Jan. 6, 1942. W. R. BOYER 2,268,693

CONVEYING APPARATUS

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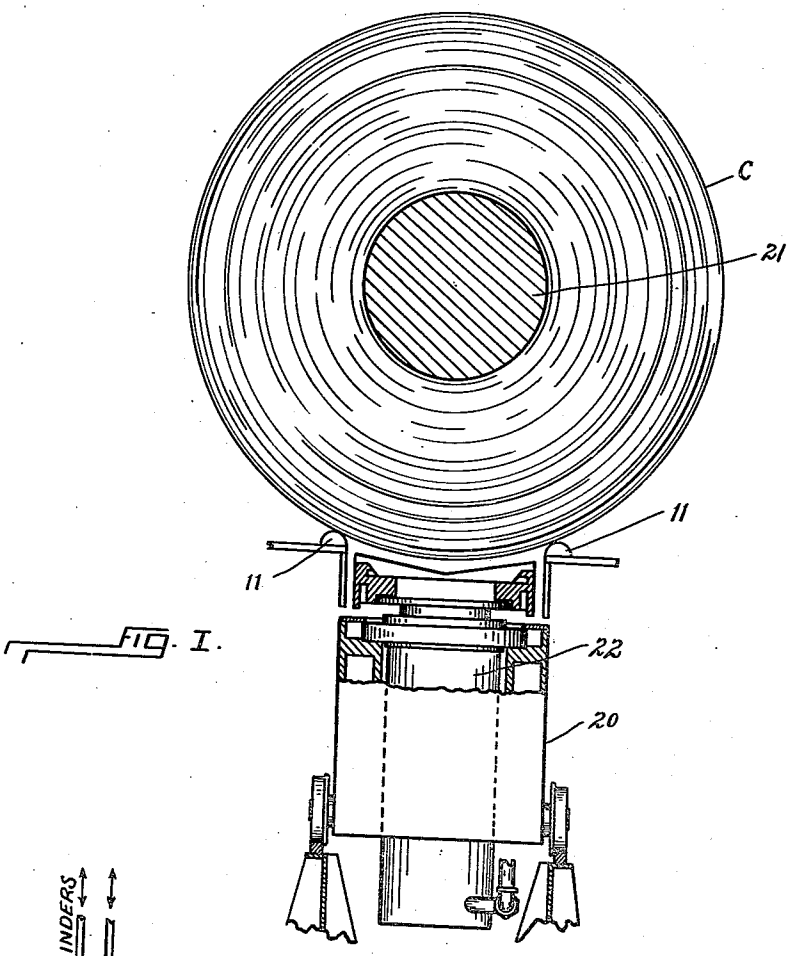


FIG. I.

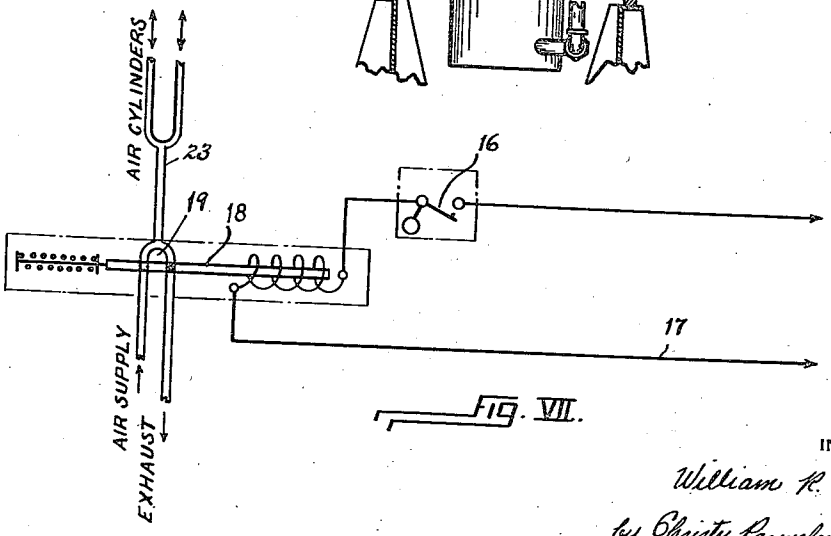


FIG. VII.

INVENTOR

William R. Boyer

by Christy, Parmelee & Strickland

his attorneys

Jan. 6. 1942.

W. R. BOYER

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CONVEYING APPARATUS

Filed Feb. 28, 1941

4 Sheets-Sheet 2

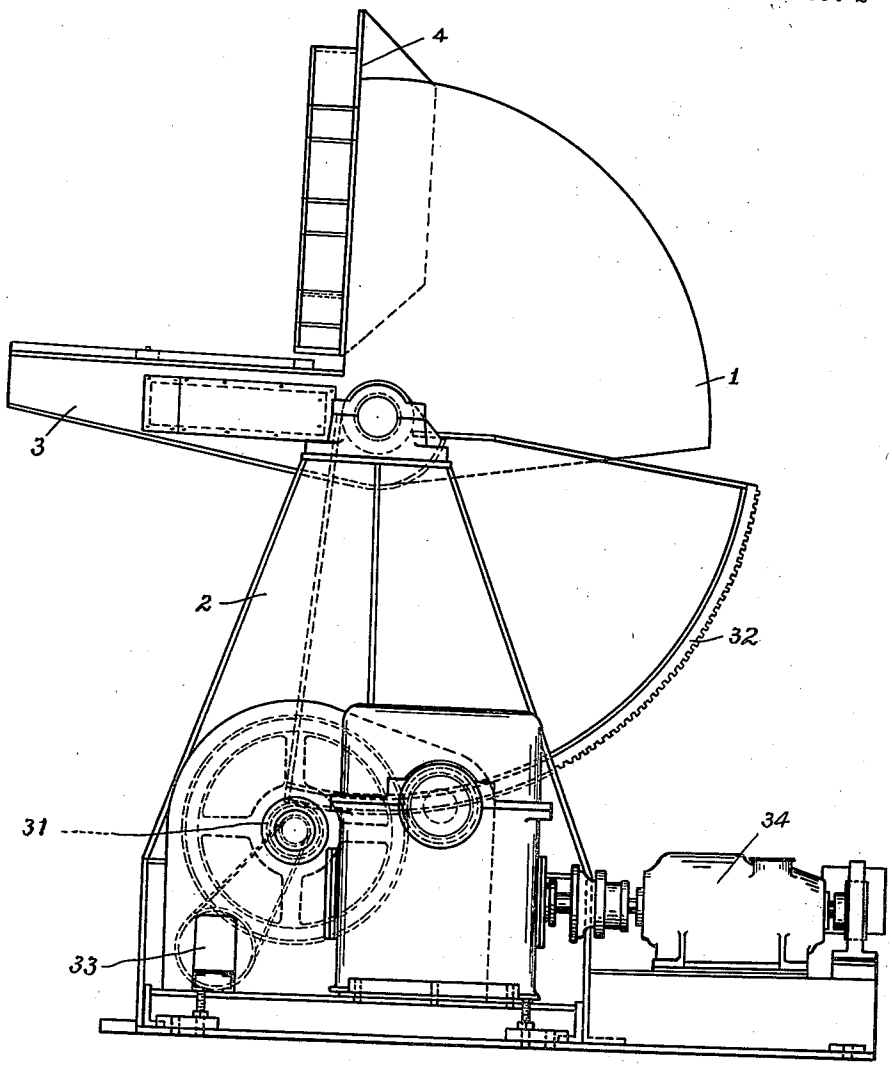


Fig. II.

INVENTOR

William R. Boyer

by Christy, Parmelee and Stricklens

his attorneys

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Filed Feb. 28, 1941 4 Sheets-Sheet 3

FIG. V.

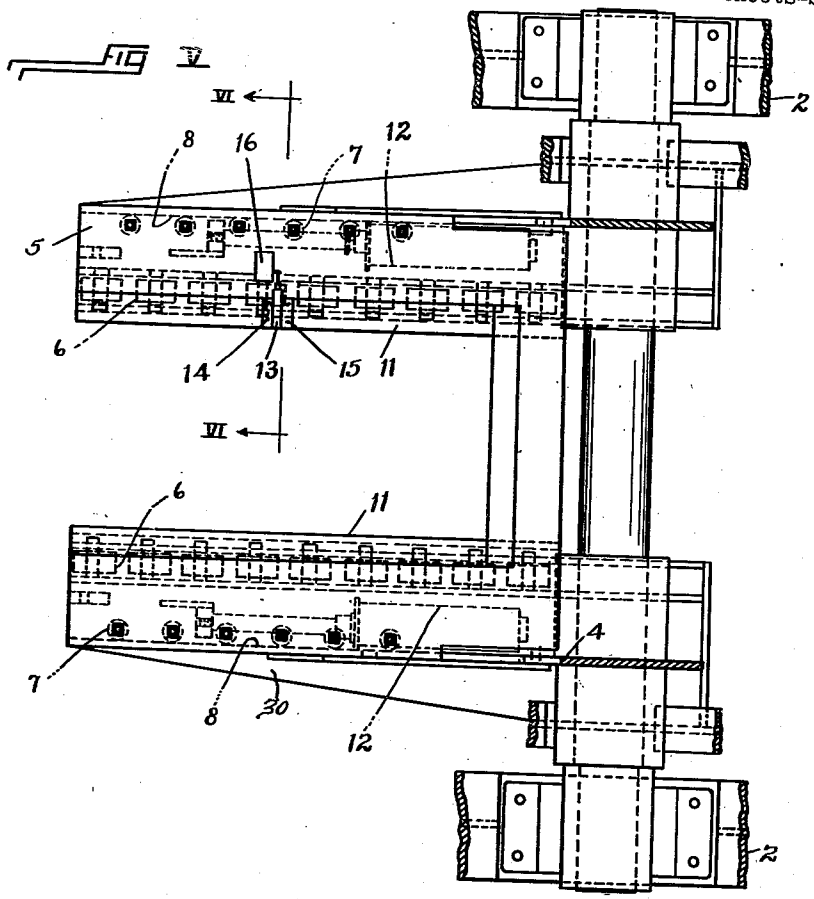
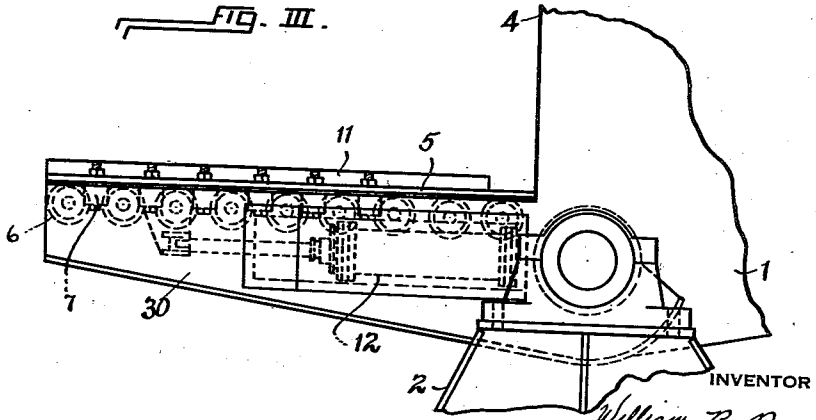


FIG. III.



INVENTOR

William R. Boyer

by Christy, Parmelee & Strickland

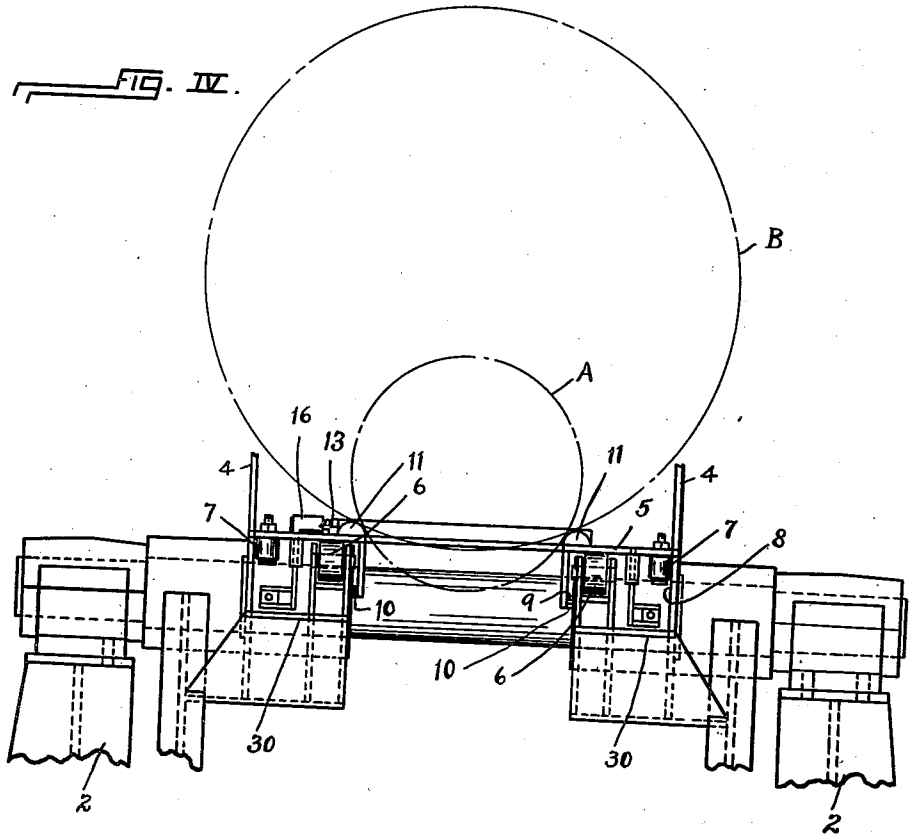
his attorneys

Jan. 6, 1942. W. R. BOYER 2,268,693

CONVEYING APPARATUS

Filed Feb. 28, 1941 4 Sheets-Sheet 4

FIG. IV.



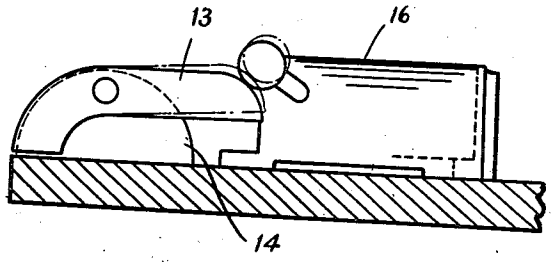


FIG. VI.

INVENTOR

William R. Boyer

by Christy, Parmelee & Strickland

his attorneys

Patented Jan. 6, 1942

2,268,693

UNITED STATES PATENT OFFICE

2,268,693

CONVEYING APPARATUS

William R. Boyer, Oakmont, Pa., assignor to Blaw-Knox Company, a corporation of New Jersey

Application February 28, 1941, Serial No. 381,073

5 Claims. (Cl. 214—130)

This invention relates to conveying apparatus, and particularly to a piece of equipment known in mill-parlance as an up-ender, used in strip mills in the conveyance of coils of strip metal. The objects in view are the correcting and overcoming of imperfections and inadequacies of up-enders heretofore used, and the handling of coils of such material under mill conditions with expedition and with avoidance of marring or disfiguring of the material handled.

In the accompanying drawings Fig. I is a view showing in elevation and section means for taking up the burden of a coil of strip, for removing it from the spindle of a coiler, and for bringing it to position in the up-ender. Fig. II is a view in side elevation of the up-ender of this invention. Figs. III, IV, and V are fragmentary views, showing the up-ender to larger scale; Fig. III is a view in side elevation, Fig. IV in end elevation, and Fig. V in plan. Fig. VI is a fragmentary view to still larger scale and in vertical section, on the plane indicated at VI—VI, Fig. V. Fig. VII is a wiring diagram.

The up-ender consists essentially of a coil-handling block 1 pivoted on a standard 2. The coil-handling block has two table-like supporting arms that extend in planes at right angles to one another. As seen in Figs. II and III, the upper face of arm 3 extends horizontally, while the opposed face of arm 4 rises vertically from the right-hand end of the horizontal face of arm 3. Means are provided for swinging the block 1 upon the standard through a range of 90° and in clockwise direction from the position shown in Fig. II. The means here shown consist in a motor 34 which, through suitable transmission drives a pinion 31. The pinion 31 meshes with a segmental rack 32 that forms an integral part of block 1. From the shaft that carries pinion 31 a limit switch 33 may be operated, to bring the block 1 precisely to the limit of its range of intended swing in either or in both directions.

In the course of operation a coil of strip of essentially cylindrical shape is brought to position, resting upon its side upon arm 3. The block 1 is then first turned slightly in clockwise direction, whereupon the heavy coil slides upon arm 3 until it comes to endwise abutment upon the face of arm 4. The turning of the block 1 is then continued until the face of arm 4 comes to horizontal position, and when this has been done the coil rests on its end and with its whole weight upon arm 4. The arm 4 is so particularly constructed as to allow the fingers of suitable lifting apparatus (not shown) to be intruded beneath the coil, and upon those fingers the coil is raised and borne away. Such are the general features and characteristics of up-enders heretofore in service.

This invention is found in refinements in detail of such a structure. It has been usual to equip the coil-receiving arm (the arm 3 of block 1) with a double line of rollers, to receive and sustain the coil and to facilitate the advance of the coil to abutment upon the face of the coil-delivering arm 4; the rollers must be such in contour of surface as to receive coils of widely varying diameters; and, with rollers shaped to the requirements indicated, there has been unavoidable marring of heavy coils by the indentation of these rollers.

This invention involves the provision of a carriage mounted to move in right-line course upon the coil-receiving arm of the up-ender in direction of advance toward and recession from the coil-delivery arm and adapted immediately to receive the coil and to sustain the coil without movement of the coil upon it, while movement of the carriage itself brings the coil to end abutment upon the face of the coil-delivering arm of the up-ender. The carriage is provided with a seat upon which coils of widely varying sizes and weights may be rested, and the up-ender will handle the coils without any marring.

The arm 3 conveniently takes the double form best seen in Figs. IV and V and consists of two spaced-apart symmetrical portions 30, 30. The carriage 5 is formed of the square-cornered U shape best seen in Fig. V, with the opening of the U to the left. The spacing of the opposite branches of the U corresponds to that of the portions 30 of the arm. The carriage is sustained by the resting of the plates that form its opposite parallel branches upon rollers 6 idly journaled in the portions 30 of the arm itself. The carriage is further provided with rows of rollers 7 that turn idly upon vertical axes, and that engage properly disposed vertical surfaces 8 upon the arm, to take care of lateral thrust and to hold the moving car to aligned position. Overlapping ledges 9, 10 duplicated upon the two sides of the double structure, secure the carriage against accidental overturning.

Along the inner edges of the branches of the U-shaped carriage extend rails 11. Upon these rails in the operation of the up-ender the coil is brought immediately to rest. The rails are of upwardly rounded contour. Fig. IV indicates in broken lines the positions A and B of two coils, one of small diameter and weight and the other

of large, at rest upon rails 11. It may be understood that the smaller diameter thus indicated is twenty-six inches and the larger sixty. It will be seen that in both cases (and, of course, in the case of any intermediate size) the cylindrical coil rests tangentially upon the rounded contours of the rails; and it will be understood that the weight of the load is distributed on lines of contact throughout the width of the coil of strip. The weight being so distributed, there is no indentation.

Fluid-pressure cylinders 12 (conveniently pneumatic), duplicated upon the two sides, are provided to return the carriage from coil-delivering to coil-receiving position upon the arm portions 30, 30. These cylinders are mounted upon the double arm, and the stems of their pistons are secured to the two branches of the U-shaped carriage. They are single-acting cylinders, ported to the air at the piston-rod end. The compressed-air feed to the driving end of the cylinder (the right-hand end, Figs. III, V) is through flexible connections 23 (Fig. VII), to permit the free swing of the up-ender.

When a coil has been brought to rest upon rails 11, and (after a slight turning of the block 1) the carriage is to roll under gravity from left to right (Fig. III) and bring the coil to end abutment upon the face of arm 4, the cylinder must be ported at the driving end as well, in order that gravity may be thus effective. The apparatus of the invention includes means for automatically establishing that condition.

The continuity of one of the rails 11 is broken, and in the gap is set a lever 13, pivoted between blocks 14 and 15. The contour of the blocks and of the exposed end of the lever corresponds to that of the rails, but the lever is normally held under spring tension in the slightly protruding position indicated in Fig. VI by full lines. The point in the extent of the rail where the lever 13 is stationed is substantially that to which the centre of a coil, whether wide or narrow, is brought in the operation of the apparatus. When a coil is applied, its weight brought to bear upon lever 13 swings the lever against spring tension to the dotted-line position, Fig. VI, and in so doing closes a switch 16 in an electric circuit 17 (cf. Fig. VII). The energizing of circuit 17 effects the traverse of an armature 18 of an electro-magnet and the shifting of a three-way valve 19, with the consequence and effect that the line of pneumatic pressure from a source (not shown) to the cylinders 12 is cut, and the cylinders are vented to the air. It will be understood that this valve control, diagrammatically illustrated in Fig. VII, is effective upon both of the two cylinders 12. When the restraining presence of a coil in place upon the rails 11 is removed, the lever 13 swings back under spring tension to normal position and in so doing opens switch 16. Thereupon valve 19 resumes its normal position and pneumatic pressure is restored to cylinders 12. The right-to-left traverse of the pistons (Fig. III) is precisely limited; the carriage 5 has a range of traverse that may, for example, be fifteen inches.

In operation a buggy 20, Fig. I, is run to position beneath a coil C of strip upon a spindle 21 upon which it has been coiled, and a lift 22 mounted on the buggy is operated to take the weight of the coil. The buggy is then run along its tracks, removing the coil from the spindle and bringing it to position above the rails 11 of the up-ender. The lift then is lowered, the coil is deposited on the rails, and the buggy is run away. The lowering of the coil to position on the rails effects the closing of switch 16, and the venting to the air of the cylinders 12 that had brought the carriage to coil-receiving position follows. The block 1 is then turned clockwise (Fig. II) through a slight angle, and thereupon carriage 5 rolls down the slight declivity until the coil abuts upon the face of arm 4. Continued turning of the block 1 through a range of ninety degrees brings the coil to position, resting on end and with its whole weight upon arm 4. Removal of the coil from 4 follows, in conventional manner. Immediately upon release from the confining engagement of the coil, the lever 13 swings under spring tension to its normal position. In so doing it effects the opening of switch 16. Thereupon valves 19 return to normal position, pneumatic pressure is restored within cylinders 12 and the carriage returns to coil-receiving position and is held there. It remains only to swing the up-ender in retrograde turning to its initial position.

Manifestly the pneumatic cylinders might be made double acting, to shift the carriage toward the arm 4, but it has been found adequate to effect that shift by gravity, as is usual in up-enders.

I claim as my invention:

1. In an up-ender for a cylindrical burden consisting of a pivotally mounted block with two angularly extending arms, the invention herein described which consists of a carriage mounted upon one arm and having a seat for a burden formed of two parallel rails that extend in direction perpendicular to the face of the other arm, the carriage being movable in its mounting in right-line course and in the direction in which the rails extend, whereby the carriage is adapted to receive a coil resting by its cylindrical side upon the rails and to carry the so resting coil to end abutment upon such other arm.

2. In an up-ender for a cylindrical burden consisting of a pivotally mounted block with two angularly extending arms, the invention herein described, of a carriage adapted to receive the burden, mounted upon one of the arms and movable in its mounting in right-line course toward and away from the other arm, and means rendered temporarily ineffective by the weight of the burden when in place on the carriage for moving the carriage away from such other arm.

3. In an up-ender for a cylindrical burden that consists of a pivotally mounted block with two angularly extending arms, the invention herein described of a burden-receiving carriage mounted upon one of said arms and movable in its mounting toward and away from the other arm, a fluid-pressure cylinder mounted upon said block and having a piston with which the said carriage is operatively connected, a fluid-pressure conduit leading to said cylinder, and means operated by the weight of the burden when received by the carriage for interrupting communication through said conduit and venting said cylinder to the air.

4. In an up-ender for a cylindrical burden that consists of a pivotally mounted block with two angularly extending arms, the invention herein described of a burden-receiving carriage mounted upon one of said arms and movable in its mounting toward and away from the other arm, a fluid-pressure cylinder mounted upon said block and having a piston with which the said carriage is operatively connected, a fluid-pres-

sure conduit leading to said cylinder, a valve arranged in said conduit and adapted in its alternate positions to establish communication through said conduit to said cylinder and from said cylinder to the open air, and means operated by the weight of the burden when received by the carriage for shifting said valve.

5. In an up-ender for a cylindrical burden consisting of a pivotally mounted block with two angularly extending arms, the invention herein described which consists of a carriage mounted upon one arm and having a seat for a burden formed of two parallel rails that extend in direction perpendicular to the face of the other arm, the carriage being movable in its mounting in the direction in which the rails extend, a fluid-pressure cylinder borne by said block and adapted to shift said carriage away from such other arm, a spring-backed lever adapted to be swung against spring tension by a burden when brought to position on said rails, and means responsive to the swinging of said lever for rendering said fluid-pressure cylinder ineffective.

WILLIAM R. BOYER.

DISCLAIMER

2,268,693.—*William R. Boyer*, Oakmont, Pa. CONVEYING APPARATUS. Patent dated January 6, 1941. Disclaimer filed June 17, 1943, by the assignee, *Blaw-Knox Company*.

Hereby enters disclaimer to claim 1 of said patent.

[*Official Gazette July 13, 1943.*]