April 1, 1952 J. McKAY 2,590,994

BRAKING APPARATUS FOR ROLLER CONVEYERS

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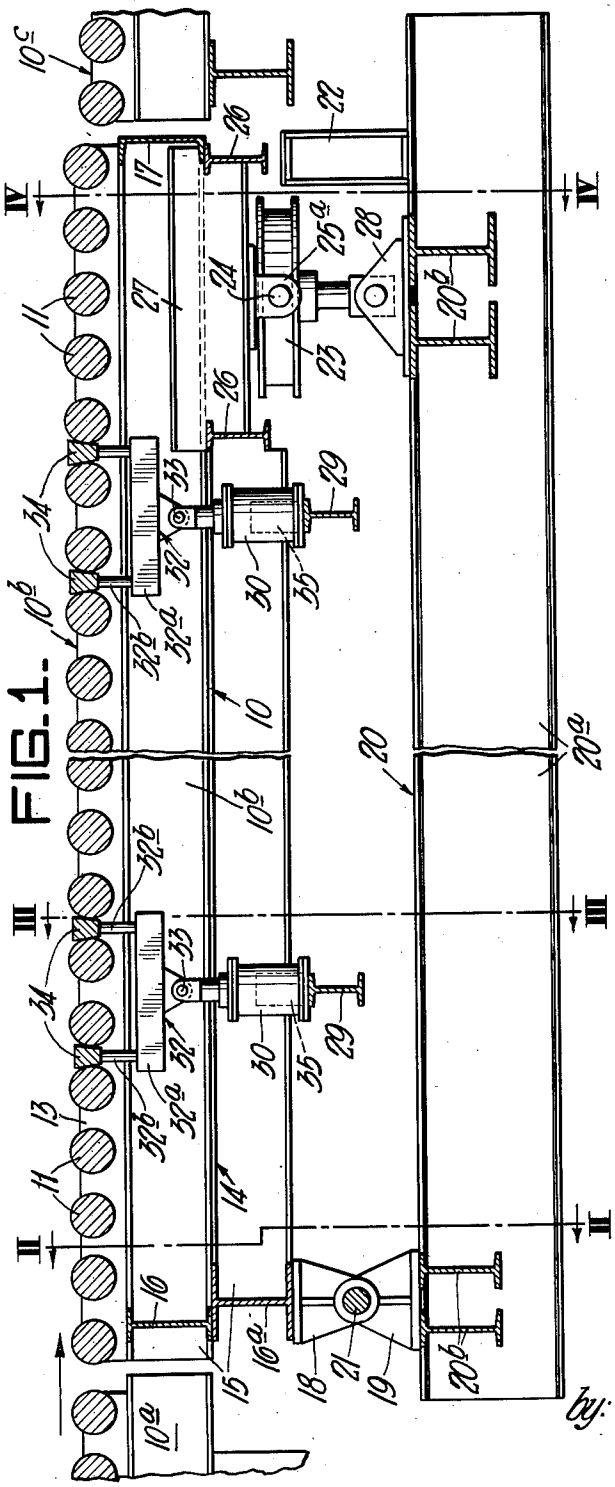


FIG. 1.

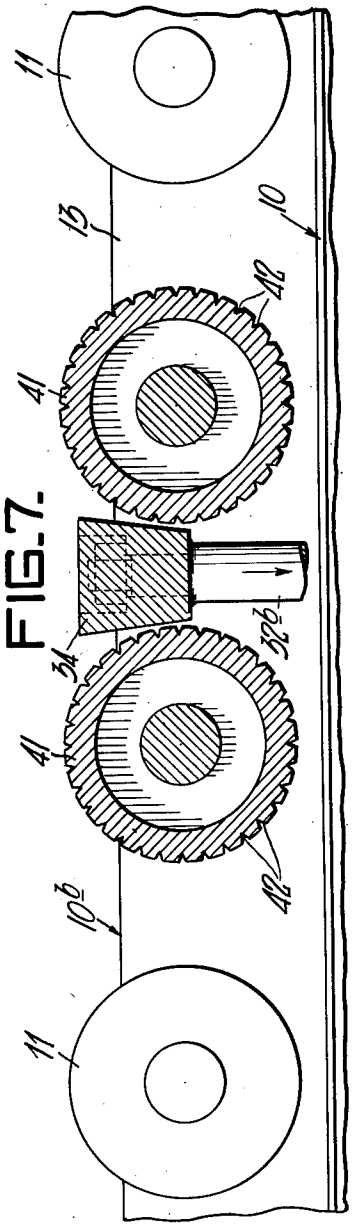


FIG. 7.

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BRAKING APPARATUS FOR ROLLER CONVEYERS.

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FIG. 2.

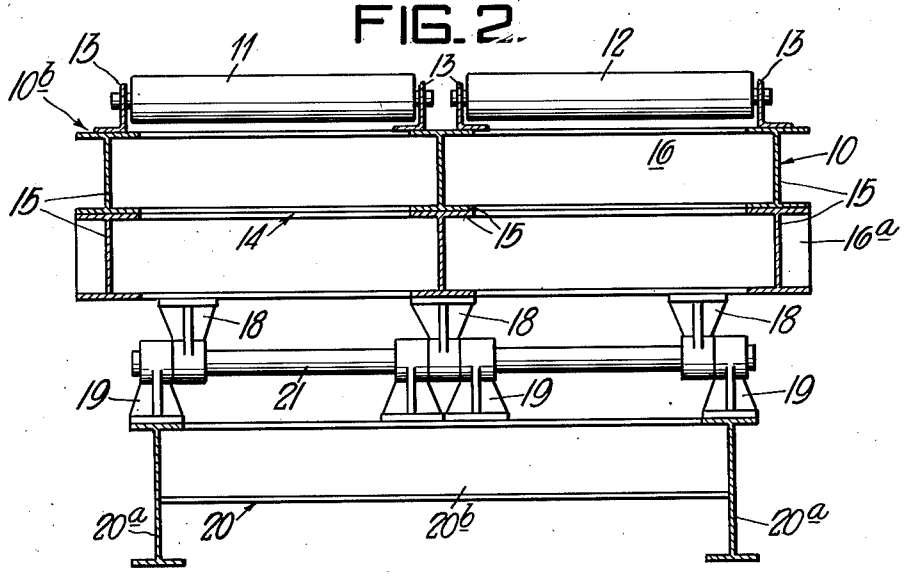
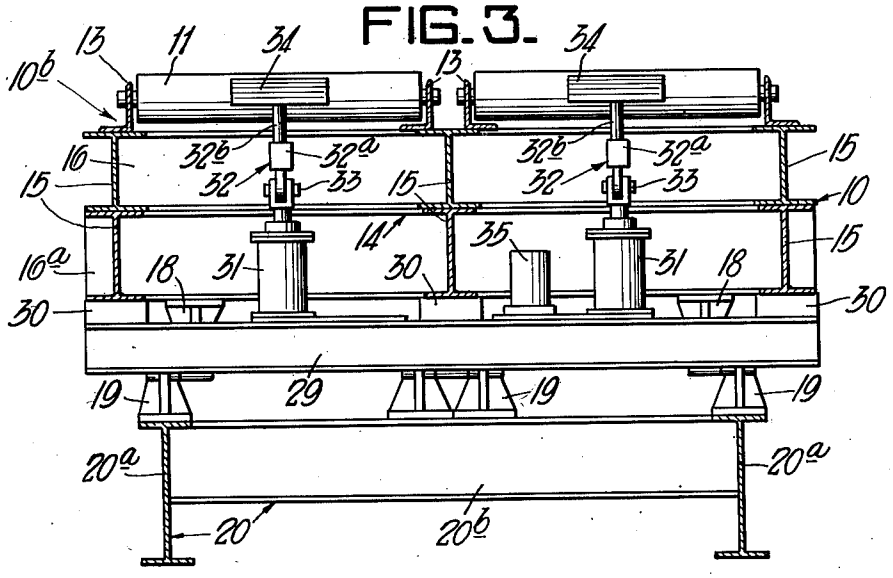


FIG. 3.



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BRAKING APPARATUS FOR ROLLER CONVEYERS

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FIG. 4.

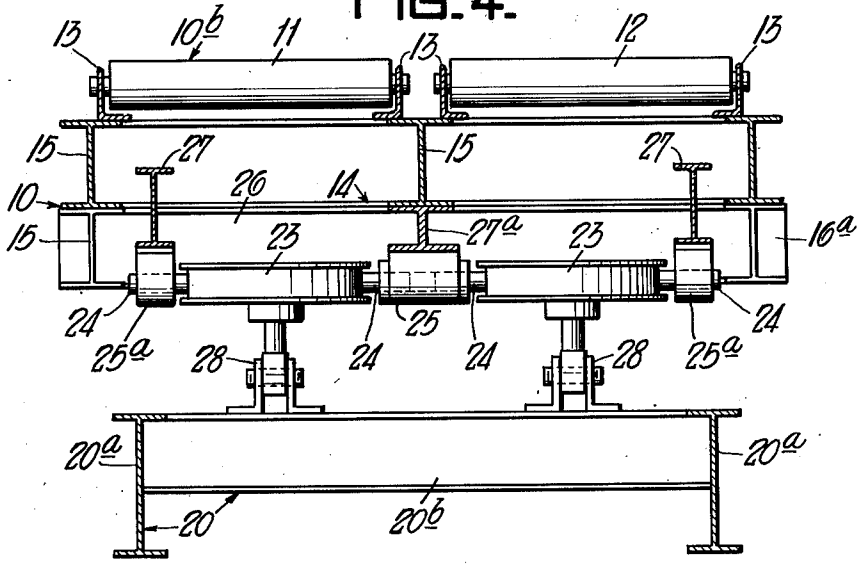
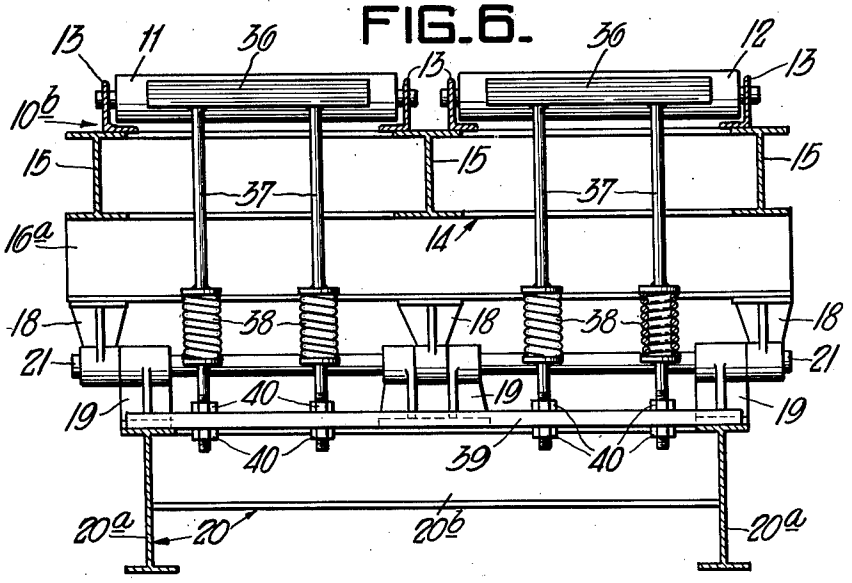


FIG. 6.



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BRAKING APPARATUS FOR ROLLER CONVEYERS

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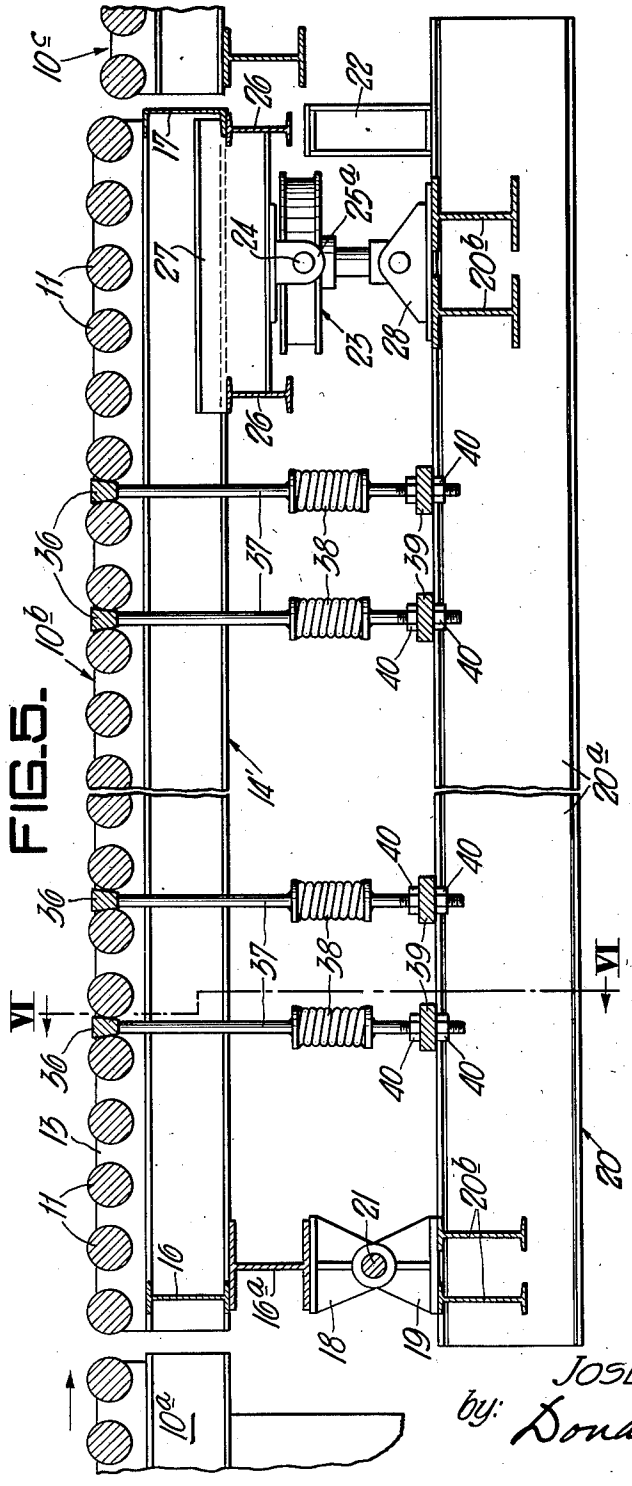


FIG. 5.

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BRAKING APPARATUS FOR ROLLER CONVEYERS

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Application August 26, 1949, Serial No. 112,540

4 Claims. (Cl. 193—35)

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This invention relates to conveyors and, in particular, to a brake mechanism for a gravity roller table including side rails and transverse rollers, the rails being notched or slotted downwardly from their upper edges for removably receiving the ends of the roller shafts.

In certain instances, it is desirable to restrain or arrest the rotation of some of the rollers of a gravity roller table in order to "spot" a load thereon at approximately a given location. One example is the section of conveyor mounted on a scale beam for the purpose of weighing loads moving along the conveyor in succession. The provision of brakes for the rollers presents a serious problem however, in cases where the rollers have their shaft ends seated in slots opening downwardly from the upper edges of the side rails in order to permit ready removal and replacement of rollers.

I have invented a novel brake mechanism particularly suited for the rollers of a table of the character described, although it may also be used with a conveyor the side rails of which have holes therein for accommodating the ends of the roller shafts. In a preferred embodiment, I provide one or more pairs of adjacent rollers with an elongated wedge block tapering downwardly, disposed longitudinally in the space between the pair of rollers and so related thereto that on relative vertical movement between the rollers and block, the peripheries of the former will be engaged frictionally by the latter, thereby exerting a braking action. The wedge block may be provided with actuating means or it may be mounted so as to become effective on upward movement of the table.

A complete understanding of the invention may be obtained from the following detailed description and explanation which refer to the accompanying drawings illustrating a present preferred embodiment and a modification. In the drawings,

Figure 1 is a central longitudinal section through a portion of a gravity roller table having the invention applied thereto;

Figures 2, 3 and 4, respectively, are transverse sections taken along the planes II—II, III—III and IV—IV of Figure 1;

Figure 5 is a view similar to Figure 1 showing a modification;

Figure 6 is a transverse section taken along the plane of line VI—VI of Figure 5; and

Figure 7 is a portion of Figure 5 shown to enlarged scale.

Referring now in detail to the drawings and,

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for the present to Figures 1 through 6, a roller conveyor table 10 includes aligned portions or sections 10^a, 10^b or 10^c forming a continuous downwardly sloping path for the transport of articles placed thereon, by gravity. The invention is illustrated as applied to the section 10^b, which is supported independently of the sections 10^a and 10^c in order to permit weighing of the articles passing along the conveyor when arrested or "spotted" by the aid of my invention, the entire section 10^b being carried on the beams of a weighing scale, not shown. It is to be understood, however, that the invention may be applied equally well to any permanently mounted portion of the conveyor on which it is desired to decelerate or arrest the articles traveling along the conveyor. Conveyor sections 10^a and 10^c are of conventional construction and the following description will therefore be confined to section 10^b.

Conveyor section 10^b proper comprises two sets of parallel rollers 11 and 12 journaled respectively in pairs of spaced angles 13. The table may, of course, be designed with a single set of angles and rollers. The use of two sets is desirable when articles of considerable width and weight are to be transported. The angles 13 are secured to a rectangular longitudinal frame 14 composed of pairs of superimposed longitudinal beams 15 and transverse beams 16, 16^a and 17. The frame 14 is mounted for limited tilting movement about one end. For this purpose, the frame is provided with hinge brackets 18. Cooperating hinge brackets 19 are mounted on a subframe 20 composed of longitudinal members 20^a and transverse members 20^b. A pivot shaft 21 extends through bearings forming part of each of the brackets 18 and 19. The subframe 20, incidentally, is supported by the scale beams as previously mentioned. Bearing blocks 22 located on subframe 20 at the end of conveyor section 10^b opposite the pivot shaft 21 normally support the frame 14 in the plane of the conveyor table which is generally horizontal but slopes downwardly toward the right so that articles placed on the rollers will travel along the conveyor by gravity.

In order to prevent an article which has been arrested on the section 10^b by my brake means to be described in detail shortly, from starting along the conveyor before completion of the weighing operation, I provide means for temporarily tilting the frame 14 counterclockwise about pivot shaft 21 through a small angle sufficient to bring the section 10^b to horizontal position, i. e., the position in which it is shown. This means com-

prises a pair of fluid-pressure cylinders and pistons 23. As shown in Figure 4, the cylinders are pivotally connected to the frame 14 by trunnions 24 extending laterally therefrom into bearings 25 and 25a mounted in the frame adjacent the right-hand end thereof. For mounting these bearings the frame is provided with additional cross beams 26 and short lengths of longitudinal beams 27 and 27a extending between them. The piston rods of the cylinders are pivoted to bearings 28 supported on the cross beams 20b of subframe 20.

The frame 14 includes intermediate cross beams 29 spaced below the longitudinal beams 15 by blocks 30 as shown in Figure 3. Fluid-pressure cylinders 31 are mounted vertically on each cross beam 29 with their piston rods extending upwardly. A yoke 32 is pivoted to each piston rod by a pin 33. Each yoke includes a horizontal beam 32a and a pair of posts 32b extending upwardly therefrom, one at each end. The upper ends of these posts are turned down and threaded as shown. An elongated wedge block 34 tapering downwardly is mounted on each post 32b and secured thereto by a nut threaded on the reduced upper end thereof. The posts 32b and the associated parts are so dimensioned that, when section 10b of the roller table is in horizontal position, the tops of the wedge blocks when in their uppermost position, will lie below the plane tangent to the rollers 11 and 12 at the tops thereof. The wedge blocks are disposed in the space between pairs of adjacent rollers and normally engage them with their tapering sides, under the weight of the blocks and associated parts but will not exert sufficient friction thereon to retard them materially.

The supply of operating fluid to the cylinders 31 is controlled by a solenoid valve 35 and it is in turn controlled by suitable push buttons and electric circuits (not shown) as well understood in the art. The control system is preferably so designed that the power fluid, e. g., compressed air, is admitted to the lower ends of the cylinders and exhausted from the upper ends when one push button ("release") is pressed, and vice versa when the other ("brake") button is pressed. That is to say, the several blocks are either supported in their uppermost position in which they have little or no contact with the rollers or are urged downwardly by the fluid pressure on the pistons of the cylinders to effect frictional engagement with rolls and exert braking action thereon, depending on which button is pressed. When neither push button is pressed, both ends of the cylinders are connected to exhaust and the wedge blocks ride lightly on the rollers suspending the weight of the yokes 32 but, as explained above, this does not cause any effective braking action on the rollers.

In order that the braking effect may be applied or released in either the "up" (horizontal) position of the section 10b or the "down" (inclined) position, the cylinders 31 should have a stroke exceeding that of cylinders 23. The number of the cylinders 31 and associated wedge blocks may be varied if necessary to secure the desired braking effect. While two pairs of cylinders are shown in the drawings, each operating two wedge blocks, three pairs of cylinders are provided for in a design developed for an actual installation.

In normal operation of the apparatus described above, the section 10b of the roller table is in its down or inclined position with the beam 26 at the right-hand end resting on the posts 22. On the approach of an article along conveyor section 10a, cylinder 23 is operated to raise the section 10b to horizontal position. The cylinders 31 at that time are connected to exhaust at both ends (unless the "release" push button is pressed) and the wedge blocks ride lightly on the rollers. When the article has almost reached the desired position on the section 10b, the "brake" button is pressed and cylinders 31 are operated to cause the wedge blocks to engage the rollers under considerable pressure, thereby applying a braking effect thereon and decelerating the article which eventually comes to rest. The weight of the article indicated on the scale is then noted, after which the "release" button is pressed momentarily, relieving fluid pressure from the upper ends of the cylinders 31 and applying it to their lower ends to lift the wedge blocks. The cylinders 23 are then operated to lower the table to inclined position whereupon the article on section 10b is started by the acceleration of gravity and continues to travel along the conveyor passing from section 10b to section 10c.

It will be appreciated from the foregoing that, in the preferred embodiment, illustrated in Figures 1 through 4, the wedge blocks may be rendered effective to exert braking action on the rollers engaged thereby, whether the table section 10b is in its inclined or horizontal position. A modified form of the invention shown in Figures 5 and 6 is of such character to apply the braking action automatically when the table section is raised to horizontal position and release it when the table is lowered to permit continued travel of the article.

Referring in detail to Figures 5 and 6, the roller table section there illustrated and the mounting thereof are generally similar to the structure already described except that the longitudinal members of the frame 14' are composed of only a single beam 15. Wedge blocks 36, similar to the blocks 34, are supported on vertical rods 37, each block having a rod adjacent each end thereof. The rods 37 include upper and lower portions connected by a helical tension spring 38 disposed coaxially thereof and secured thereto. The lower ends of the rods 37 are threaded and pass through holes in cross bars 39 extending between the longitudinal members of the subframe 20. The rods are adjustable vertically on the cross bar 39 by means of nuts 40.

The rods 37 are adjusted so that, when the table section 10b is raised to horizontal position (the position in which it is shown in Figure 5) by cylinders 23, the blocks 36 will engage the adjacent rollers and the springs 38 will be elongated slightly to exert a yielding downward force on the blocks. When the table section is lowered to inclined position, the springs 38 will be fully collapsed and support the blocks 36 out of contact with the adjacent rolls. The overall effect of this construction is that the brakes are applied when the table section is raised to horizontal position, thus arresting an article traveling therealong preparatory to weighing it. After the weighing operation, lowering of the table section to inclined position releases the braking effect automatically and permits the article to continue its travel.

Figure 7 illustrates a modification in the form of the rollers providing increased braking action. According to this modification, the plain or smooth rollers 11 and 12 are replaced by rollers 41 having longitudinal grooves 42 spaced around the periphery thereof in the portion of their length engaged by the wedge blocks 34 or 36.

These grooves increase the frictional resistance to turning of the rollers on engagement thereof by the wedge blocks. A still further increase of such resistance may be obtained by providing the sides of the wedge block with longitudinal ridges giving them a saw-tooth contour.

It will be apparent from the foregoing that the invention provides effective braking means for conveyor tables having rollers journaled in slots formed in spaced side rails for the sake of easy removal and replacement. The application of braking action is effected by a downward pull on the wedge blocks but all portions of the mechanism are always maintained below the level of the tops of the rollers avoiding interference with the travel of articles along the conveyor when the brakes are released. The braking action is under manual control independent of the position of the tilting table section in the case of the preferred embodiment and is applied automatically in the case of the modified construction. In both cases, the construction is relatively inexpensive and easy to maintain.

I claim:

1. Braking apparatus for a gravity roller conveyor made up of an elongated frame and a plurality of parallel rollers journaled transversely in said frame in spaced relation along the length thereof, said apparatus comprising an elongated block of wedge shape disposed with its narrower edge down and located between two adjacent rollers parallel thereto, the maximum width of the block being greater than the distance between said adjacent rollers at their nearest points, whereby the block is adapted frictionally to engage said adjacent rollers with its sides, the thickness of the block being such that the top thereof is below the plane tangent to the rollers at the top thereof when the sides of the block are out of engagement with said adjacent rollers and means mounting said frame and block for movement of one of them in a generally vertical direction relative to the other whereby to cause the sides of the block to engage said adjacent rollers.

2. The apparatus defined by claim 1 characterized by said means being a hinge on which the frame is tiltable, said hinge being offset along the frame from said block.

3. The apparatus defined by claim 2 characterized by a yielding support for said block extending upwardly from below said frame.

4. The apparatus defined by claim 1 characterized by said means being a support on which said block is carried, and power means for raising and lowering said support.

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