H. B. BROCKENBROUGH.

CABLE DRIVING MECHANISM.

APPLICATION FILED JUNE 12, 1916.

1,260,308.

Patented Mar. 26, 1918.

4 SHEETS—SHEET 1.

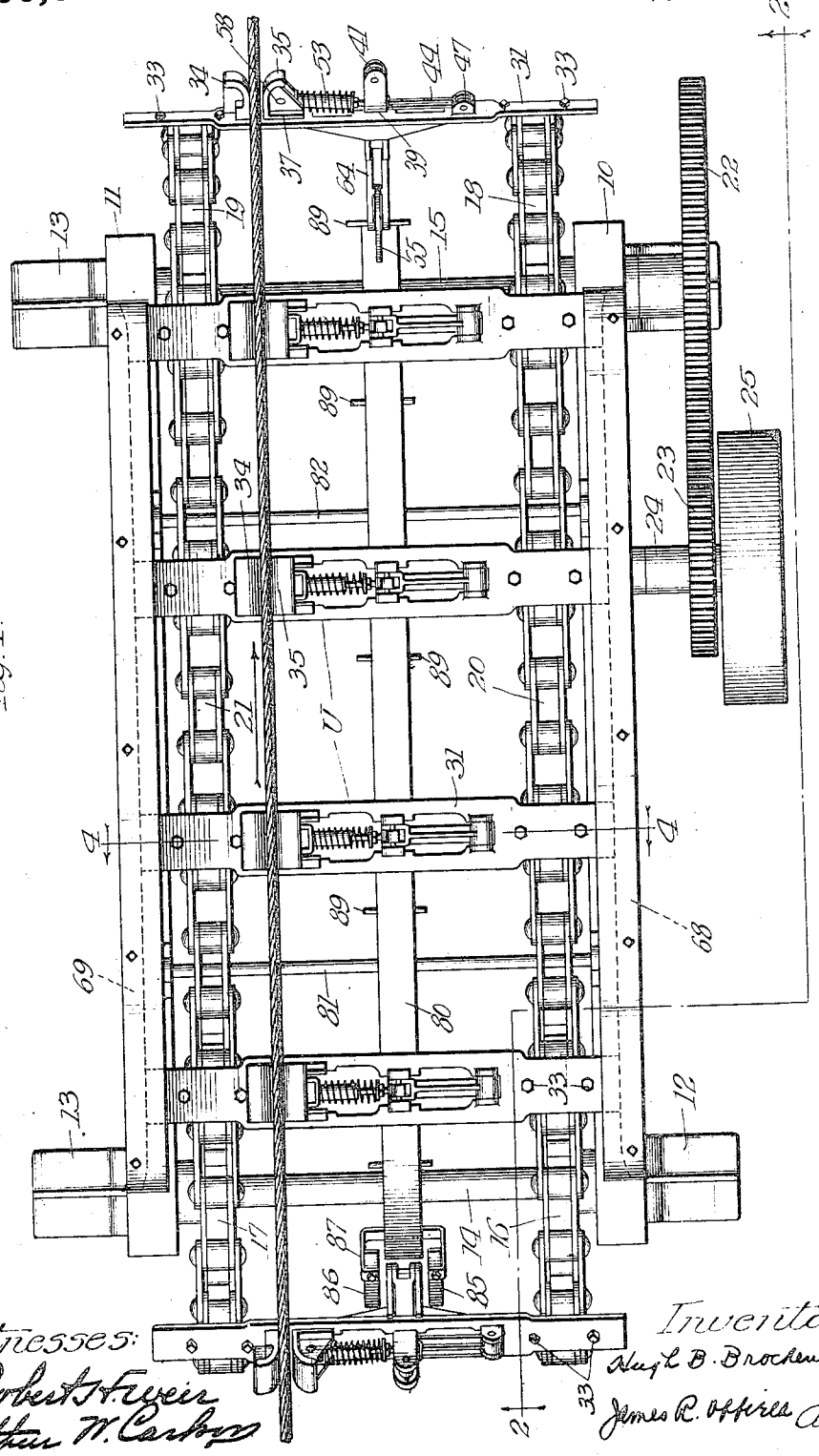


Fig. 1.

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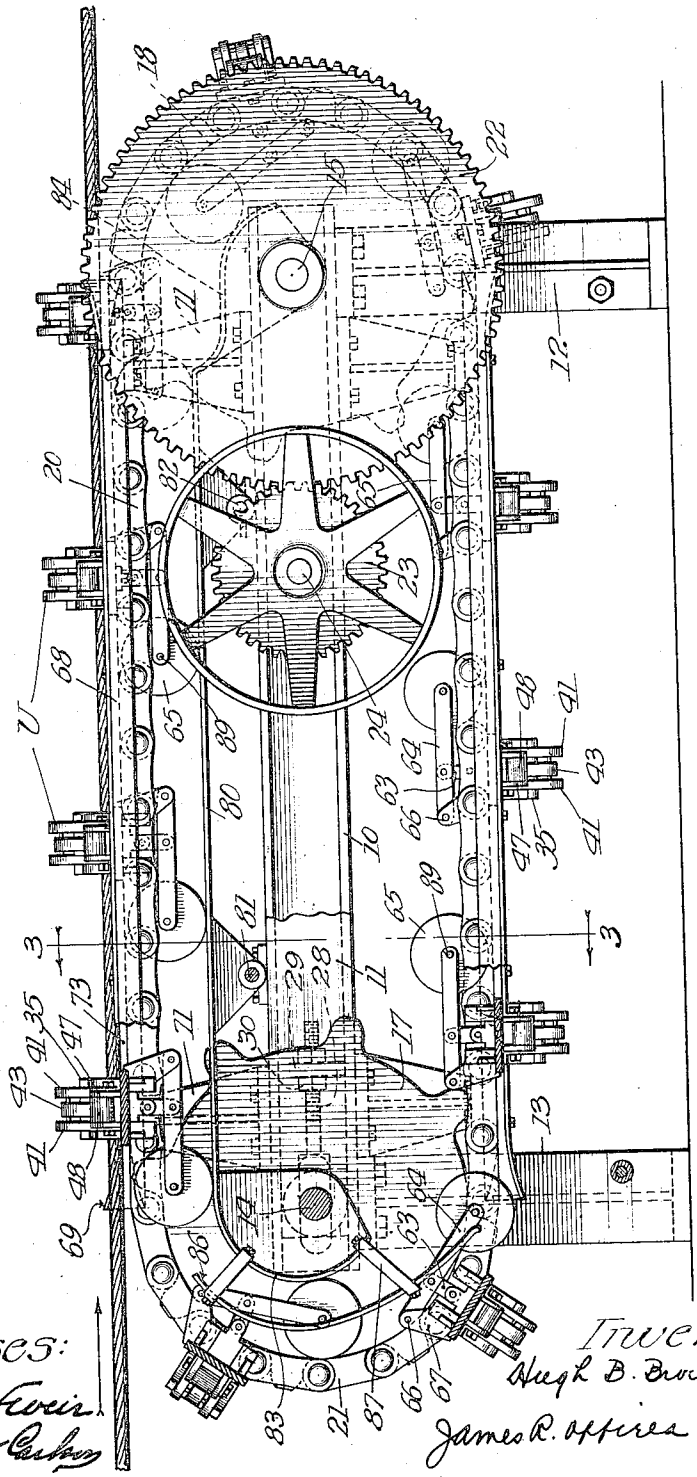
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4 SHEETS—SHEET 2.

Fig. 2.



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4 SHEETS—SHEET 3.

Fig. 3.

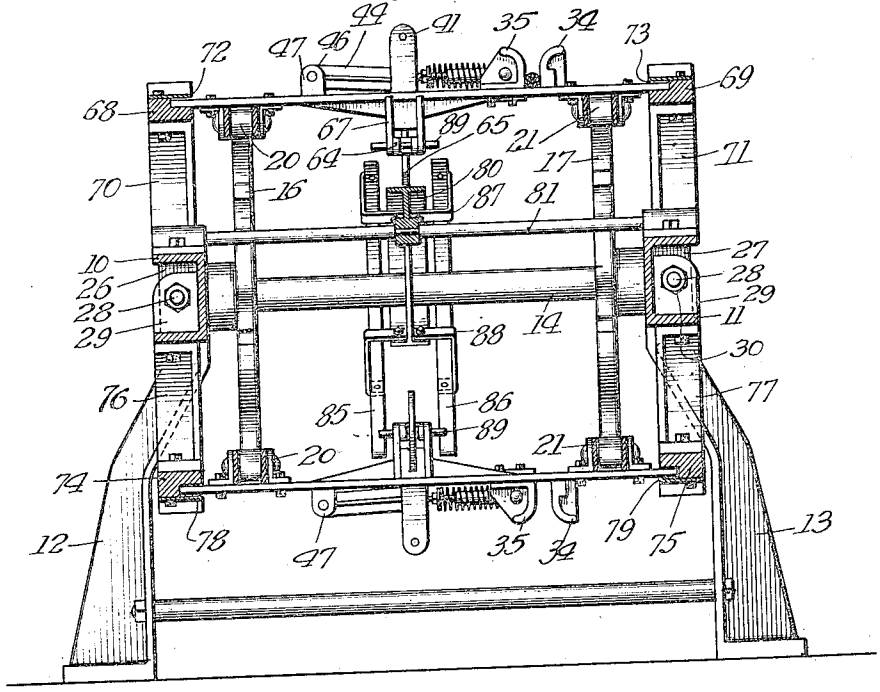
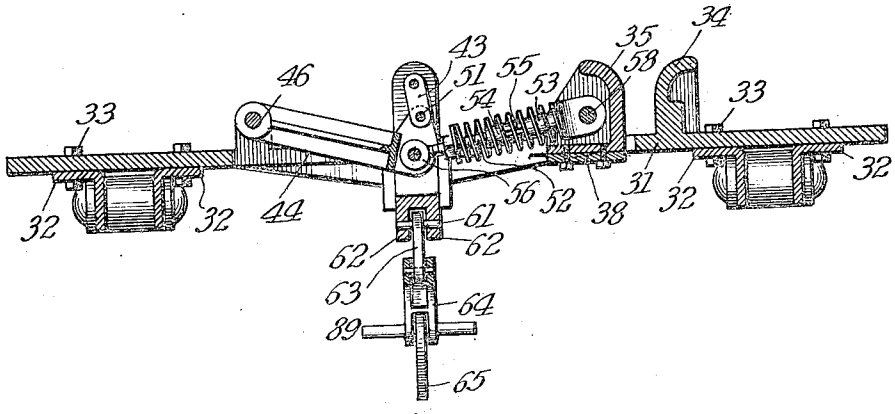


Fig. 5.



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4 SHEETS—SHEET 4.

Fig. 4.

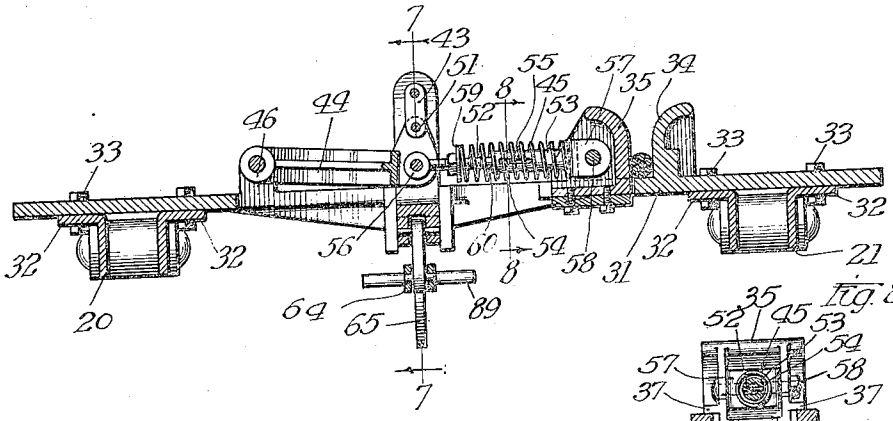


Fig. 8.

Fig. 6.

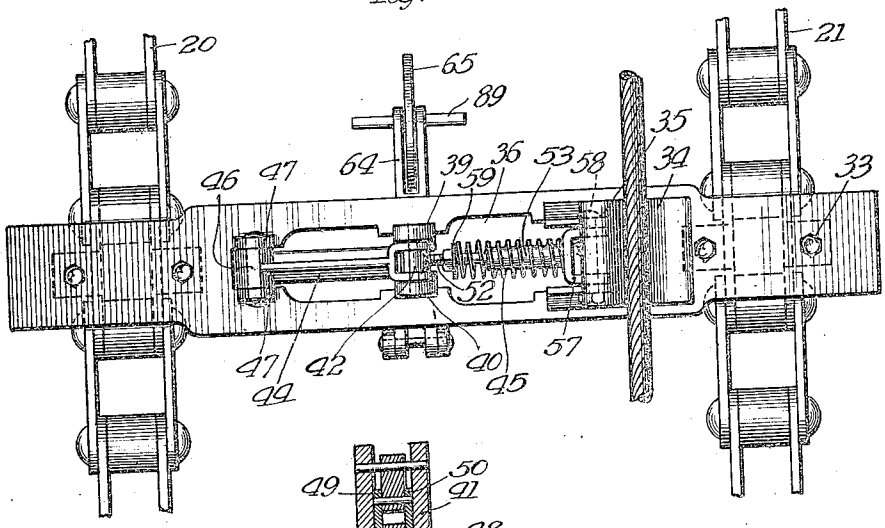
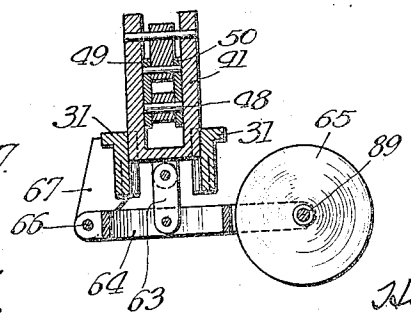


Fig. 7.



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UNITED STATES PATENT OFFICE.

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CABLE-DRIVING MECHANISM.

1,260,308. Specification of Letters Patent. **Patented Mar. 26, 1918.**

Application filed June 12, 1916. Serial No. 103,195.

To all whom it may concern:

Be it known that I, HUGH B. BROCKENBROUGH, a citizen of the United States, and a resident of Fort Dodge, in the county of Webster and State of Iowa, have invented certain new and useful Improvements in Cable-Driving Mechanism, of which the following is a specification.

My invention relates to cable driving mechanism for driving the propulsion cable in tramway systems.

The general purpose of my invention is to produce drive mechanism particularly adaptable for driving the car propulsion cable in tramway systems where the cars travel repeatedly around a closed track circuit and where the cars are permanently connected with the propulsion cable. For example in aerial tramways cars travel repeatedly around a closed aerial track circuit between loading and unloading stations and each car is permanently connected with the cable so that these car connections with the cable must pass through the cable drive mechanism.

On the accompanying drawings I have shown an improved driving mechanism which is particularly adaptable for driving the propulsion cable of aerial tramway systems. In these drawings

Figure 1 is a plan view,

Fig. 2 is a side elevational view from plane 2—2, Fig. 1,

Fig. 3 is a sectional view on plane 3—3, Fig. 2,

Fig. 4 is an enlarged sectional view on plane 4—4, Fig. 1, showing the cable gripping mechanism in gripping position,

Fig. 5 is a similar view showing the gripping mechanism opened,

Fig. 6 is a plan view of the parts shown in Fig. 4,

Fig. 7 is a sectional view on plane 7—7, Fig. 4, and

Fig. 8 is a sectional view on plane 8—8, Fig. 4.

The supporting structure for the drive mechanism comprises two side beams 10 and 11 mounted on legs 12 and 13. Journaled at the front and rear ends of the side beams are the transverse shafts 14 and 15. On the shaft 14 sprocket wheels 16 and 17 are secured inside of and adjacent the side beams and on the shaft 15 are similarly mounted the sprocket wheels 18 and 19. The wheels 16 and 18 receive the chain belt 20 and the wheels 17 and 19 receive the chain belt 21. At its outer end shaft 15 carries a drive gear 22 with which meshes the drive pinion 23 on shaft 24, a belt pulley 25 being also secured to this shaft. Upon rotation of the belt pulley the sprocket wheels and chain belts will be driven. To keep the chain belts tight slidable bearings 26 and 27 are provided for the shaft 14 from which threaded stems 28 extend through lugs 29 and are provided with locking nuts 30.

Bridging between the chain belts and secured thereto are the cable clamping units U. Each of these units comprises a rectangular frame 31 secured at its ends to the chain belts. As clearly shown in Figs. 4 and 5, the sides of chain link members have laterally extending ears 32 which are secured against the under side of the unit frame as by means of bolts 33. Near one end of each unit is a stationary jaw member 34 which extends outwardly, and coöperating with each stationary jaw member is a movable jaw member 35. As shown, the frame 31 has the longitudinally extending opening 36 therethrough in one end of which the movable jaw 35 is located. As clearly shown in Fig. 8 the base of the movable jaw has lateral extensions 37 for engaging with the top of the frame 31 and a cross plate 38 secured to the under side of the base engages at its ends with the under side of the frame, the jaw being thus locked against transverse movement on the frame but being free to shift longitudinally toward and away from the stationary jaw member 34. At substantially the middle of each frame 31 opposite vertical guide grooves 39 and 40 are provided for vertically guiding the limbs of a U-frame 41. Connecting the frame limbs at their upper ends is a pin 42 from which a link 43 is suspended. This link supports the inner ends of toggle members 44 and 45. The outer end of toggle member 44 is pivoted on the shaft 46 supported in ears 47 extending upwardly on the frame 31. The inner end of the member 44 is bifurcated and extends into the U-frame 41 and receives a pivot pin 48. The bifurcated arms 49 and 50 extend vertically upwardly and support pin 51 to which the lower end of link 43 is pivoted.

The toggle member 45 comprises an inner rod part 52 and an outer sleeve part 53 into which the rod telescopes, a pin 54 supported on the rod extending through the longi-

tudinal slot 55 in the sleeve part to lock the parts against separation. The inner end 56 of the rod part receives the pin 48 so that the two toggle members are pivoted together at their inner ends and there suspended by the link 43 in frame 41. The outer end of the sleeve part 53 has the head 57 which receives pivot pin 58 on the movable jaw 35 and abutting against the head and against a washer 59 on the rod 52 is a compression spring 60 which encircles the rod and sleeve and tends to separate these parts and to shift the movable jaw 35 toward the stationary jaw 34. A pin 61 secured in depending ears 62 on frame 41 suspends a link 63 which is pivoted at its lower end to the cam lever 64 whose front end pivots a cam roller 65 and which at its rear end is pivoted on pin 66 supported in the lugs 67 extending downwardly from the frame 31. As the cam roller shifts vertically the frame 41 is raised and lowered and the jaws 34 and 35 closed and opened by the toggle members.

In practice the drive mechanism is spaced below the cable to be driven and when the clamping units are at the top of the chain belts they will receive the cable and will be locked in closed clamping engagement with the cable, that is, each unit during each rotation of the belts will be in clamping engagement for a period to assist in propelling the cable. To more definitely fix the path of the units guide rails 68 and 69 are supported over the side beams 26 and 27 on brackets 70 and 71, the ends of the unit frames 31 passing through the guide slots 72 and 73 in the rails. Likewise, guide rails 74 and 75 are suspended from the side beams by the hangers 76 and 77 and have the grooves 78 and 79 in which the ends of the clamping unit frames engage during their travel below the belts.

To control the opening and closure of the clamping jaws of the clamping units a cam rail 80 is supported on cross bars 81 and 82 supported on the side beams 26 and 27, the rail being horizontal and disposed below and in the path of the cam wheels 65 which trail after the clamping units in their travel with the belts. The height of the rail is such that when engaged by the wheels the clamping jaws will be held in closed position. The front end 83 of the rail is curved downwardly to form a gradual approach incline for the cam wheels to the top of the rail. The rear end of the cam track has the depressed section 84 which permits dropping of the cam rollers and levers just before the clamping units start to swing around with the adjacent sprocket wheels. Such downward swing of the cam rollers and levers away from the unit frames causes the toggle mechanism to be actuated to open the jaws so that the cable is released. After the units reach the under side of the sprocket wheels and become inverted the cam levers will swing in the opposite direction, that is, they will tend to shift the toggle mechanism to close the jaws, and such closed position is maintained until the units have swung around the front sprocket wheels and have almost reached the tops of these wheels. When the mechanism is rapidly driven centrifugal force will tend to swing the cam levers outwardly as the units travel around the front sprocket wheels. Provision is made to checkmate such centrifugal action and to positively effect reopening of the jaws in time to receive the cable before the cam rollers coöperate with the cam rail to close the jaws. As clearly shown in Figs. 1, 2 and 3, guide rails 85 and 86 are supported in front of the track approach 83 on brackets 87 and 88 extending forwardly from the approach, and these guide rails are spaced to permit travel between them of the cam levers and wheels, and the pivot pins 89 of the cam wheels are extended laterally to engage with the rails. As best shown in Fig. 2, the lower ends of the guide rails project downwardly sufficiently to receive the cam wheel pivot pins before the cam levers start to swing around with the sprocket wheels. The engagement of the pins with the rails will exert considerable leverage on the toggle mechanism and as the pins travel along the rails the jaws will be positively opened and they will be held fully open to receive the cable before they are closed when the cam rollers engage with the horizontal cam rail 80. The upper ends of the guide rails are preferably parallel with the approach 83 and spaced therefrom so that the rails will hold the wheels to the approach until the top of the cam rail is reached. The guide rails entirely checkmate centrifugal action and no matter how fast the mechanism is operated the clamping jaws will always be positively fully opened to fully receive the cable before they are closed.

The drive mechanism described is particularly useful where cars are permanently secured to the propulsion cable and where such cars travel repeatedly around a closed track circuit, as for example in an aerial tramway system where loading and unloading stations are located adjacent the track to load and unload cars during their transit around the track circuit. The permanent connections between the cable and cars does not in any wise interfere with the efficient operation of my improved drive mechanism. There being a multiple of clamping units at all times in rigid clamping association with the cable, positive and powerful drive of the cable is assured.

I do not, of course, desire to be limited to the precise construction, arrangement and operation shown and described, as changes and modifications are no doubt possible

which would still come within the scope of the invention. I claim as follows:

1. In cable driving mechanism, the combination of a supporting frame, a pair of sprocket wheels at each end of said frame, parallel endless belts received by said sprocket wheels, means for driving the sprocket wheels and the belts thereon, an endless row of clamping units secured crosswise on said belts to travel therewith, cable clamping mechanism on each unit, means at one end of said belts for successively opening the clamping units to receive a cable, and means for successively closing the clamping units to clamp the received belt and for retaining successive groups of said clamping units in clamping engagement with said cable.

2. In cable driving mechanism, the combination of a supporting frame, a pair of sprocket wheels at each end of said frame, parallel belts engaging said sprocket wheels, means for driving said sprocket wheels and belts, an endless row of clamping units secured crosswise on said belts to travel therewith, clamping jaws on each unit, actuating mechanism on each unit for said jaws, cam mechanism connected with each actuating mechanism, a cam rail between said belts of sufficient length to coöperate with a number of said cam mechanisms to effect closure of the clamping jaws, and means for coöperating with said cam mechanisms to successively open the jaws before coöperation of the cam mechanisms with the cam rail.

3. In cable driving mechanism, the combination of a continuous row of clamping units, means for continuously propelling said units through a fixed closed path, clamping jaws on each unit, toggle mechanism on each unit for actuating said jaws, cam lever mechanism for each toggle mechanism, a cam rail parallel with a section of said path to coöperate with the cam lever mechanism to effect closure of successive jaws and to maintain closure of a plurality of jaws, and means for opening the jaws before coöperation of the cam mechanisms with said rails.

4. In cable driving mechanism, the combination of front and rear sprocket wheels, a pair of belts mounted on said wheels to travel in parallel closed paths, means for driving said sprocket wheels, an endless row of cable clamping units secured crosswise on said belts to travel therewith through said fixed paths, cable clamping jaws on each unit, toggle mechanism on each unit for actuating said jaws, lever mechanism associated with each toggle mechanism and terminating in a cam roller, a cam rail in position to coöperate with successive units to engage the cam roller to actuate the lever mechanism and effect operation of the corresponding toggle mechanism to close the jaws, means for coöperating with successive cam rollers to effect operation of the lever mechanism and toggle mechanism of successive units to open the clamping jaws before coöperation of the clamping members with the cam rail, and means for opening the jaws after coöperation of the cam mechanisms with said rail.

5. In cable driving mechanism, the combination of a series of cable clamping units, means for repeatedly propelling said units through a fixed path, a stationary jaw member on each unit and a movable jaw member thereon, toggle mechanism on each unit connected with the movable jaw member, and a rail adjacent said path for coöperating with the toggle mechanism of the successive units to maintain closure of the jaw members during travel of the units through part of said path.

6. In cable driving mechanism, the combination of a series of clamping units, means for repeatedly propelling said units through a fixed path, jaws on each unit, a frame shiftable transversely on each unit, toggle levers connected with said frame and jaws, means on each unit tending to hold said toggle levers in position to open said jaws, and a rail adjacent the path of said units for cooperating with the toggle levers to shift them to close the jaws during travel of the units through part of said path.

7. In cable driving mechanism, the combination of a series of clamping units, means for repeatedly propelling said units through a fixed path, clamping jaws on each unit, a frame reciprocable transversely on each unit, toggle levers on each unit connected with the frame and jaws thereon, cam levers extending from said frame, and a cam rail adjacent the path of travel of said units for coöperating with said cam levers to shift the toggle levers to close the jaws of the units as they travel through part of said path.

8. In cable driving mechanism, the combination of a series of clamping units, means for repeatedly propelling said units through a fixed path, a stationary jaw member on each unit and a movable jaw member also thereon, two toggle levers on each unit having their inner ends connected together, the outer end of one of said levers being connected with the unit and the outer end of the other lever being connected with the movable jaw member, mechanism on each unit transversely slidable thereon and connected with the inner ends of said toggle levers, and a cam rail adjacent the path of travel of said units for coöperating with said mechanism to swing said toggle levers to effect closure of the jaws of the units as they travel through part of said path.

9. In cable driving mechanism, the combination of a series of clamping units, means

for repeatedly propelling said units through a fixed path, a stationary jaw member on each unit and a movable jaw member also thereon, two toggle levers on each unit pivoted together at their inner ends, the outer end of one of said levers being pivoted to the unit and the outer end of the other lever being pivoted to the movable jaw member, a frame shiftable transversely on each unit, a suspension link connected with each frame and the inner ends of the toggle members, means on each unit tending to hold the toggle levers in position to separate the jaw members, and a rail adjacent the path of travel of said units for coöperating with said frames to effect shift thereof and movement of the toggle levers to bring and hold the jaw members together during travel of the units through part of said path.

In witness whereof I hereunto subscribe my name this 5 day of June, A. D., 1916.

HUGH B. BROCKENBROUGH.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."