June 23, 1964 C. L. STUPFEL ETAL 3,138,258

METHOD AND APPARATUS FOR SORTING AUTOMATICALLY LOGS AND LIKE OBJECTS

Filed June 12, 1961 3 Sheets-Sheet 1

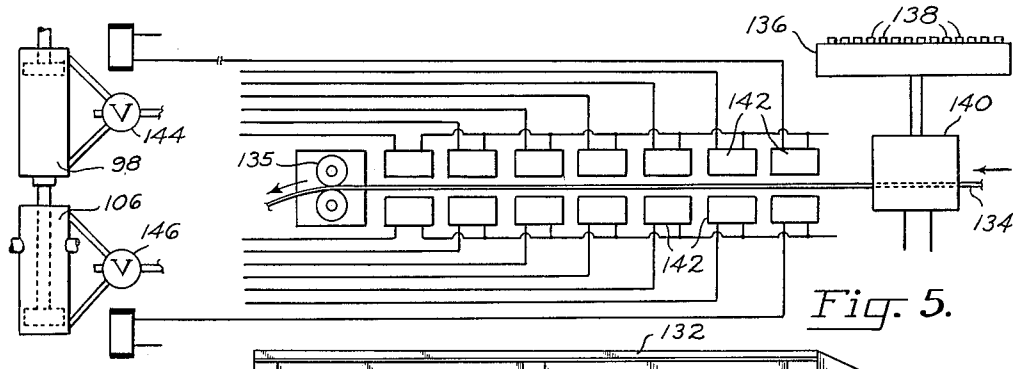


Fig. 5.

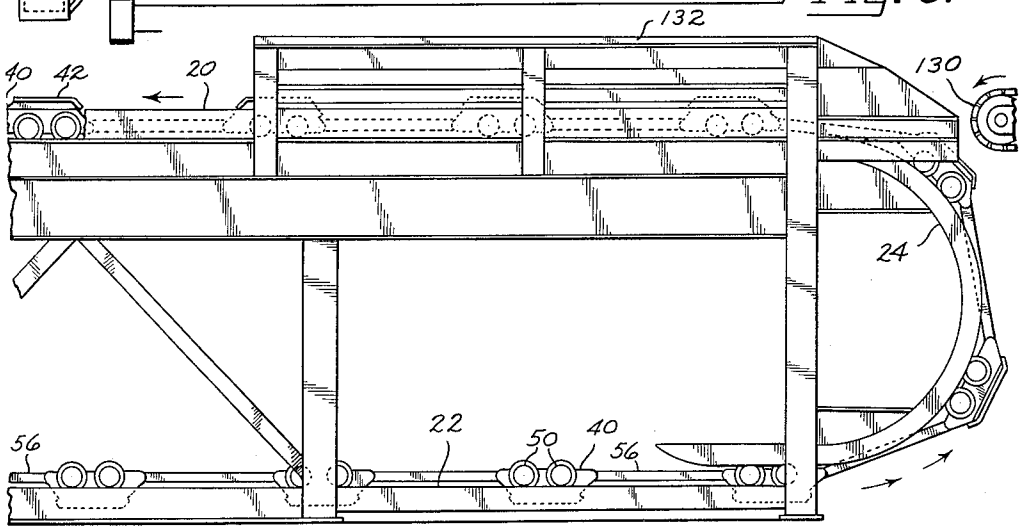


Fig. 1.

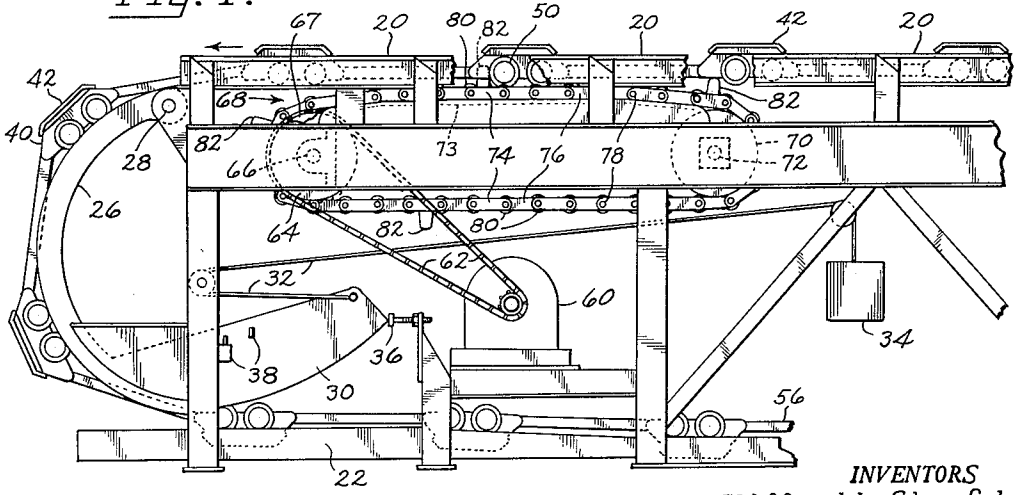


Fig. 2.

INVENTORS
Clifford L. Stupfel
BY Joseph H. R. Gelissen
Eugene P. Farley
Atty.

June 23, 1964 C. L. STUPFEL ETAL 3,138,258

METHOD AND APPARATUS FOR SORTING AUTOMATICALLY LOGS AND LIKE OBJECTS

Filed June 12, 1961 3 Sheets-Sheet 2

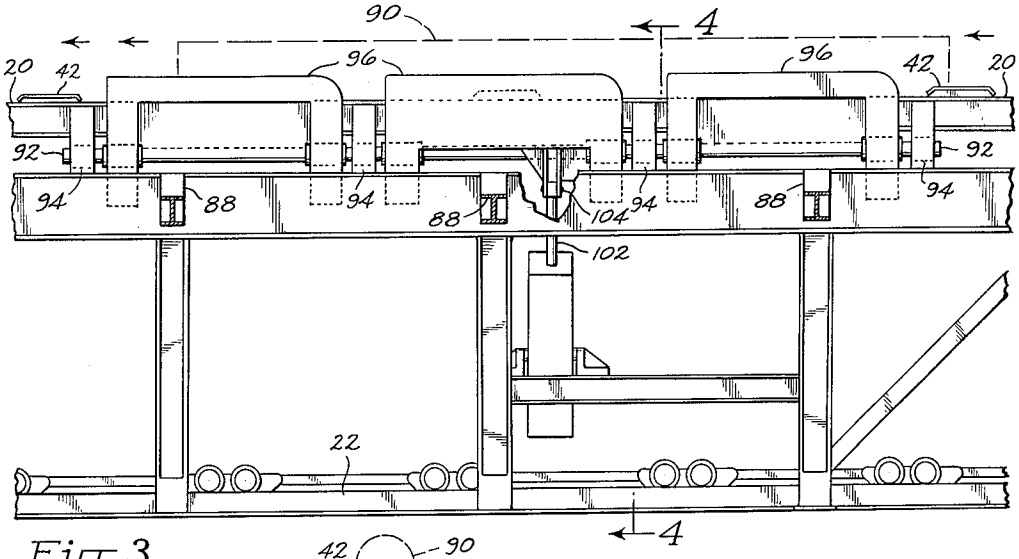
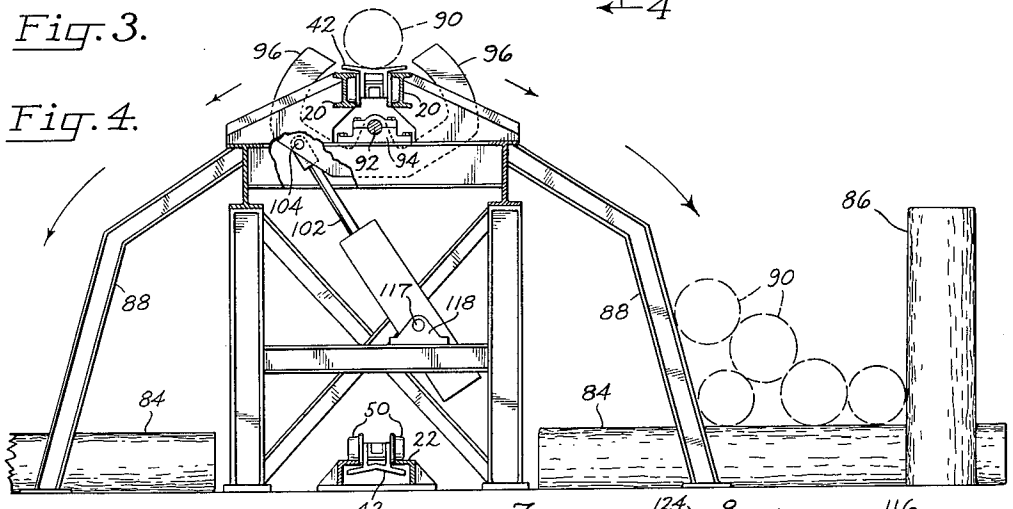


Fig. 3.

Fig. 4.



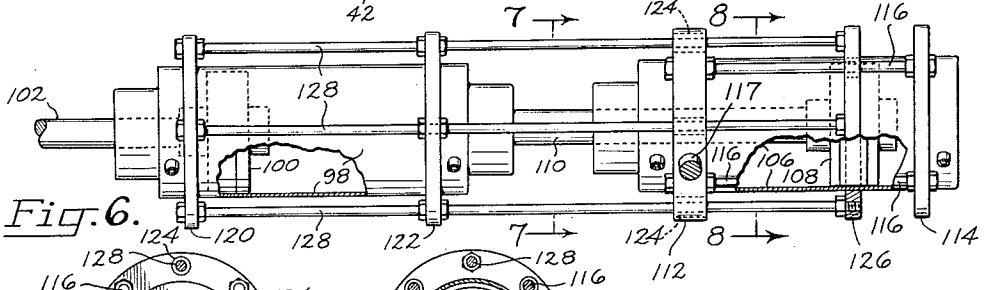


Fig. 6.

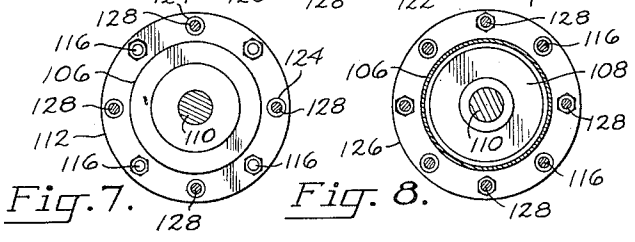


Fig. 7. Fig. 8.

INVENTORS
Clifford L. Stupfel
BY Joseph H. R. Gelissen
Eugene D. Farley
Atty.

June 23, 1964 C. L. STUPFEL ETAL 3,138,258

METHOD AND APPARATUS FOR SORTING AUTOMATICALLY LOGS AND LIKE OBJECTS

Filed June 12, 1961 3 Sheets-Sheet 3

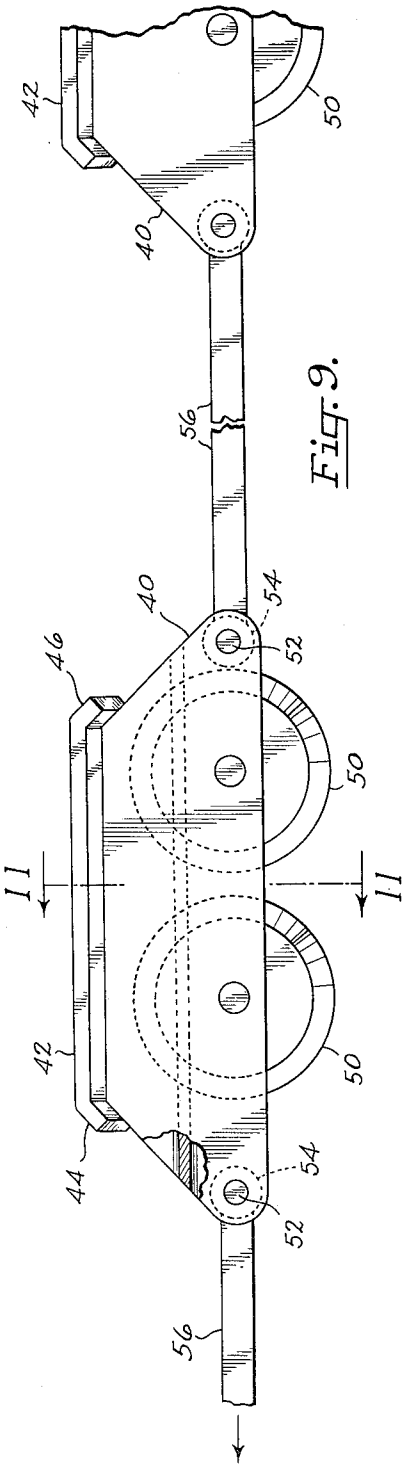


Fig. 9.

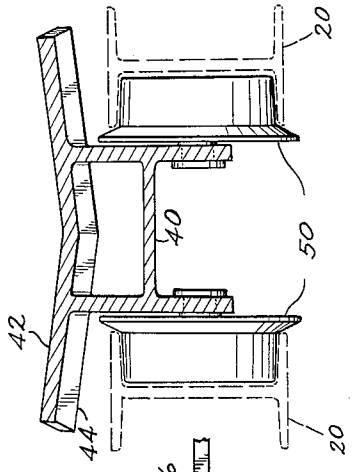


Fig. 11.

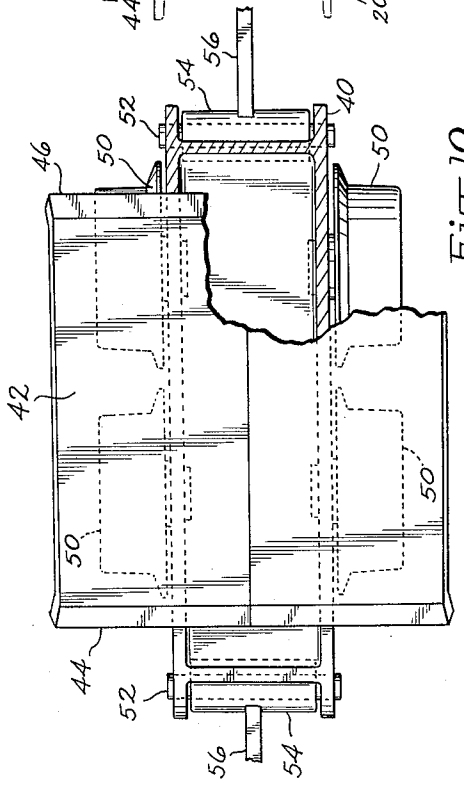


Fig. 10.

INVENTORS
Clifford L. Stupfel
BY Joseph H. R. Gelissen
Eugene D. Farley
Atty.

United States Patent Office 3,138,258 Patented June 23, 1964

3,138,258

METHOD AND APPARATUS FOR SORTING AUTOMATICALLY LOGS AND LIKE OBJECTS

Clifford L. Stupfel and Joseph H. R. Gelissen, Seattle, Wash., assignors to Crown Zellerbach Corporation, San Francisco, Calif., a corporation of Nevada

Filed June 12, 1961, Ser. No. 116,507
7 Claims. (Cl. 209—82)

This invention relates to method and apparatus for sorting automatically logs and like heavy, elongated objects.

In sawmill operation it is desirable to sort the logs according to diameter preliminary to running them through the mill. This minimizes gang saw setting and otherwise facilitates sawmill operation so that maximum efficiency is obtained. Sorting the logs obviously presents a problem, however, since they are cumbersome, heavy and difficult to handle.

It is the general object of this invention to provide a sorter for logs which will sort them rapidly according to diameter or other selected characteristic, depositing them in bins which then may be used as a source of supply for feeding the saws.

It is another object of this invention to provide a sorting apparatus which is automatic and continuous in operation, and which will sort objects of random size at random spacing without scheduling, and without the necessity of starting and stopping equipment carrying heavy loads.

In the drawings:

FIGS. 1, 2 and 3 are fragmentary views in side elevation of the presently described sorting apparatus;

FIG. 4 is a transverse sectional view taken along line 4—4 of FIG. 3;

FIG. 5 is a schematic view of a control system for controlling the sequence of operation of the herein described sorting apparatus;

FIG. 6 is a detail view in elevation, partly broken away, of a dual, fluid-operated cylinder assembly applicable in the herein described sorting apparatus;

FIGS. 7 and 8 are transverse sectional views taken along lines 7—7 and 8—8, respectively, of FIG. 6; and

FIGS. 9, 10 and 11 are, respectively, views in side elevation, plan and section of a carriage assembly applicable in the herein described sorting apparatus.

Where the presently described apparatus is to be used for sorting logs, the logs first may be sawed to length and barked. They then are placed one at a time, end to end, on an endless conveyor system of substantial length and including two or more units. One of these units conveys the logs successively past a plurality of discharge stations. Its construction is shown in FIGS. 2–5 inclusive.

Suitably supported in a framework designed to carry heavy loads, is an endless track arranged for operation in a vertical plane. The track comprises a horizontal top section **20**, a horizontal bottom section **22**, an arcuate infeed end section **24** and an arcuate outfeed end section **26**. The top of the latter is pivoted to the frame by pivot pins **28**. Its lower end terminates in a plate **30** to which are attached tensioning cable **32** and weight **34**. An adjustable screw abutment **36** limits angular movement of the section in a counterclockwise direction. Limit switch **38**, in an electric circuit with the drive of the unit, stops the drive in the event of mechanical failure.

Mounted on the track is an endless carriage assembly including a plurality of individual carriages, the construction of which is shown particularly in FIGS. 9–11. Each carriage includes a frame **40** on top of which is a shallow bed **42**. This member may be slightly V-shaped in transverse cross section, better to center the load which

it carries. Preferably its leading and trailing ends are provided with downwardly turned guide segments **44**, **46** to assist in guiding the load onto the bed.

Rotatably mounted on frame **40** are flanged wheels **50**, dimensioned to ride on the various sections of the track.

Forwardly and rearwardly extending sections of frame **40** support cross pins **52** on which are mounted sleeves **54**. The carriages then may be connected one to the other to form an endless chain by means of link bars **56**.

The continuous drive for the carriage assembly is shown in FIG. 2.

A motor **60** drives chain **62** which in turn drives a sprocket **64** keyed to shaft **66** which drives the head sprocket **67**. One end of a caterpillar chain drive assembly **68** engages the sprocket **67**. The other end engages a sprocket **70**, keyed to a rotatably mounted shaft **72**.

Chain assembly **68** moves across a supporting track **73**. It is made up of units comprising outside side bars **74** and inside side bars **76** interconnected by pins **78** which also mount rollers **80**, the rollers tracking on track **73**.

At spaced intervals corresponding to the spacing of the carriages, outwardly extending dogs or lugs **82** are welded to the chain side bars. These are proportioned for insertion in the space in the underside of each carriage between the wheels and sleeve **54** against which the lug bears, driving the carriage assembly.

At spaced intervals along the track and carriage assembly are a plurality of bins sized to receive the logs or other objects being carried. In the illustrated form of the invention there are fourteen such bins arranged in rows of seven on each side of the conveyor. Twelve of these are designed to receive logs having individual diameters of from 6–17 inches inclusive. An additional bin is retained for all larger diameters in a single sort. Another is retained for logs needing rebarking or retrimming.

The bins are located at a lower level than the logs and are formed of suitable structural elements such as floor pieces **84**, outer posts **86** and inner posts **88**, the upper sections of which are angled to form guiding surfaces. Floor pieces **84** may be elevated sufficiently so that the accumulation of logs **90** may be removed by a fork truck.

Mounted on the same frame that supports the track and endless carriage assembly, and adjacent each bin, is a discharging assembly, the construction of which is illustrated in FIGS. 3 and 4. Its function is to discharge the logs to the right or to the left in the appropriate bins, as required to sort them.

The discharge assembly may be mounted on a rock shaft **92** journaled in bearings **94**. Fixed to the shaft are a plurality of pushing members or arms **96** which are substantially U-shaped in cross section and which are arranged in such a manner that, as seen in FIG. 4, their ends may be made to push against one side or the other of the log as they are rocked on shaft **92**.

Although diverse types of drive means may be employed to actuate the pushing members, it is preferred to to employ a dual, fluid-operated cylinder assembly such as is shown in FIGS. 6–8.

This assembly includes a first double-acting, fluid-operated cylinder **98**, the piston **100** of which is in an extended position and the piston rod **102** of which is coupled through pin **104** to the intermediate one of pusher arms **96**.

It is also includes a second double-acting, fluid-operated cylinder **106**, the piston **108** of which normally is in retracted position and the piston rod **110** of which is fastened to cylinder **98**.

Cylinder **106** mounts a pair of spaced collars **112**, **114** interconnected by rods **116**. The assembly is trunnion-

mounted by trunnions **117** extending outwardly from collar **112** and received in bearings **118** which, in turn, are mounted on the frame of the conveyor (FIG. 4).

Means are provided for permitting cylinder **98** to reciprocate as a unit with respect to cylinder **106**. To this end cylinder **98** carries a pair of spaced collars **120**, **122** in which are placed bearings **124**. A cooperating collar **126** is mounted about cylinder **106**. Slides **128** interconnect the three collars so that, as the piston of cylinder **106** reciprocates, cylinder **98** reciprocates as a unit with it. Accordingly it is possible, by extending piston **108**, to move pusher arms **96** clockwise, as viewed in FIG. 4. Similarly, by retracting piston **100** of cylinder **98**, the arms may be moved counterclockwise. This in turn dislodges log **90** and pushes it in the direction of the right hand or left hand bin respectively.

Logs are fed onto the carriage assembly by a cooperating, aligned conveyor unit **130**. The logs, traveling horizontally on this unit, are picked up by the carriages as they ascend in feed end section **24** of the track. Retaining walls **132** assist in locating the logs properly on the carriages as they are transported to the discharge stations.

Means also are provided for actuating automatically the apparatus described above for discharging the logs in the appropriate bins. The actuating means are illustrated in FIG. 5.

As the logs proceed on conveyor unit **130**, preliminary to being transferred to the carriages, they pass a gauging station where they are measured for diameter or other selected characteristic by the operator. Past the gauging station runs a tape **134** driven by rolls **135** at a speed scaled to the speed of the logs. The tape may be of the punch type or magnetic type and is employed to record instructions which subsequently will result in the log being discharged in the proper bin.

Accordingly there is provided a control panel **136** provided with a plurality of push buttons **138**, the number of which corresponds to the number of bins, i.e. fourteen in the present instance. Upon pushing the selected button, tape **134** is punched or otherwise altered in instrument box **140**. The altered portion then progresses past a plurality of sensing elements **142**, equal in number, and scaled spacing to the corresponding sorting bins.

As the tape proceeds past the sensing elements, it eventually passes the one tuned to the alteration. At that particular instant the log will have reached a position opposite the corresponding bin. An electric circuit thereupon is completed by the sensing element, energizing one or the other of solenoid-operated valves **144**, **146**. If valve **144** is energized, cylinder **98** is actuated, moving pusher arm **96** counterclockwise (FIG. 4) and tipping log **90** into the left hand bin. On the other hand, if solenoid-operated valve **146** is energized, arms **96** are moved in a clockwise direction, tipping the log into the right hand bin.

In this manner there is provided automatic apparatus for sorting continuously moving logs or other heavy elongated objects according to a predetermined characteristic, the logs being of random length and random spacing, without the necessity of scheduling the sorting operation, or if periodically starting and stopping heavily loaded, massive equipment.

It is to be understood that the form of our invention herein shown and described is to be taken as a preferred example of the same and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of our invention or the scope of the subjoined claims.

Having thus described our invention, we claim:

1. Apparatus for sorting objects which comprises conveyor means for conveying them successively past a gauging station and past a plurality of linearly spaced discharge stations, a signal tape, means for traversing the tape past the gauging station at a linear speed scaled to the speed of the objects on the conveyor means, altering means positioned for altering the tape in accordance with a selected characteristic possessed by the object, a plurality of spaced sensing means responsive to the alterations on the tape and located at a plurality of spaced sensing stations, the spacing of which is scaled to the location of the discharge stations, and at each discharge station discharge means operable by the sensing means for discharging selectively from the conveyor objects possessing the selected characteristic.

2. Apparatus for sorting logs and like elongated heavy objects which comprises an endless track arranged for operation in a vertical plane, a plurality of carriages mounted on the track and each provided with a substantially flat bed for supporting the objects, a plurality of elongated links pivotally interconnecting the carriages in an endless chain, drive means driving the carriages about the track at a predetermined linear speed, a plurality of bins arranged at spaced intervals along opposite sides of the track below the upper stretch thereof, stationed adjacent each bin discharge means comprising U-shaped, dual-acting ram means straddling the upper stretch and mounted for pivotal reciprocation on an axis substantial parallel to the line of movement of the chain, and drive means connected to the ram means for pivoting the spaced ends of the U-shaped ram toward opposite sides of the carriages, thereby pushing the object located thereon into the associated bin.

3. Apparatus for sorting logs and like elongated heavy objects which comprises an endless track arranged for operation in a vertical plane, a plurality of carriages mounted on the track, a plurality of elongated links pivotally interconnecting the carriages in an endless chain, a driven endless chain provided with spaced outwardly projecting dogs, the spacing between the dogs corresponding to the spacing between the carriages, the dogs being engageable with the carriages for driving them along the track, a plurality of receivers arranged at spaced intervals along the track, and discharge means stationed opposite each receiver, the discharge means being operable upon selected actuation to move selected ones of the objects into the adjacent receiver.

4. Apparatus for sorting logs and like elongated heavy objects which comprises an endless track arranged for operation in a vertical plane, a plurality of carriages mounted on the track, a plurality of elongated links pivotally interconnecting the carriages in an endless chain, drive means driving the carriages about the track at a predetermined linear speed, a plurality of receivers at spaced intervals along the track, and discharge means stationed opposite each receiver and including signalling means comprising a tape, means for moving the tape at a linear rate scaled to the rate of movement of the carriages, punch means for punching the tape in characteristic patterns, a plurality of sensing means, each responsive to a selected pattern of punches and spaced apart linearly from each other, the linear spacing being scaled to the linear spacing of the receivers, and an electric circuit operatively associating the sensing means and the discharge means, the discharge means being operable upon selective actuation to move selected ones of the objects into the adjacent receiver.

5. Apparatus for sorting logs and like elongated heavy objects which comprises an endless guide track arranged for operation in a vertical plane, a plurality of carriages mounted on and guided by the track, a plurality of elongated links pivotally interconnecting the carriages in an endless chain, the endless track comprising top, bottom and arcuate end segments, arranged in a common vertical plane and forming a substantially continuous guide track for the carriages and links, one end segment being pivotally mounted at its upper end on a transverse axis and disconnected at its lower end from the bottom segment of the track, and tensioning means applied to the pivotally mounted segment for urging the latter pivotally outward in the longitudinal direction of the track for tensioning the

carriage chain and maintaining the latter in working relation to the track, drive means independent of said one end segment for driving the carriages about the track at a predetermined linear speed, a plurality of receivers arranged at spaced intervals along the track, and discharge means stationed opposite each receiver, the discharge means being operable upon selective actuation to move selected ones of the objects into the adjacent receiver.

6. Apparatus for sorting objects which comprises conveyor means having an elongated working stretch, a plurality of receivers arranged at spaced intervals along opposite sides of the working stretch, a U-shaped discharge member mounted adjacent each receiver for pivotal reciprocation outside the cross sectional perimeter of the working stretch on an axis substantially parallel to the line of movement of the conveyor, the spaced ends of each discharge member being disposed for engaging objects carried on the conveyor selectively during said pivotal reciprocation to discharge the objects selectively to receivers on opposite sides of the conveyor, and drive means engaging each discharge member for pivoting the latter selectively toward opposite sides of the conveyor.

7. In an endless conveyor, track means for mounting

and guiding the conveyor and comprising top, bottom, and arcuate end segments arranged in a common vertical plane and forming a substantially continuous guide track for the conveyor, one end segment being detached at one end from the adjacent track segment, pivot means interconnecting the opposite end of said one end segment to the adjacent track segment on an axis normal to the longitudinal axis of the track, and tensioning means applied to the pivotally mounted end segment for urging the latter pivotally outward in the longitudinal direction of the track for tensioning the conveyor and maintaining the latter in working relation to the track, and drive means independent of said one end segment for driving the conveyor about the track.

References Cited in the file of this patent

UNITED STATES PATENTS

2,438,068	Mercier	Mar. 16, 1948
2,902,150	Rambo	Sept. 1, 1959
3,001,649	Rogers	Sept. 26, 1961

FOREIGN PATENTS

587,754	Canada	Nov. 24, 1959