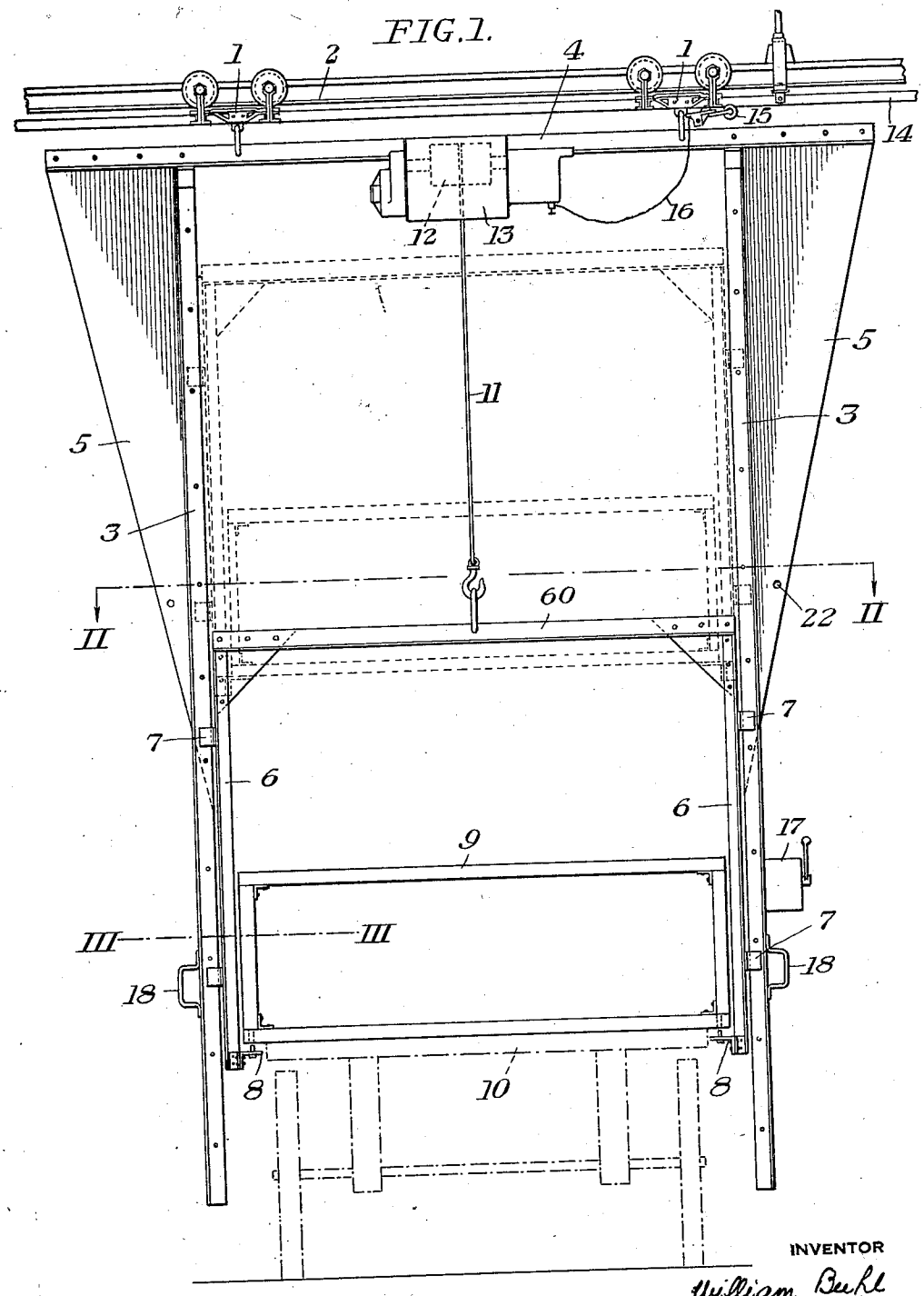
May 28, 1929. W. BUHL 1,714,945

CONVEYING APPARATUS

Filed Aug. 23, 1927 3 Sheets-Sheet 1

FIG. 1.



INVENTOR

William Buhl

by Christy and Christy

his attorneys

May 28, 1929. W. BUHL 1,714,945

CONVEYING APPARATUS

Filed Aug. 23, 1927 3 Sheets-Sheet 2

FIG. 2.

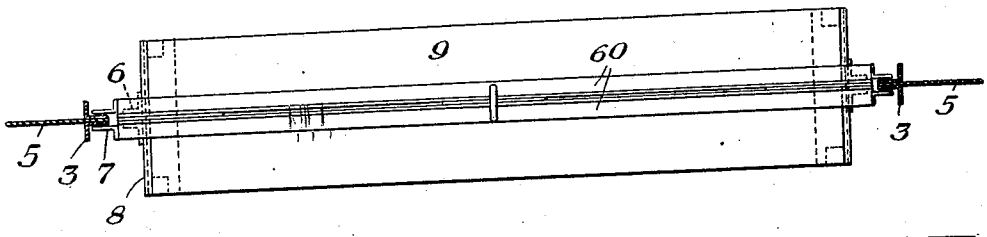


FIG. 3.

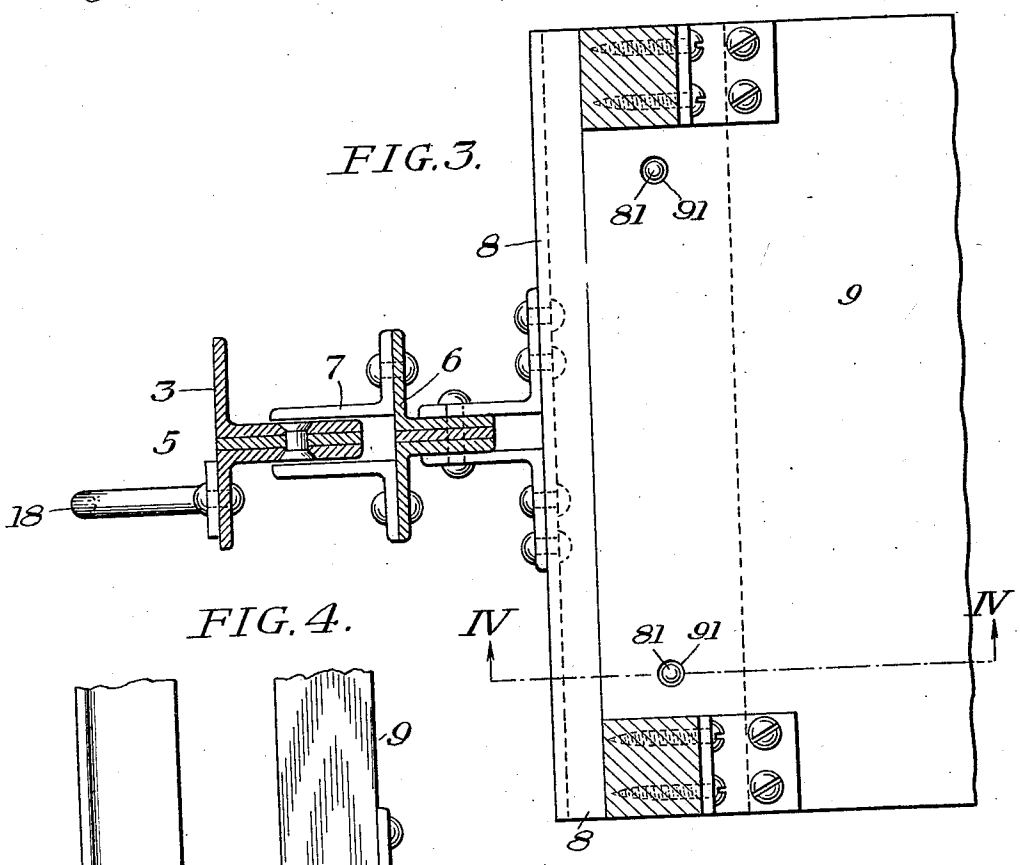
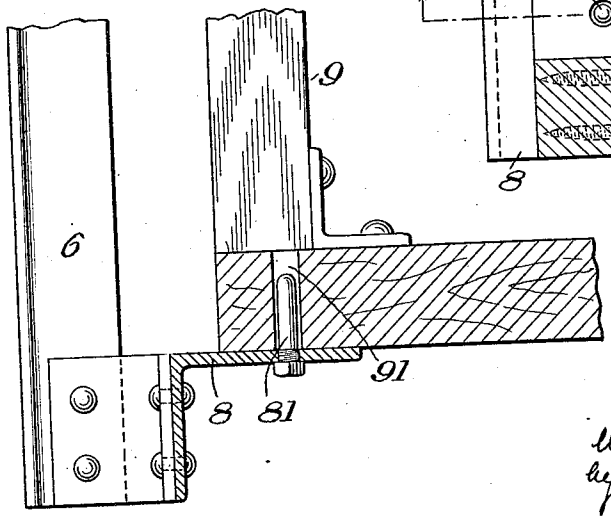


FIG. 4.



INVENTOR

William Buhl

by Christy and Christy

his attorneys

May 28, 1929. W. BUHL 1,714,945

CONVEYING APPARATUS

Filed Aug. 23, 1927 3 Sheets-Sheet 3

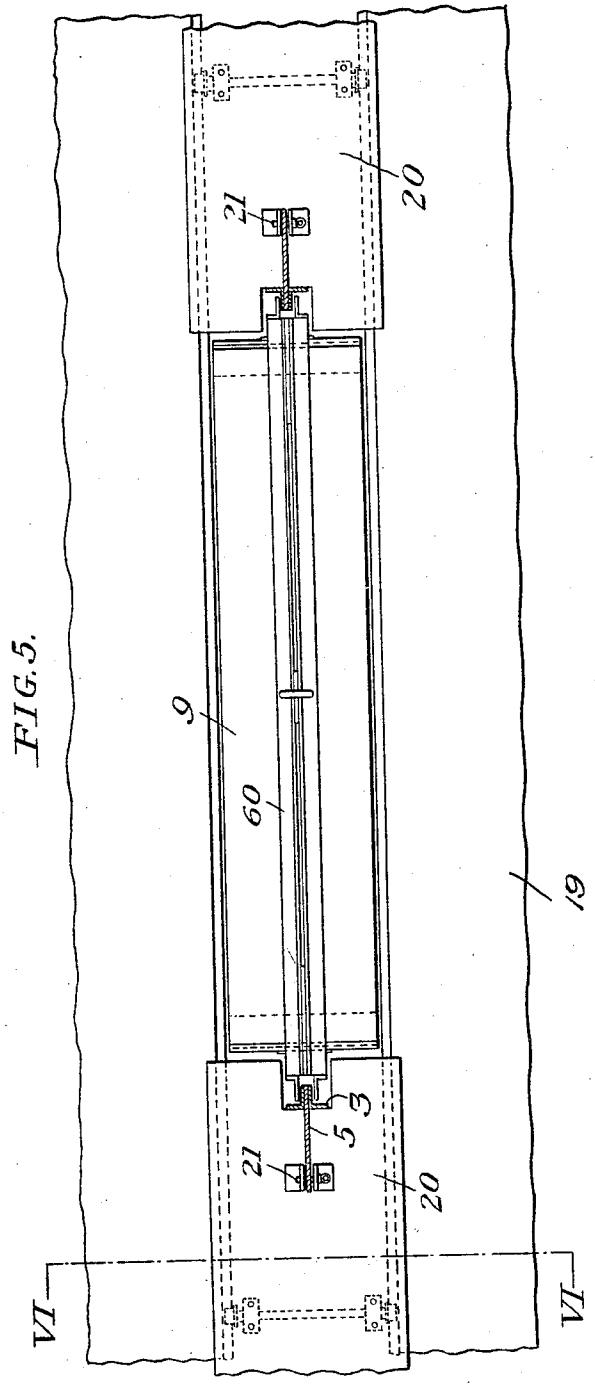


FIG. 5.

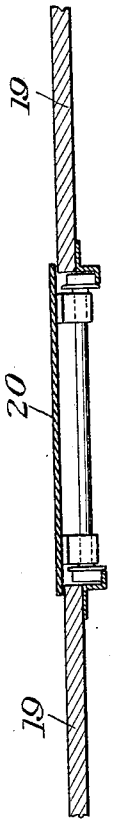


FIG. 6.

INVENTOR

William Buhl

by Christy and Christy

his attorneys

Patented May 28, 1929. 1,714,945

UNITED STATES PATENT OFFICE.

WILLIAM BUHL, OF PITTSBURGH, PENNSYLVANIA, ASSIGNOR TO DRAVO-DOYLE COMPANY, OF PITTSBURGH, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

CONVEYING APPARATUS.

Application filed August 23, 1927. Serial No. 214,892.

My invention relates to improvements in conveying apparatus and, more specifically, conveying apparatus which includes both an elevating and a transversely moving element. It finds practical application in apparatus to be used in manufacturing plants, for carrying material from place to place.

In such application the invention is illustrated in the accompanying drawings. Fig. 1 is a view in side elevation of conveying apparatus in which my invention is embodied. Fig. 2 is a view in horizontal section, on the plane indicated by the broken line II—II, Fig. 1. In Fig. 2 the elevator ways or guides are shown in section, but the elevator cage is shown in plan. Fig. 3 is a view to larger scale, showing in horizontal section both the elevator ways or guides, and the cage. Fig. 4 is a vertical section, on the plane indicated at IV—IV, Fig. 3, and Figs. 3 and 4 together show the feature of a removable container borne by the cage. Fig. 5 is a view corresponding to Fig. 2 and showing the apparatus elaborated with associated structural parts. Fig. 6 is a view in vertical section, transverse with respect to Fig. 5, and on the plane indicated at VI—VI, Fig. 5.

The conveying apparatus includes a transversely movable element, movable in an elevated plane. This element, in the particular embodiment of the invention which the drawings show, consists of trucks 1, running on a rail 2. It is a mono-rail structure, and two trucks are shown, mounted on a single rail.

The transversely movable element carries, depending from it, the ways or guides of an elevator element. In this instance the two ways 3, connected above and spaced apart by the beam 4, are hung from the trucks 1, and the two trucks engage the beam 4 by being linked to it at symmetrical points, adjacent to the vertical lines in which the ways extend. The attachment of the ways 3 at their upper ends to the beam 4 may be made rigid by gusset plates 5, which it will be observed, while extending in common plane with the vertical and parallel ways 3, are external to the space defined by and between the ways. The ways 3, as best seen in Fig. 3, may conveniently be formed of two angle bars set back to back with a filler strip between and riveted together. Thus a T-shaped structure is formed, whose cross-arm gives strength against transverse bending and whose stem affords a guide rail, to be engaged by the cage.

The cage conveniently comprises vertical side members 6 connected above by a transverse beam 60 and spaced apart at their lower ends. The side members, as best seen in Fig. 3, may be formed like the ways 3 of two angle bars riveted back to back with a filler strip between, and so strong to resist strain. To the outer face of each side member 6, and against the cross-bar of the T are riveted at properly spaced intervals lengths 7 of angle bar, and these cooperate to form guide-rail engaging shoes. They hold the cage to alignment between the ways and allow free rise and descent of the cage.

The side members 6 at their lower ends are equipped with opposite brackets 8, spaced apart, on which rests the load to be conveyed. In this instance a container 9 for the load, of rectangular form, rests over extended areas of contact upon the horizontal surfaces of brackets 8. Accurate alignment of parts and security against accidental displacement are afforded by the pins 81 which stand upon brackets 8 and enter recesses 91 formed to receive them in the body of container 9. The parts are so proportioned that as the cage rises and descends between ways 3, container 9 may be raised from or deposited upon a suitable support, such for instance as the car 10 shown in Fig. 1 in dotted lines. This car it will be understood is adapted to travel at ground or floor level.

In particular installations the apparatus of my invention may require extended openings in floors of factories, and in Figs. 5 and 6 I show fragmentarily a portion of such a floor 19. The opening here shown in the floor is elongate in the direction of extent of rail 2, in order to permit the advance of the conveying apparatus along the rail 2. The opening is provided with sliding closures 20, and these are attached to the ways 3 of the conveying apparatus, as by pins 21. In Fig. 1 I have indicated pin holes 22, by which such union may be effected. As trucks 1 run along rail 2 and carry the elevator structure transversely, the closures 20 will be shifted to cover the opening in floor 19, except for the space requisite for the operation of the elevator.

Any suitable means may be provided for moving the cage vertically between the ways, and for moving the trucks transversely upon the rail. I have in Fig. 1 of the drawings in-

dicated that the cage is hung from rail 4 by a cable 11. I have indicated a drum 12 on which the cable may be wound, and an electric motor 13 for powerfully driving the drum. I have indicated an electrical conductor 14 extending adjacent the burden carrying rail 2, and a contactor, in this instance a roller 15, borne by one of the trucks 1, and electric connection 16, by which means it will be understood circuit may be completed through the motor, to energize it. A control switch is indicated at 17, and the engineer will understand that it is a matter of wiring thus to energize the motor and to shift the cage up and down between the ways. Handles 18 are shown attached to the ways 3, by which the trucks 1 may be shifted along rail 2, to bring the cage accurately to the desired position of vertical alignment.

It will be understood that the several shifting means are shown by way of example merely. It is a matter of familiar engineering to organize a movable part for driving manually or by motor, and conveniently by electric motor, as conditions of service dictate.

In operation the cage 6 is movable vertically between the ways 3 to engage, to elevate, to lower, and to release the load, and the elevator structure as a whole is movable transversely along rail 2 to bring it to any desired position for loading, unloading, raising, or lowering.

The transversely extending rails 2 and the trucks 1 are overhead and out of the way, leaving floor spaces unencumbered. The hanging of the elevator structure from the trucks insures an arrangement in which the bars which constitute the ways 3 will when carrying a load, be under tension. In consequence the load is carried and shifted with greatest accuracy of position and with minimum expenditure of power.

I claim as my invention:

Conveying apparatus including an elevated and horizontally extending support, a truck movable upon said support and equipped with a pair of guide rails hung vertically downward, a cage movable vertically between said rails, said cage comprising vertical side members connected above and spaced apart at their lower ends and at their lower ends equipped with opposite horizontally extending brackets spaced apart, a container adapted to rest upon the opposite brackets, and vertically arranged pin and recess engagement between cage and container.

In testimony whereof I have hereunto set my hand.

WILLIAM BUHL.