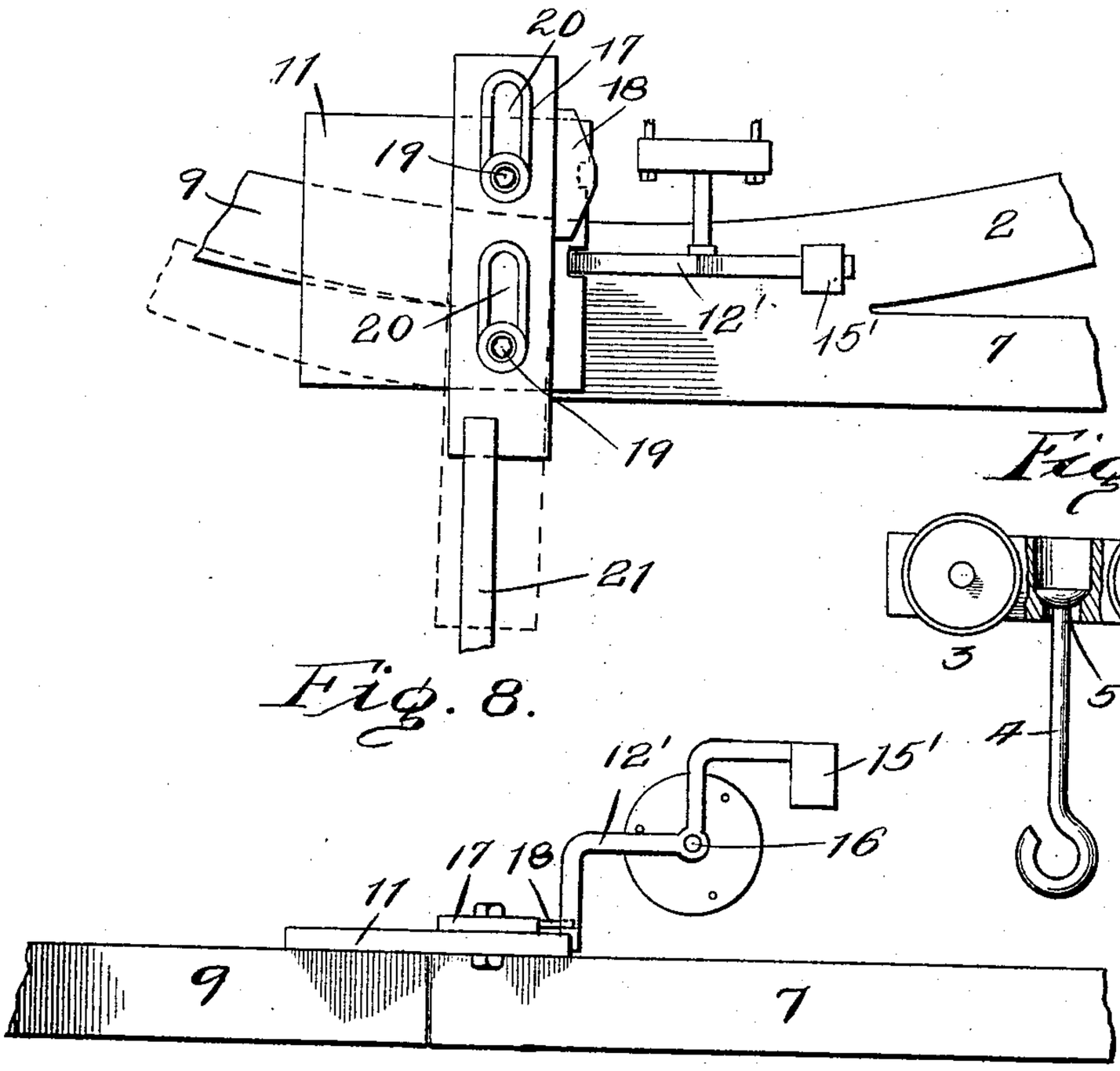


Fig. 8.

Fig. 12.

Fig. 10.

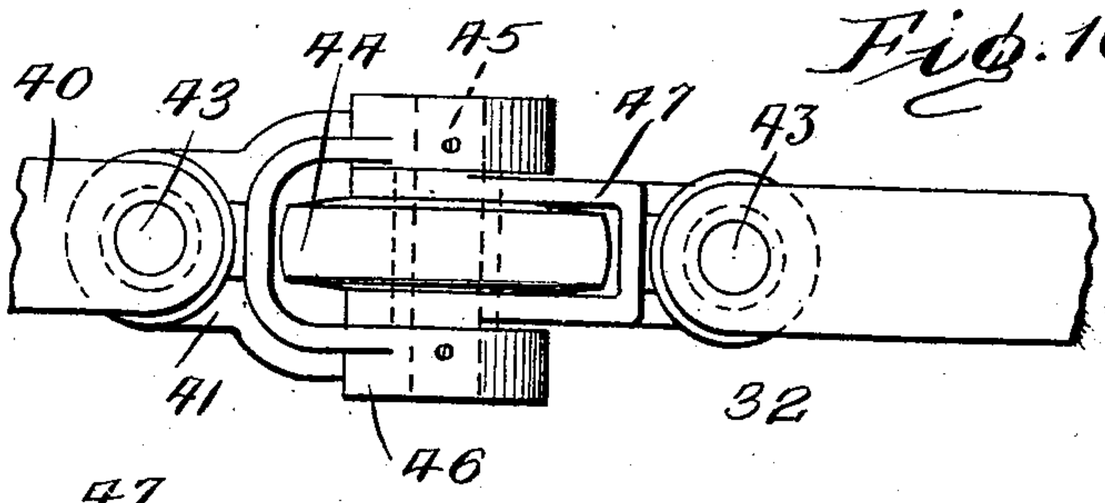
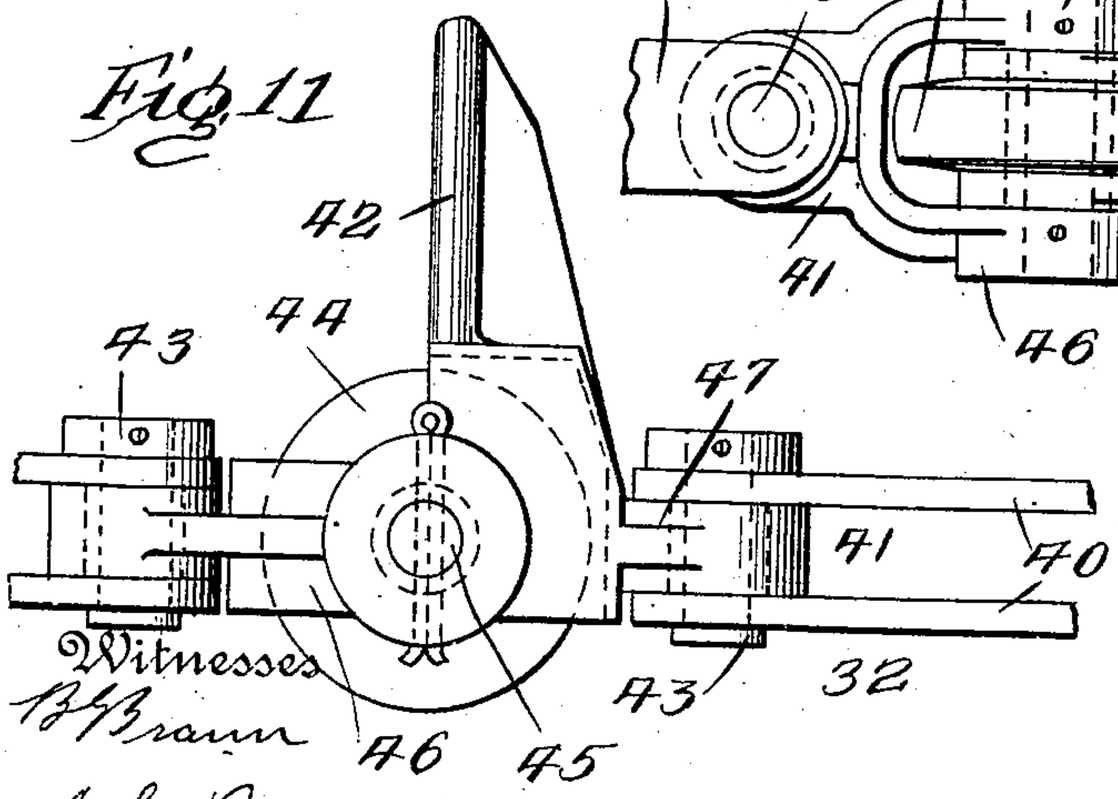


Fig. 11



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UNITED STATES PATENT OFFICE.

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CONVEYER.

969,415. Specification of Letters Patent. **Patented Sept. 6, 1910.**

Original application filed December 1, 1906, Serial No. 345,963. Divided and this application filed April 27, 1908. Serial No. 429,515.

To all whom it may concern:

Be it known that we, MAX SKLOVSKY and GEORGE W. MIXTER, citizens of the United States, residing at Moline, in the county of Rock Island and State of Illinois, have invented certain new and useful Improvements in Conveyers, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to switching devices for conveyers, and, while applicable to conveyers generally, we show it herein adapted to conveyers of the type set forth and claimed in our application Serial No. 345,963, filed December 1, 1906, of which the present application is a division. In the present application we show and describe so much of the conveyer as is necessary for a clear understanding of the switching device.

The conveyer is designed to carry articles from one level to another, and in its preferred form comprises an overhead track along which the articles to be conveyed travel, and an endless chain or other flexible element which is movably mounted adjacent and parallel to the track and which is provided with arms extending across the track. The articles moving along the track are engaged directly or indirectly by the arms of the chain, which moves at a constant speed. If the articles are being lowered from one level to another the chain arms serve to retard them, while, if the articles are being lifted from one level to another the chain acts as the positive propelling means.

In the accompanying drawings: Figure 1 is a view showing in elevation one form of conveyer embodying our invention, the drawing being somewhat diagrammatic in character and illustrating the invention applied to a structure four stories in height; Fig. 2 is a top plan view of the same apparatus taken above the head drive; Fig. 3 is an enlarged sectional elevation, the section being taken transversely of the track and chain guide adjacent one of the supporting girders; Fig. 4 is a plan view of the track switching arrangement at each branch; Fig. 5 is a side view of the switch and safety lock therefor; Fig. 6 is a top plan view of the parts shown in Fig. 5; Fig. 7 is a top plan view of another form of switch-lock; Fig. 8 is a side view of the parts shown in Fig. 7; Fig. 9 is a view partly in section and partly in elevation showing an arrangement for insuring a complete throw or movement of the switch; Fig. 10 is a side elevation, and Fig. 11 a top plan view of the chain employed in our apparatus; Fig. 12 is a detail view of one of the trolleys or carriers employed.

In the accompanying drawings, A represents a vertical shaft or well which may be located between the walls B, B′ through one or both of which are formed openings C leading to the various floors of the building, these being represented by D′, D², D³, D⁴. Within the well A is mounted the conveyer, which is of helical arrangement, this construction being adopted for convenience.

2 represents a track-slide or way along which move the articles being conveyed, or their carriers. We prefer that this track or slide should be in the form of a slotted trough (see Fig. 3) suitably supported and arranged to receive and have run therein small trolleys 3, from which depend hooks or hangers 4, adapted to extend through the slot 5 in the way or track, and by which the material or articles to be conveyed are suspended. The track or way 2 is supported by suitable brackets, or by bars or beams 6, so disposed, and of such number, as to give the desired rigid support to the track. The track is preferably helically arranged, in order that it may be placed within a comparatively small compass and that its inclination be not too great, for, it will be understood, the trolleys and the articles carried thereby are adapted, in the form of conveyer illustrated and now being described, to travel down the way or track by gravity. Branch tracks 7 lead into the main track 2 at various points, as for instance, one from each floor of the apartment or from each opening C into the shaft. Other branch tracks 8 may be arranged to lead off from the main way or track into the apartments. By this arrangement we are enabled to run material on to the main track from any of several different points arranged at different levels, and also to receive or deliver material from the conveyer at any of several different points, accordingly as the branches are located.

In order to control the movements of the trolleys or other carriers that may pass along the track or way, we provide it with switching devices arranged at the meeting points of the main and branch tracks.

9 indicates a movable section of the track pivotally connected as at 10 with a stationary portion thereof near one of its ends, its free end being adapted to register with either the main track 2 or the branch 7, accordingly as the section is moved. To the end of the switch section 9 we prefer to secure a relatively broad overhanging piece 11 that is adapted to bear upon the contiguous ends of the track sections 2, and 7 and operate to prevent the stationary and movable sections from getting out of proper vertical adjustment relative to each other. In order to hold the free end of the adjustable section 9 in proper horizontal position to accurately register with one or the other of the stationary track sections, we employ a lock, which is preferably in the form of a bolt 12 arranged to engage with notches 13 formed in the edge of the overhang 11. The bolt may be arranged to move rectilinearly as indicated in Figs. 4, 5 and 6, where it is represented as being mounted in bearings 14 and actuated by a spring 15. As an alternative or equivalent arrangement the lock or bolt may be arranged to vibrate and be operated by a weight, as represented in Figs. 7 and 8, where it is designated by 12′, and is in the form of an angular lever pivoted at 16 and held in locking position by a weight 15′.

17 is a sliding plate carrying a double-faced cam 18 arranged to move the bolt or lock and release the movable switch section. This plate preferably rests upon the overhanging piece 11 to which it is secured by the headed bolts or screws 19, the stems of which pass through slots 20 formed in the plate. A shifting bar 21 is connected with the plate 17 and is the medium through which the latter is operated. In Fig. 4 the parts of the switch are represented as being in position to have the movable switch member register with the main track 2, where it is locked. If now it be desired to shift the switch to cause it to register with the branch track section 7, as when an article approaches along the branch 7 in the direction of the arrow, the plate 17, through the operating bar 21, is shifted into the position indicated by the dotted lines. The first result is to slide the bar or plate 17 relative to the switch member without imparting any movement to the latter, this being permitted by reason of the slots 20, formed in the plate 17. As these movements are taking place the cam 18 comes into engagement with the bolt or lock 12 and forces it back, so freeing the switch section 9. A further movement of the bar or plate 17 causes its movement to be imparted to the switch section 9, and carries the cam 18 beyond the lock or trigger 12. The movements of the parts will be continued until they reach the positions indicated by the dotted lines, when the switch section will register with the branch track, and where it will be locked by the bolt 12.

The switch can be shifted by hand, but we prefer that it should be controlled by the movements of the trolleys or articles that may pass along the track, and we have devised a mechanism for securing this result.

22 is a bell crank lever to one arm of which is connected the shifting bar 21, and 23 is a link connecting the other arm of such lever with the arm 24 of a three-arm lever 25 mounted between the main track section 2 and a branch 7. The arm 26 of the lever 25 is arranged to extend into the path of the trolleys or other objects that pass along the main track 2, while another arm, 27, is arranged to be moved into the path of the trolleys or objects that may pass along the branch 7. The angular relations of these arms to each other is such that one or the other is always in the path of the trolleys passing along one of the ways 2 or 7, but both arms never stand at the same time in the paths of the trolleys.

When the arm 26 is lying across the opening 5 of the track 2, and hence in the path of a trolley or other object that may be passing along such track or way, the switch 9 is set for the branch track, and unless the switch be thrown the trolley would run off the track at the switch opening; but the arm 26, extending as it does across the path of the trolley, is moved by the passage of the latter and the switch is thrown and caused to register with the main track section before the trolley and its load reaches such section. On the other hand, when the switch is set for the main track, the arm 27 lies across the branch 7, and if a load be sent along such branch toward the main line its passage along the track 7 causes the switch to be set in line therewith. These movements of the switch are best illustrated in Fig. 4.

In order to insure against the switch section coming to rest at an intermediate position where its free end does not register perfectly with either of the stationary track sections, it is sometimes desirable to provide means for completing the throw of the switch after such movement has been started by the action of a passing trolley or load upon one of the arms of the lever 25. An arrangement for securing this result is represented in Fig. 9, where 28 indicates a box mounted at the upper end of a lever or swinging bar 29, the lower or free end of which enters a slot formed in the shifting bar 21. Within the box is a freely movable

weight preferably in the form of a ball 30. The box 28 is elongated so that the ball may move from one side of the fulcrum 31 of the lever 29 to the other accordingly as the box is inclined. The shifting of the switch-throwing mechanism by the passage of a trolley or load will be sufficient to move the lever 29 sufficiently to incline the box in a direction opposite to that which it occupied before the shifting operation began, and as soon as this change of inclination takes place, the weight will roll down to the opposite end of the box and operate to assist in the further movement of the parts, insuring a complete throw of the switch.

The parts which have thus far been described constitute a complete gravity conveying apparatus and if the inclination of the way be not too great it is entirely practicable to use it with no other part than those which have been described. But when the conveyer is erected in a structure of ordinary proportions, it is impracticable to give to the track that gentle inclination which is necessary to prevent dangerously rapid movements of the trolleys as they descend from one part of the structure to a lower level. We have therefore combined with the gravity-conveying mechanism thus far described a retarding mechanism. Broadly stated, this consists of an endless chain or similar device, a guide therefor arranged parallel with and in close proximity with the track of the conveyer, means for regulating the speed at which the chain may travel, and means carried by the chain and extending into the path of the trolleys or loads carried on the track for arresting the free movements of such moving objects.

Referring to the drawings, 32 indicates an endless chain. It is preferably a sprocket chain and may be in many of its details of any usual or preferred construction. It passes around an upper or head sprocket wheel 33 and a lower or foot sprocket wheel 34. One run (the up run) of the chain preferably extends in a straight line between these sprocket wheels and is at the axis of the helix formed by the main track of the conveyer. The chain passes from the upper or head sprocket wheel 33 to a guide wheel 35 mounted upon an axis 36, and from this wheel to a stationary guide 37, that is arranged adjacent to and parallel with the way or track 2, the chain guide and conveyer track being preferably supported from the same beams or supports, although this is not a necessary arrangement. The chain guide 37 terminates at such point along the lower part of the conveyer track as to allow the loads to move off without risk of interference from the chain. At this point a guide wheel 38 is placed in such position relative to the guide 37 and track 2 that the chain will easily travel around the wheel and move away from the track 2, thereby relinquishing control of the load. From the wheel 38 the chain is then led to the sprocket wheel 34, placed in such position that the chain will engage it without binding, and from thence it travels vertically upward in the center of the shaft to the head sprocket wheel 33, which is preferably situated in the same vertical plane as in the sprocket 34 below.

The chain is formed of a series of articulated links certain of which are adapted to engage with the teeth of the sprocket wheels 33 and 34. The details of construction of this chain are illustrated in Figs. 3, 10, and 11, by reference to which it will be seen that the links 40 thereof are open for engagement with the sprocket teeth, while other links 41 are of peculiar construction, and are provided with laterally extending arms or projections 42 adapted to extend outward into the path of the trolleys or articles which may be passing along the track of the conveyer. The links 41, which are intermediate the links 40, and are connected thereto by the pins or pintles 43, are each formed of two parts 46, 47. The part 46 is pivotally connected with the links 40 in advance and is substantially U-shaped as indicated in Fig. 10, its two arms lying one above the other and having between them the arms or central portion of the part 47 of the link. These two parts, 46, 47, are pivotally united by a pin or pintle 45, the axis of which is at a right angle to the axes of the pintles 43, uniting the link 41 with the adjacent links 40. The laterally extending arm 42 is preferably carried by the part 47 of the link. 44 is an anti-friction roller mounted upon the pintle 45, preferably at the center thereof, and between the two arms of the part 47 of the link. This roller is arranged to run in engagement with the back wall of the stationary chain guides 37. It will be observed that the two parts of the links 41 are united to each other by a coupling the axis of which is at right angles to the axis of the couplings that unite such links with the other parts of the chain; thus forming a link that constitutes a sort of universal joint in the chain.

It will be seen by reference to Fig. 1 that the chain guide follows the course of the conveyer track. Where the latter is a helix the chain guide is a helix of the same pitch as, but of smaller radius than, the track. Thus, the chain in following the guide 37 and in passing over the guide and sprocket wheels must be flexed in various directions, and the link construction thereof which we have described and illustrated permits this without the binding of any of the joints or necessitating undue looseness of parts. The guide gives to the chain a rigid support, and at the same time effectively constrains and

directs its motions, so that it follows the conveyer track or is diverted therefrom as circumstances may require.

While we have described the chain as being a retarding device, it is evident that it could be used as a propelling means, or both as a propelling and retarding means, as would be the case should the track of the conveyer for a portion of its course lie in a horizontal plane or even be upwardly inclined. The chain, when used entirely as a retarding device, might be free to be moved by the loads passing along the conveyer track and the speed be controlled by suitable retarding or braking mechanism. We prefer, however, that the chain should be positively driven by some motor, such motor operating to regulating the speed of the chain and hence of the conveyer, and incidentally as a braking device to check the speed of the conveyer if it should become overloaded and tend to run too rapidly.

46 is a motor, an electric motor being represented, connected by a belt 47, a shaft 48 and a train of speed-reducing gearing 49, with the shaft 50 of the head sprocket wheel 33, the motor and gearing being mounted in a suitable framework 51.

The upper guide wheel 35 is preferably adjustably supported, being mounted in a bracket or arm 58, pivoted at 54, and has connected therewith a weight 52, the suspending cable of which passes over a guide wheel 56. This arrangement permits the wheel 35 to move toward and from the sprocket wheel 33, and the upper end of the chain guide 37, and constitutes a compensating means for taking care of the slack that may be in the chain, and to give to the latter a uniform tension.

As the inclination of the track changes,—as for instance, the inclination of the main portion 2 is greater than that of the branches 7 and 8,—we make provision for maintaining the hangers 4, from which the loads are suspended, in substantially vertical positions whatever the inclination of the track or way. This may be accomplished by interposing a ball and socket or other flexible connection 53 between the upper end of the hanger and the trolley which carries it.

We have described but one form or embodiment of the conveying devices proper, but many of the parts may be modified in construction and relation to other parts, and in our application hereinbefore referred to we have described several embodiments differing in details of construction from that which has been described above.

The operation of the apparatus may be easily understood from the foregoing description and an examination of the accompanying drawings. The trolleys or carriers 3 are loaded at one or another floor and are sent along the branches 7 to the main track, where they descend by gravity, the speed of their movement being regulated by the retarding mechanism described. The load or loads pass out at the lower end of the track where they are removed, but they must be caused to pass to any floor to which a branch 8 may lead, as may be desired, for it will be understood that a proper switch is interposed at the junction of each branch 8 with the main line. Thus, by means of the apparatus described it is impossible to load at any floor and to deliver at any floor, as may be desired.

What we claim is:

1. An overhead conveyer comprising a track along which the suspended articles are passed, a branch track arranged to connect with the main track, a switch at the junction of the main and branch tracks comprising a movable section of the main track having one end arranged to swing into alinement with either the main or branch track, and means controlled by a load passing along either the main or branch track for setting the switch, substantially as set forth.

2. An overhead conveyer comprising a main track along which the suspended articles travel, a branch track arranged to connect therewith, a switch at the junction of the main and branch tracks comprising a movable section of the main track having one end arranged to swing into alinement with either the main or the branch track, a lock for holding the switch in line with one or the other of the tracks, and means moved by the switch shifting means for releasing the lock before the switch is moved, substantially as set forth.

3. An overhead conveyer comprising a main track along which the suspended articles move, a branch track arranged to connect therewith, a switch at the junction of the main and branch tracks comprising a movable section of the main track having one end arranged to swing into alinement with either the main or the branch track, a lock for holding the switch in line with one or the other of the tracks, and means controlled by the passage of a load along one or the other of the said tracks for controlling the said lock and switch, substantially as set forth.

4. An overhead conveyer comprising the main track along which suspended articles move, a branch track connected therewith, a switch at the junction of the said tracks comprising a movable section of the main track having one end arranged to swing into alinement with either of said tracks, a lock for holding the said section in line with one or the other of the said tracks, means controlled by a load passing along one of the tracks for releasing the lock, and lost motion connections between the lock releasing means and the switch section whereby the lock is re-

leased in advance of the movement of the switch, substantially as set forth.

5. A gravity conveyer, comprising a main inclined track, branches leading thereto at various levels, switches at the points where the said main line and the branches join, and means controlled by a passing load for setting the switches, substantially as set forth.

6. A conveyer, comprising a main track along which the articles being moved pass, a branch connecting with the main track, a movable switch section at the junction of the main and branch tracks, switch-shifting devices, and a lever with which the switch-shifting devices are connected arranged between the branch and main tracks and provided with a pair of arms or projections, one of which is arranged to extend into the path of the articles passing along the main track when the switch and the connecting parts are set for the branch track and the other arm being arranged to extend across the path of an article passing along the branch when the switch and connected parts are set for the main track, the said lever being arranged to be operated by the passage of articles along the said tracks and in turn to operate the switch, substantially as set forth.

7. A conveyer comprising a main track, a branch connecting therewith, a movable track section at the junction of the main and branch tracks, a lock for engaging with the switch section to hold it in line with one or the other of the tracks, a shifting-plate 17 connected with the movable switch section by bolts passing through elongated apertures in the plate whereby there is a lost motion connection between the two, a lock releasing cam 18 carried by the shifting plate, and means for operating the shifting-plate to first release the switch section from the lock and then to move it, substantially as set forth.

8. A conveyer, comprising a main track along which the articles pass, a branch connecting therewith, a switch section at the junction of the said main and branch tracks, a lever 25 situated between the main and branch tracks at a distance from the switch and provided with arms 26 and 27 extending respectively toward the main and branch tracks and adapted to lie in the paths of the articles passing along said tracks, accordingly as the lever is moved into one position or another, and connecting means between the lever 25 and the movable switch section, whereby the movement of the former by an article passing along one of the tracks is communicated to the switch for setting the latter in position to allow such article to pass the switch, substantially as set forth.

9. An overhead conveyer comprising a main inclined track along which suspended articles travel, branches connecting with the main track at different levels, switches at the points where the main and branch tracks join, and means controlled by a passing load for setting the switches, substantially as set forth.

In testimony whereof we affix our signatures, in presence of two witnesses.

MAX SKLOVSKY.
GEORGE W. MIXTER.

Witnesses:
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EUGENE L. TAYLOR.