

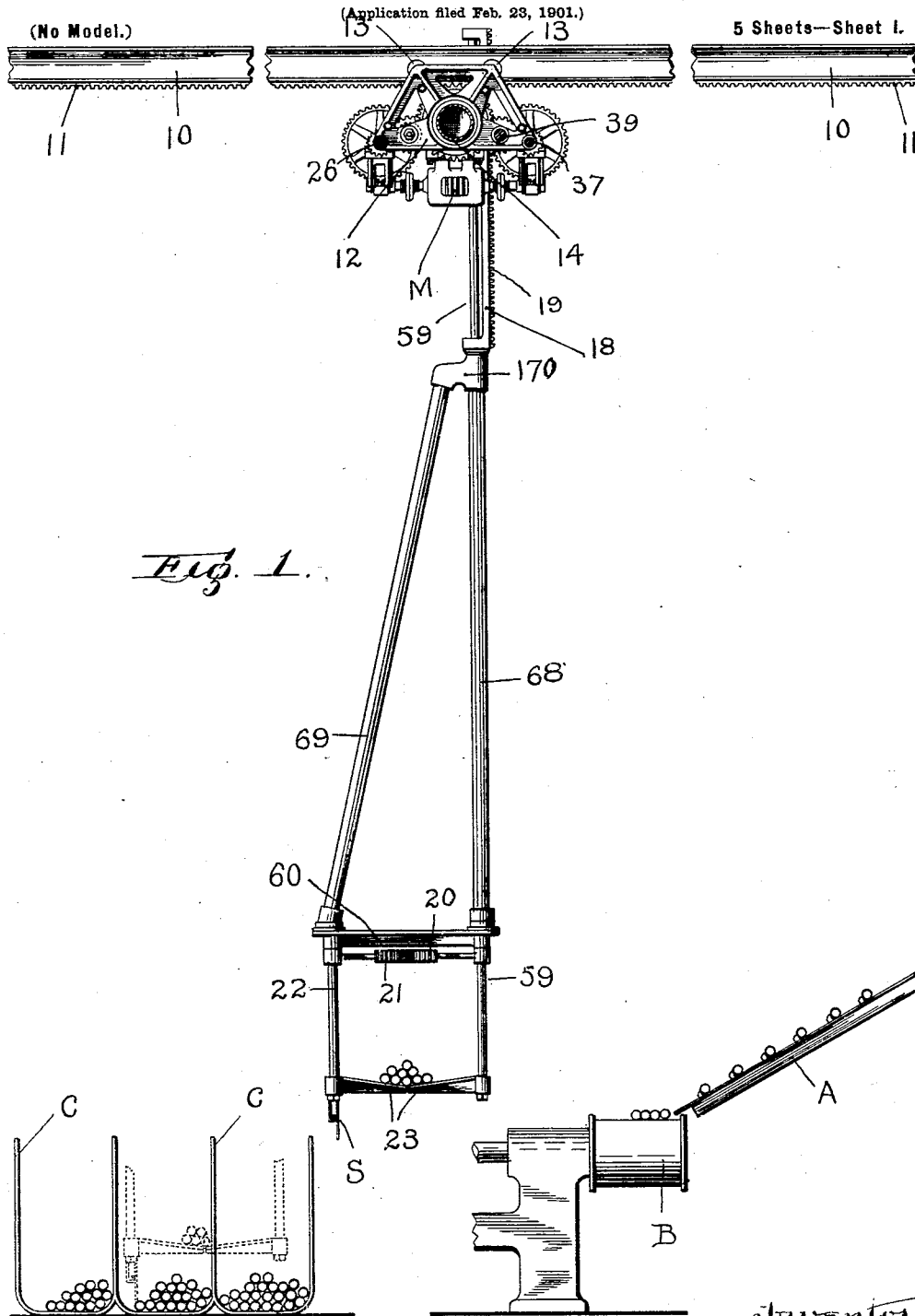
No. 710,920.

Patented Oct. 7, 1902.

C. H. MORGAN.

HOISTING AND CONVEYING APPARATUS FOR LONG METAL BARS OR FOR
SIMILAR PURPOSES.

(Application filed Feb. 23, 1901.)



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5 Sheets—Sheet 2.

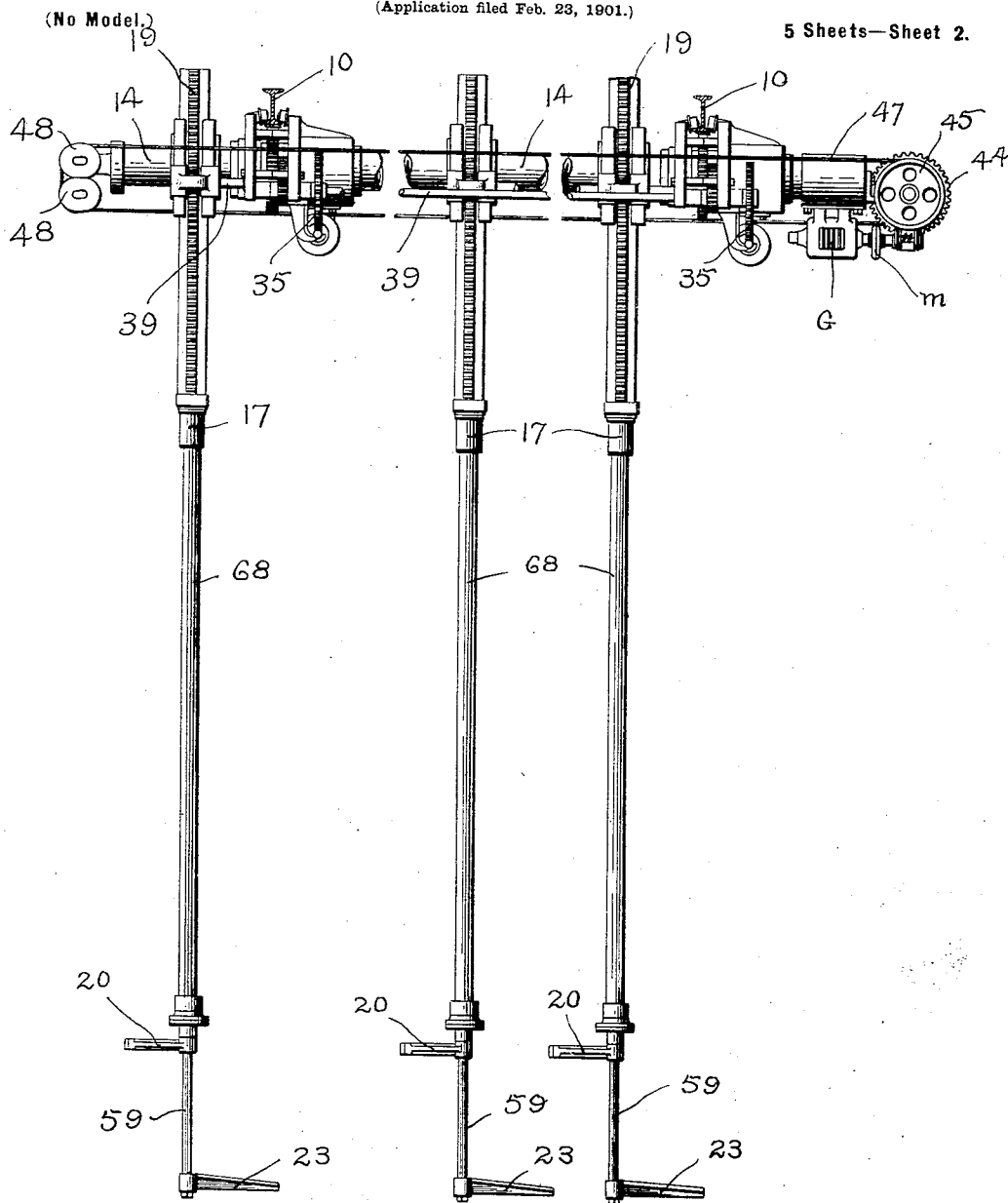


Fig. 2.

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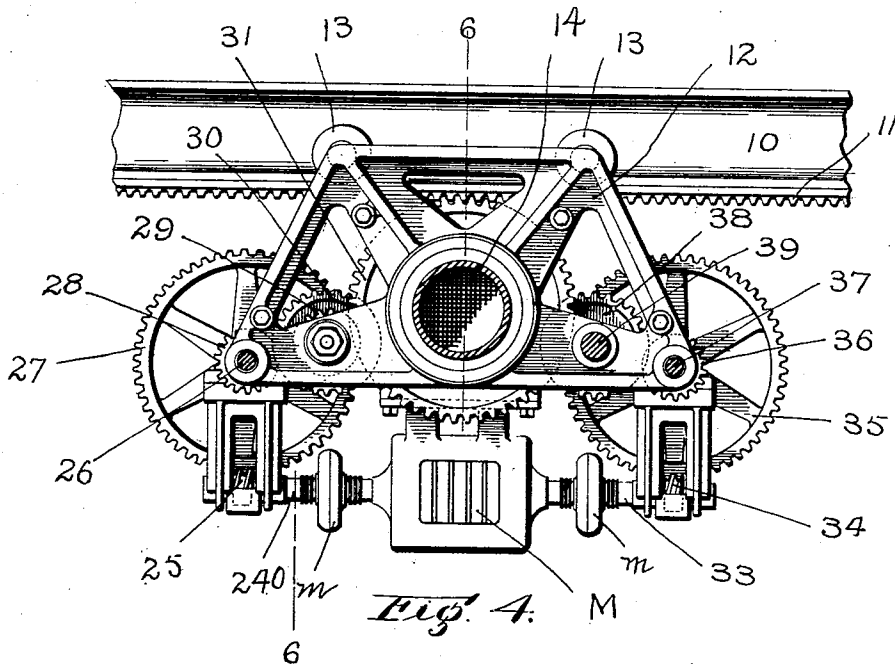
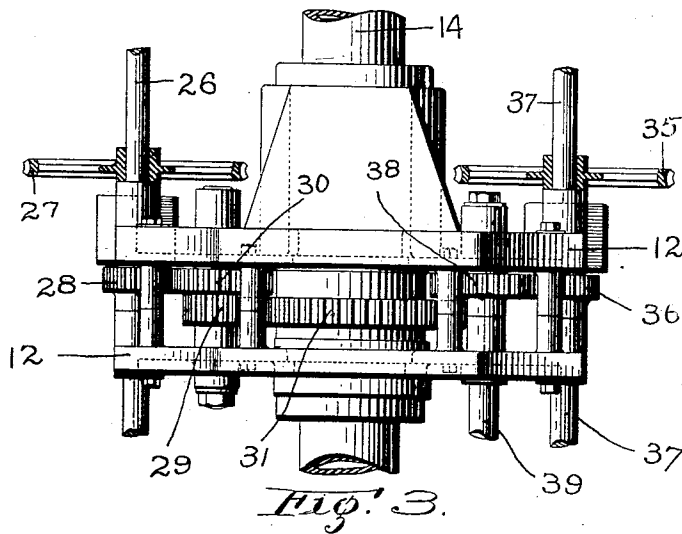
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5 Sheets—Sheet 3.



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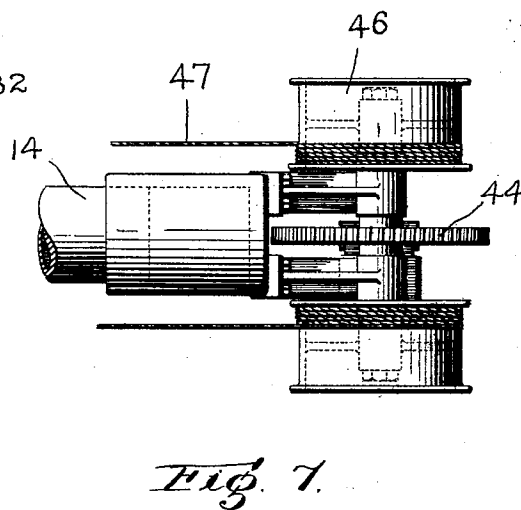
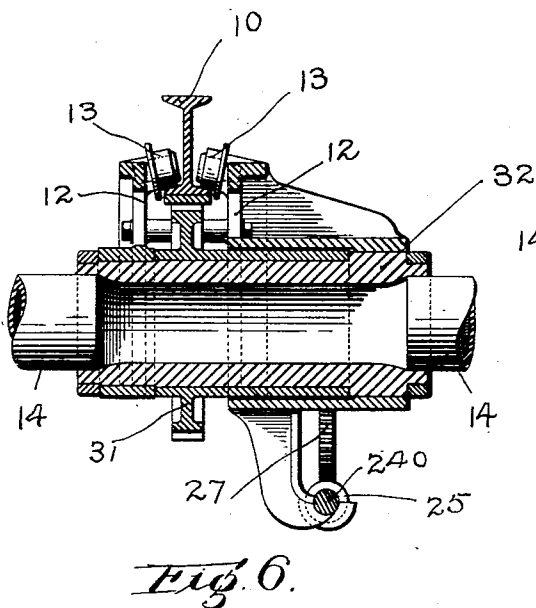
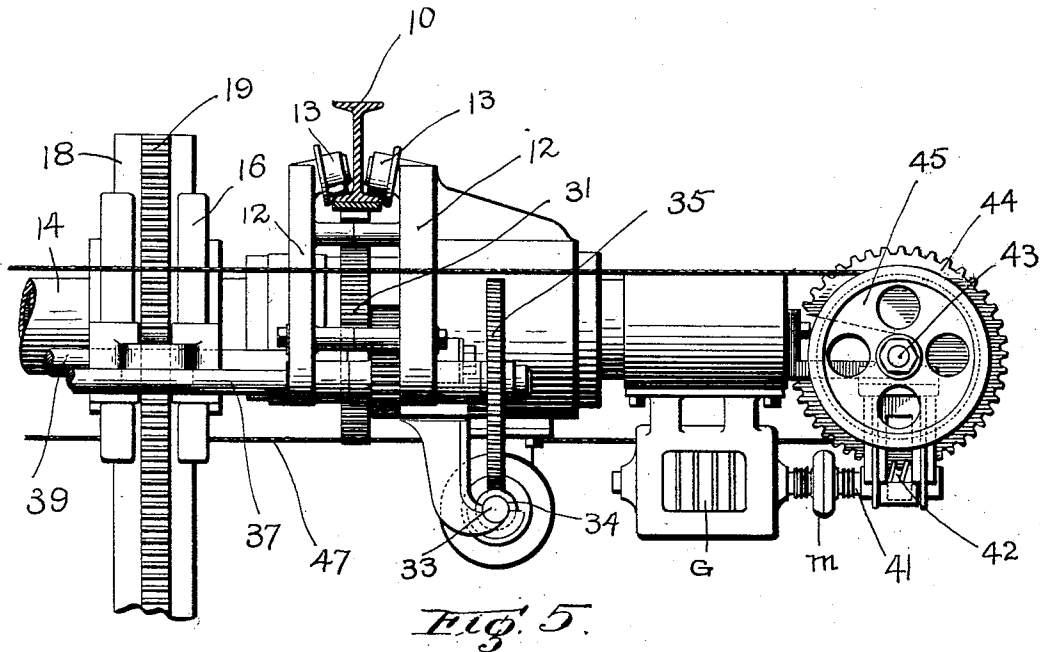
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(No Model.)

5 Sheets—Sheet 4.



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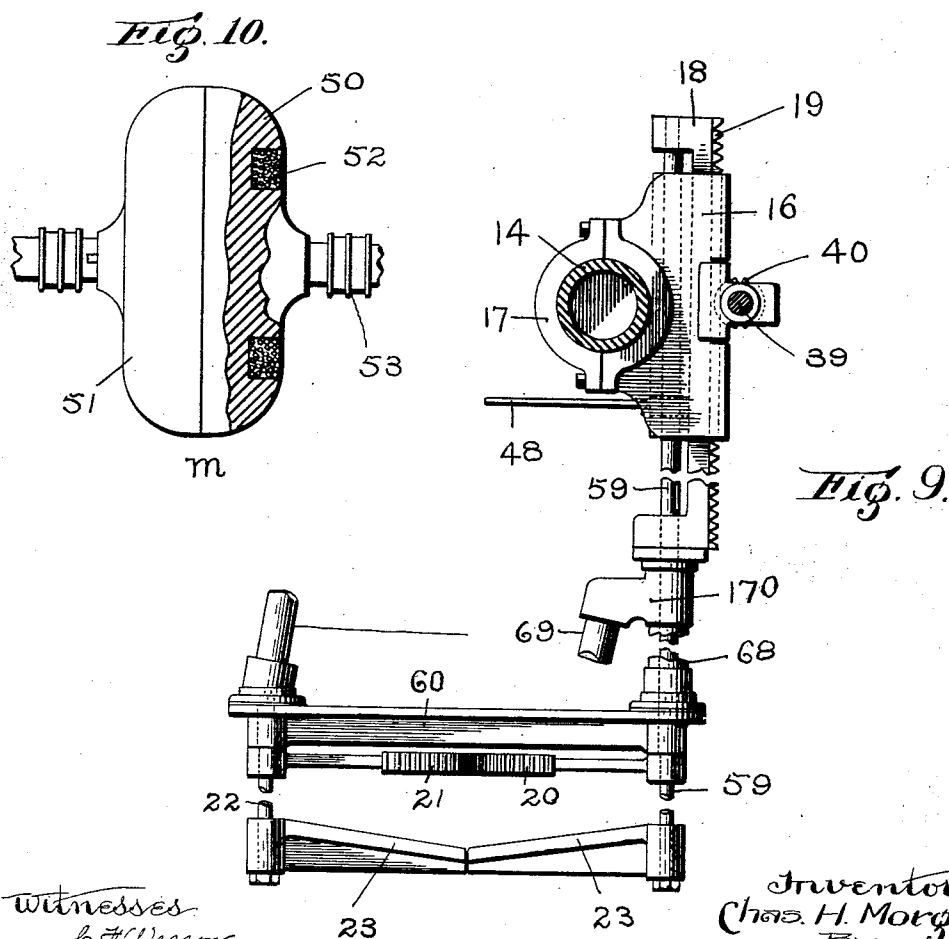
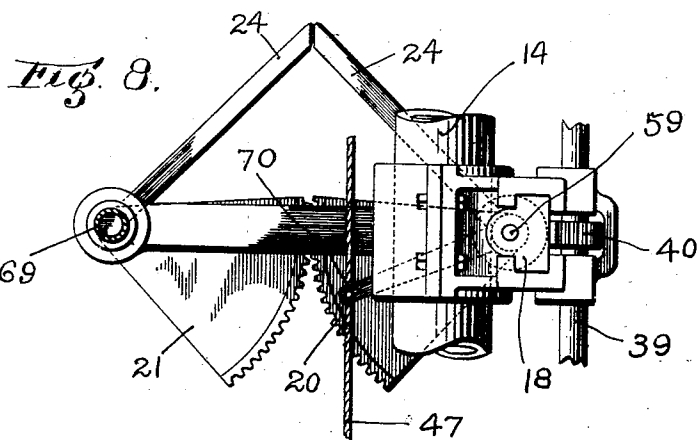
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5 Sheets—Sheet 5.



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UNITED STATES PATENT OFFICE.

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HOISTING AND CONVEYING APPARATUS FOR LONG METAL BARS OR FOR SIMILAR PURPOSES.

SPECIFICATION forming part of Letters Patent No. 710,920, dated October 7, 1902.

Application filed February 23, 1901. Serial No. 48,472. (No model.)

To all whom it may concern:

Be it known that I, CHARLES H. MORGAN, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Hoisting and Conveying Apparatus for Long Metal Bars or for Similar Purposes, of which the following is a specification.

This invention relates to a hoisting and conveying apparatus or traveling crane which has been especially devised for selecting, lifting, and carrying long metal bars from the cooling-supports of a rolling-mill and depositing said bars in storage-bins arranged to receive different sizes of bars; and the especial objects of this invention are to provide an apparatus for hoisting and conveying metal bars which comprises a plurality of lifting devices arranged to engage the bars at different points along their lengths, to provide a strong, light, and efficient carriage for supporting the lifting devices, to provide efficient forms of gearing and connections preferably operated by a plurality of independent electric motors for operating the lifting devices and for propelling the carriage, and to arrange the parts so that they may be accurately and efficiently controlled.

To these ends this invention consists of the apparatus for hoisting and conveying long metal bars or for similar purposes and of the combinations of parts therein, as hereinafter described, and more particularly pointed out in the claims at the end of this specification.

In the accompanying five sheets of drawings, Figure 1 is an end view, partially broken away, of an apparatus for hoisting and conveying metal bars constructed according to this invention. Fig. 2 is a side view of the same, partially broken away. Fig. 3 is an enlarged fragmentary plan view illustrating the trains of gearing for propelling the carriage and operating the lifters. Fig. 4 is an enlarged transverse sectional view of the carriage. Fig. 5 is an enlarged end view of the carriage, illustrating the connections which may be employed for opening and closing the lifters. Fig. 6 is a sectional view taken on the line 6 6 of Fig. 4. Fig. 7 is a plan view

illustrating the drums which carry the rope for opening and closing the lifters. Fig. 8 is a detail plan view illustrating the gearing for connecting the carrying-arms. Fig. 9 is a detail view, partially broken away, of one of the lifters; and Fig. 10 is a detail view, partially broken away, of one of the magnetic clutches which may be employed for coupling the motors.

In manufacturing merchant bars it is now frequently customary to roll out and form bar-sections several hundreds of feet in length. The excessive length of these freshly-rolled heated bars renders the handling of the same exceedingly difficult, and where different styles of bars are produced or where several rolling-mills are employed side by side no efficient form of apparatus, so far as I am informed, has heretofore been devised for selecting the different sets of bars and carrying the same so that they may be sorted and deposited in separate compartments or bins according to their respective sizes. To provide an apparatus for use in such situations, a device for hoisting and conveying long bars constructed according to this invention comprises a plurality of lifting devices, which are arranged to engage the bars at different points along their lengths. The lifting devices extend down from and are carried by a traveling carriage or frame, which is supported to run on rollers on beams or girders. Each of the lifting devices preferably consists of a frame having two pivoted inclined-faced carrying-arms arranged so that they may drop down at opposite sides of the bars which it is desired to pick up and then be turned or brought together beneath the bars. The inclined faces or top surfaces of the carrying-arms will form depressions for keeping the bars central in the lifting devices, and by this arrangement the weight of the bars will assist in swinging the carrying-arms open when the bars are to be released.

Referring to the accompanying drawings and in detail in Sheet 1, A designates an inclined cooling frame or table on which the freshly-rolled bars are supported and allowed to move slowly down onto the supporting-

rolls B in the ordinary manner, the supporting-rolls being arranged at different points along the lengths of the bars.

The bins or compartments C for receiving the bars may be located at any desired distance from the cooling-table and are formed by uprights or boiler-plate blades located at different points along the lengths of the bars. These parts may be of any ordinary or approved construction and need not be herein shown or described at length.

Extending transversely over the bins for receiving the bars are supporting beams or girders 10, having racks or toothed sections 11 on their lower faces. Supported on the girders or beams 10 is the long traveling carriage, consisting of a number of frames 12, arranged in pairs and bolted together, so as to be supported by rolls or wheels 13. The pairs of frames 12 are connected together by pipe-sections 14. Extending down from the traveling carriage as thus constructed are a plurality of lifting devices, which are arranged to engage the bars at different points along their lengths and which are set close enough together so that they will form an efficient support for the bars as the same are being carried from the supporting-rolls B to the bins C.

The construction of the lifting devices is most clearly illustrated in Fig. 9. As shown in this figure, a bracket or frame 16 is clamped onto one of the pipe-sections 14 by a yoke or clamp-piece 17, and fitting into the frame 16 is a vertically-movable slide 18, carrying a rack 19. At its lower end the slide 18 is provided with a piece 170, extending down from which are pipes 68 and 69, connected at their lower ends by a cross-piece 60. Journaled in the cross-piece 60 are downwardly-extending shafts 22 and 59, which are provided at their lower ends with carrying-arms 23, having inclined tops or faces. The shafts 22 and 59 are geared together by sectors 20 and 21, and secured on the shafts 22 and 59 are stop-arms 24, which are brought into engagement when the carrying-arms are closed. The shaft 59 extends up through the pipe 68 and is provided with an arm 70, controlled by a cord or wire, to open and close the carrying-arms 23, as shown in Fig. 8.

Any convenient arrangement of gearing may be employed for raising and lowering the lifting devices, for propelling the carriage, and for operating the cord which opens and closes the carrying-arms. In practice, however, I contemplate employing a plurality of separate electric motors, and by employing a plurality of separate motors I am enabled to apply power as directly as possible at the several places where the same is required, and at the same time the weight will be so distributed as to be carried to the best possible advantage on the overhead girders or tracks. The trains of gearing which may be employed for propelling the carriage and for

raising and lowering one of the lifting devices are most clearly illustrated in Figs. 3 and 4. As shown in these figures, M designates a reversible electric motor, which may be bolted to or supported from the frames 12 in any desired manner. The motor M is provided with a magnetic clutch *m* at each side thereof, and through one of its magnetic clutches *m* the motor may be coupled to drive a shaft 240, having a worm 25, which meshes with and drives a worm-wheel 27, secured on a shaft 26. The shaft 26 is provided with a gear 28, which meshes with and drives a gear 30, and turning with a gear 30 is a gear 29, which meshes with and drives a gear 31, which meshes into the rack 11 on the under side of the beam 10. As shown most clearly in Fig. 6, the propelling-gear 31 preferably forms part of a sleeve journaled on a coupling 32, which connects two pipe-sections 14. At its opposite side the motor M is coupled through a magnetic clutch *m* to drive a shaft 33, carrying a worm 34, which meshes with and drives a worm-wheel 35, secured on a shaft 37. Fastened on the shaft 37 is a gear 38, secured on the shaft 39. As shown most clearly in Fig. 9, the shaft 39 is provided with a gear 40, which meshes into and operates the rack 19 for raising and lowering a lifting device. As indicated in Fig. 2, each shaft 39 is geared to raise and lower two adjacent lifting devices, and the shafts 26 and 37 preferably extend the entire length of the carriage, so as to couple the several electric motors together in an efficient and direct way.

To provide for opening and closing the carrying-arms of the lifting devices, I preferably employ a separate electric motor, and the manner in which the same may be mounted and connected is most clearly illustrated in Figs. 5 and 7. As shown in these figures, the carriage is provided at one end with brackets, in which a shaft 43 is journaled, and secured on the ends of the shaft 43 are drums 45 and 46. The wire rope or cord 47 is coiled on the drums 45 and 46 in opposite directions, and at the opposite end of the carriage it passes around pulleys or sheaves 48. Bolted onto the carriage to operate the drums 45 and 46 is a reversible motor G, which is connected by a magnetic clutch *m* to turn a shaft 41, carrying a worm 42, meshing with a worm-wheel 44, secured near the middle of the shaft 43.

The form of magnetic clutch which I may employ for coupling the motors M and G is illustrated in Fig. 10. As shown in this figure, such magnetic clutch may consist of a clutch-section 50, secured rigidly on the shaft, and a clutch-section 51, which is keyed or splined onto the shaft, so as to be movable longitudinally thereon. The clutch-section 50 may be provided with a recess or annular groove for receiving a coil of wire, through which the controlling-current may be passed

from suitable brushes coöperating with the contact-rings 53 when it is desired to energize the clutch.

As shown in Fig. 1, a circuit-breaking device S may be employed in connection with each lifting device for throwing out the motor thereof when the same is lowered down, so as to be brought into contact with the pile of bars in any one bin, as indicated by the dotted lines. Furthermore, the electrical connections for controlling the operations of the several motors may all be controlled from any desired situation. In this application for patent, however, I do not desire to claim any particular form of electrical connections, the present invention being primarily designed to provide an efficient hoisting and conveying apparatus for the purpose described independent of the means by which the same can be controlled.

The operation of the construction is best illustrated in Fig. 1. When it is desired to transfer the metal bars from the supporting-rolls B to the bins C, the carrying-arms being open, the lifting devices are dropped down to straddle the bars which it is desired to pick up. The carrying-arms are then closed and the lifters raised to engage the bars at different points along their lengths, as shown by the full lines, and when the bars have been carried over the desired bin the lifters may be lowered and the carrying-arms opened to deposit the bars in the desired location, as indicated by dotted lines. By providing the carrying arms with inwardly-inclining faces the weight of the bars will tend to assist in opening the carrying-arms, and hence there will be comparatively little strain on the cord or operating-rope 47. It will be seen that when either or both of the magnetic clutches *m* are released the carriage will be locked in its position by means of the worm 25 and worm-gear 27 and that the lifting devices will be locked by means of the worm 34 and worm-wheel 35 and also whereby the carriage will be locked in position when the bars are being lifted or lowered and whereby the lifters are locked in position when the carriage is being moved.

I am aware that numerous changes may be made in employing my invention in the different relative situations to which the same is applicable. I do not wish, therefore, to be limited to the construction I have herein shown and described; but

What I do claim, and desire to secure by Letters Patent of the United States, is—

1. In an apparatus for hoisting and conveying long metal bars or for similar purposes, the combination of a plurality of lifting devices having inclined-faced carrying-arms arranged to drop down at the sides of the bars and to be swung or turned together under the bars, and means for simultaneously actuating the lifting devices.

2. In an apparatus for hoisting and convey-

ing long metal bars or for similar purposes, the combination of a transversely-movable carriage mounted on overhead supports, a plurality of lifting devices carried thereby and arranged to engage the bars at different points along their length, and a plurality of separate motors for actuating the lifting devices.

3. In an apparatus for hoisting and conveying long metal bars or for similar purposes, the combination of a transversely-movable carriage mounted on overhead supports, a plurality of lifting devices carried thereby, and arranged to engage the bars at different points along their length, a plurality of separate motors, and means for coupling said motors to propel the carriage or to operate the lifting devices.

4. In an apparatus for hoisting and conveying long metal bars or for similar purposes, the combination of a transversely-movable carriage mounted on overhead supports, a plurality of lifting devices carried thereby, a plurality of separate reversible electric motors, two trains of gearing controlled by each electric motor, one train of gearing being connected to actuate one of the lifting devices, and the other train of gearing being connected to propel the carriage.

5. In an apparatus for hoisting and conveying long metal bars or for similar purposes, the combination of a transversely-movable carriage mounted on overhead supports, a plurality of lifting devices carried thereby and arranged to engage the bars at different points along their length, a plurality of separate reversible electric motors, two trains of gearing for each electric motor, one train of gearing being connected to operate a lifting device, and the other train of gearing being connected to propel the carriage, and magnetic clutches for connecting the electric motors with said trains of gearing.

6. In an apparatus for hoisting and conveying long metal bars or for similar purposes, the combination of a transversely-movable carriage, a plurality of lifting devices carried thereby, each of said lifting devices comprising two vertical shafts which are geared together and provided with carrying-arms at their lower ends, and means for turning the vertical shafts of the lifting devices to open and close the carrying-arms.

7. In an apparatus for hoisting and conveying long metal bars or for similar purposes, the combination of a transversely-movable carriage mounted on overhead supports, a plurality of lifting devices carried thereby, and each comprising a pair of vertical shafts connected to turn together, and having carrying-arms at their lower ends, and an operating-rope mounted in the carriage and connected to turn said vertical shafts to open and close the carrying-arms.

8. In an apparatus for hoisting and conveying long metal bars or for similar purposes,

the combination of a transversely-movable carriage mounted on overhead supports, a plurality of lifting devices carried thereby, each comprising a pair of vertical shafts connected to turn together, and provided with carrying-arms at their lower ends, an operating-rope connected to turn the vertical shafts to open and close the carrying-arms, the ends of said cord being wound on drums in the carriage, and a reversible electric motor connected to turn said drums to open and close the carrying-arms.

9. In an apparatus for hoisting and conveying long metal bars or for similar purposes, the combination of a transversely-movable carriage comprising a plurality of sets of frames connected together in pairs, which are supported by rollers from overhead tracks or ways, and having pipe-sections connecting said pairs of frames, a plurality of lifting devices extending down from the carriage, and means for operating the lifting devices to engage the bars at different points along their length.

10. In an apparatus for hoisting and conveying long metal bars or for similar purposes, the combination of a transversely-movable carriage comprising a plurality of sets of frames connected together in pairs, and supported by rolls from overhead tracks, and with pipe-sections connecting said pairs of frames, a plurality of lifting devices extending down from the carriage to engage the bars at different points along their length, a plurality of separate electric motors, and means for coupling said electric motors to operate the lifting devices or to propel the carriage.

11. In an apparatus for hoisting and conveying long metal bars or for similar purposes, the combination of a transversely-movable carriage, comprising a plurality of sets of frames connected together in pairs, and supported by rolls on overhead tracks, with pipe-sections connecting the pairs of frames, a plurality of lifting devices extending down from the carriage to engage the bars at different points along their length, a plurality of separate electric motors, two sets of gearing for each electric motor, one set of gearing being connected to operate a lifting device, and the other set of gearing being connected to propel the carriage, and magnetic clutches for coupling each electric motor to operate either set of gearing as desired.

12. In an apparatus for hoisting and conveying long metal bars or for similar purposes, the combination of a transversely-movable carriage comprising a plurality of sets of frames connected together in pairs and supported by rollers on overhead tracks or ways, pipe-sections connecting the sets of pairs of frames, a plurality of lifting devices extending down from the carriage and each comprising a pair of vertical shafts geared to turn together, and provided with inclined-faced carrying-arms at their lower ends, means for opening and closing the carrying-arms, and

for raising and lowering the lifting devices and propelling the carriage.

13. In an apparatus for hoisting and conveying long metal bars or for similar purposes, the combination of a transversely-movable carriage comprising a plurality of sets of frames connected together in pairs and supported by rollers on overhead tracks or ways, pipe-sections connecting the sets of pairs of frames, a plurality of lifting devices extending down from the carriage, and each comprising two vertical shafts geared to turn together, and having inclined-faced carrying-arms at their lower ends, an operating-cord for opening and closing the carrying-arms, and electric motors for shifting the operating-cord, for raising and lowering the lifting devices, and for propelling the carriage.

14. In an apparatus for hoisting and conveying long metal bars or for similar purposes, the combination of a carriage, a plurality of lifting devices extending down from the carriage, a reversible electric motor geared by a worm and worm-wheel to each lifting device, and a clutch arranged between each motor and worm.

15. In an apparatus for hoisting and conveying long metal bars or for similar purposes, the combination of a transversely-movable carriage comprising a plurality of sets of frames connected together, a reversible electric motor, a train of gearing including a worm and a worm-gear from each motor for shifting the carriage transversely, and a clutch between each motor and worm.

16. In an apparatus for hoisting and conveying long metal bars or for similar purposes, the combination of a transversely-movable carriage comprising a plurality of frames, a plurality of lifting devices extending down from the carriage, a reversible electric motor on each set of frames geared by a worm and a worm-wheel to its lifting device, and by a train including a worm and worm-wheel to move the carriage transversely, and clutches arranged between the motor and each of said worms.

17. In an apparatus for hoisting and conveying long metal bars or for similar purposes, the combination of a transversely-movable carriage comprising a plurality of frames, a lifting device extending down from each part of the carriage, a reversible electric motor mounted on each part of the carriage, a train of gearing including a worm and worm-wheel geared to each lifting device and a train of gearing including a worm and worm-wheel for shifting the carriage transversely, and magnetic clutches whereby the motor can be coupled to actuate either train.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

CHAS. H. MORGAN.

Witnesses:

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LOUIS W. SOUTHGATE.