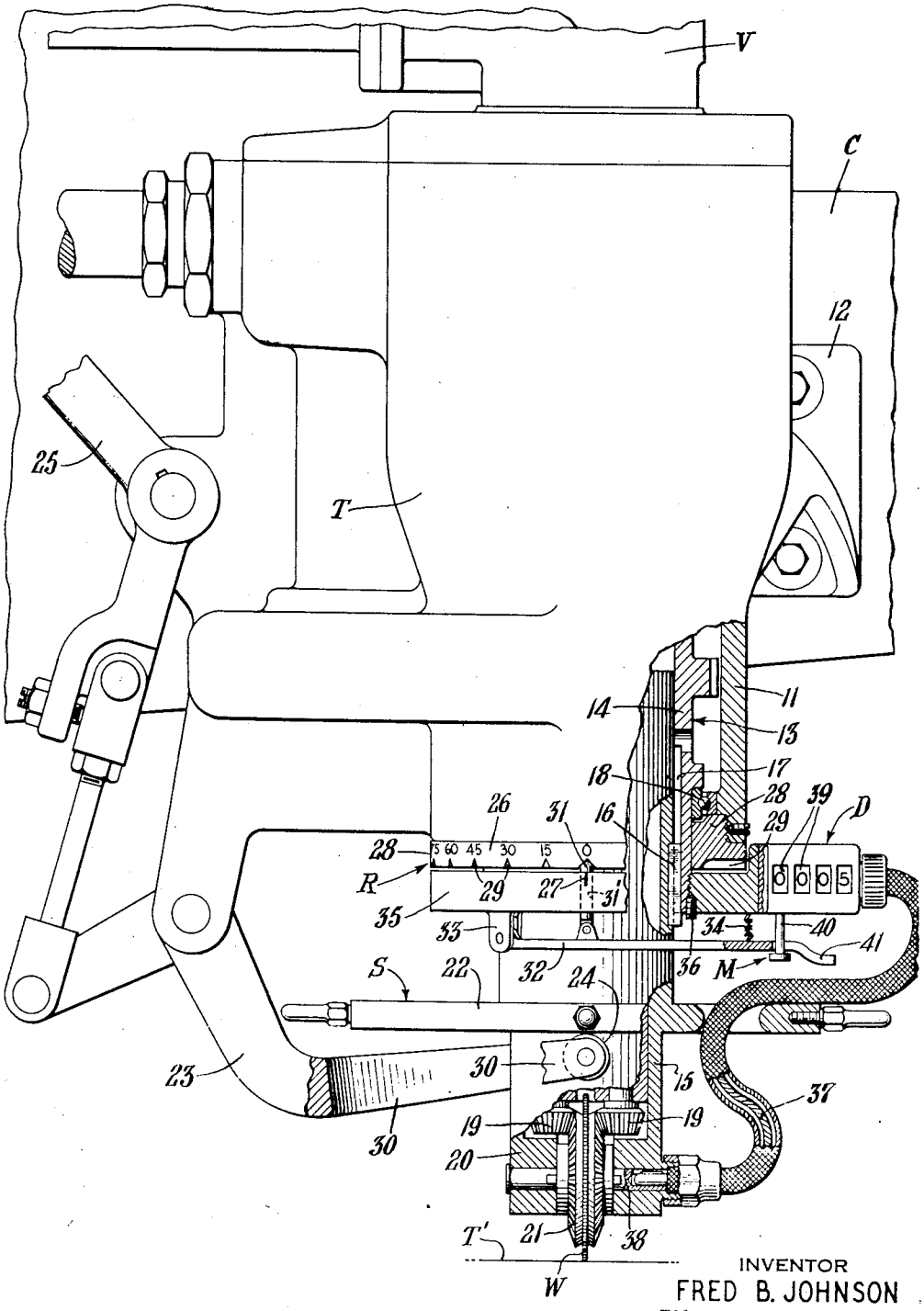
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REPRODUCING MACHINE GUIDING UNIT

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REPRODUCING MACHINE GUIDING UNIT

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This invention relates to guiding mechanism and more particularly to tracing devices for controlling the motion of the tool-supporting carriage of a reproducing machine.

It has been customary, when reproducing contours, to mount a reproducing tool, such as a flame-cutting blowpipe, on a carriage free to move in all directions in a plane, and to guide the carriage along a path defined by a templet located on a working surface. The carriage customarily has been propelled and guided by traction wheels which either engage the opposite sides of a templet strip or roll directly upon a paper pattern as shown in S. R. Oldham Patent No. 2,279,338 dated April 14, 1942.

In many cases, the path to be followed consists of a number of straight lines having included angles of known degree. Even with such simple shapes it has been customary to prepare a drawing to serve as an outline for a hand-guided traction unit, or to prepare a mechanical templet consisting of a bent strip along which driving trunnions may roll. Both of these practices entail an expenditure of time, labor, and materials that may be dispensed with completely through the medium of the present invention. If it is desired to use a paper templet in conjunction with a manually-guided traction head, unnecessary wear of the templet may be avoided by means of the present invention, thereby considerably extending the templet life.

The principal objects of the present invention are: to provide an improved guiding device for a reproducing machine; to provide a traction head for a reproducing machine having means for recording the extent of carriage travel; to provide a traction head having angle and distance indicators permitting an operator to follow predetermined contours by coordinating predetermined angular positions of the tracing head with the recorded carriage travel; to provide in such a traction head means for resetting the odometer whenever a change is effected in the direction of travel; and to provide the combination of an odometer and an angle selector on the traction head of a reproducing machine wherein the odometer is driven directly from the traction wheel. These and other objects of the invention will become apparent from the following description and from the accompanying drawing disclosing one form of the invention as applied to the upper carriage of a shape-cutting machine of the type shown in the Oldham patent hereinbefore referred to.

The single view in the drawing comprises a side elevational view of the improved guiding unit, as applied to the upper carriage of a shape-cutting machine, certain parts being illustrated in section.

Generally speaking, the invention comprises a traction head T bolted or otherwise secured to a carriage C universally movable in a horizontal plane, for example, along rectangular horizontal coordinates as shown in the aforesaid Oldham patent. A traction wheel W is journalled at the lower end of the traction head T for rolling engagement with a work surface or traction surface provided by the top of a table T'. Steering means S pivots or turns the traction wheel about a vertical axis so as to change the direction of its movement. The traction wheel may be held in one of a number of angular positions by a registering index R, and the degree of movement in any direction is indicated on an odometer D. Resetting mechanism M which provides means for restoring the odometer to a zero reading, preferably cooperates with the steering means so as to be actuated thereby whenever the steering means is operated.

The traction head T comprises a housing 11 having a bracket 12 integral therewith for mounting the housing 11 to the carriage C. A steering column 13 consists of a lower sleeve 15 mounted for vertical movement relative to an upper sleeve 14 as by a key 16 and keyway 17 extending in cooperative relation between the respective sleeves. The entire steering column 13 is turned relative to the housing 11 about a central vertical axis, as by one or more anti-friction bearings 18.

The traction wheel W is journalled about a horizontal axis to a suitable support, e. g., the steering column 13, and specifically a reenforced portion 20 of the lower sleeve 15. The traction wheel W is rotated about its axis by one or more driving means such as beveled pinions 19 extending downwardly through the steering column from a transmission housing V at the top of the traction head T. At least one of the pinions 19 engages a bevel gear 21 secured coaxially to the traction wheel W. The steering column 13, and accordingly the traction wheel W, may be turned about a vertical axis by the steering means S which may comprise a handwheel 22 or other suitable manually operable device by which the operator may turn the steering column to shift the direction of the carriage movement in a horizontal plane. It will be apparent that the principles of this invention are adaptable to carriages moving in other than horizontal planes

and that the use throughout the present description of terms denoting horizontal, vertical, or other positions of the parts is to be construed in a relative sense only. As the carriage is propelled over the table T', the steering column 13 may rise and fall in accordance with undulations or other irregularities in the work surface, in which case the lower sleeve 15 will telescope in and out of the upper sleeve 14. The traction wheel W may be lifted bodily from the table T' to stop the carriage, as by a bifurcated lever 23 on each tine 30 of which a roller 24 is mounted for engagement with the under surface of the handwheel 22 adjacent to the periphery. A remote control lever 25 operates the mechanism from a point adjacent to the blowpipe end of the machine so that the traction wheel W may be raised and lowered by the operator while observing the blowpipe action.

The angle at which the traction wheel W is guided may be denoted by a protractor scale 26 and an index 27 mark operative between the housing 11 and the steering column 13. Any suitable means may be provided to secure the parts in adjusted position at any desired angle, as by the registering means R, which may comprise a ring 28 threaded or otherwise fixed to the bottom of the housing 11. The ring 28 may be provided with a suitable protractor scale 26, at least some of the angles of which include V-shaped grooves, notches, or indentations 29, for cooperative relation with a resilient detent 31, preferably aligned with the index 27. The ring 28 may be provided with as many grooves as desired, but for simplicity of illustration, only a few grooves have been indicated in the drawing, to allow the steering column to index automatically, for example, in successive 15° intervals. The detent is mounted in a suitable manner on the steering column, as will appear, and is urged upwardly for engagement with the grooves by a lever 32 pivotally mounted within a lug 33 and constrained upwardly by a spring 34. It will become apparent that as the handwheel 22 is steered, the detent may be made to engage the respective grooves 29 so as to hold the traction wheel in predetermined angular positions. The detent may be rendered inoperable to provide free steering movement by depressing the free end of the lever 32.

The odometer D, which measures carriage travel, may be mounted in any suitable position upon the machine, but preferably is mounted so as to rotate with the steering column to provide a simplified method for connecting the odometer to the driving mechanism of the traction head. As shown in the drawing, the odometer D may be fastened directly to a mounting ring 35 secured at the bottom of the upper sleeve 14 in any convenient manner. The ring 35 may be threaded onto the sleeve 14 and may be locked against relative movement with respect thereto as by a set screw 36. The lug 33 may be welded or otherwise secured against the under surface of the ring 35. A smooth bore 31' may be formed through the ring 35 to slidably receive the detent 31. It will be apparent that the ring 35 rotates with the steering column relative to the housing 11, and that the detent 31 reciprocates vertically as the handwheel 22 is turned to guide the traction wheel in different directions.

The driving connections for the odometer D may be of any conventional design. One form of odometer transmission mechanism, as shown in the drawing, comprises a flexible shaft 37 extending from the odometer to any desired portion of the driving mechanism within the traction head T. The exact point of connection is determined largely by the speeds of the rotating parts and the nature of the gearing employed within the odometer. The machine will operate satisfactorily irrespective of the location of the driving connection within the head, provided the odometer is coordinated with the movement of the traction wheel W so as to record the extent of carriage travel in terms of standard lineal units, for example, centimeters or inches. As shown in the drawing, the flexible shaft 37 may be keyed directly to a spindle 38, forming a journal for the traction wheel W, though without gearing, the shaft speed may be relatively low.

With the unit thus far described, the operator may cause the carriage C to trace polygonal shapes without the use of paper or mechanical templets. The shape to be followed is charted by simply tabulating the angles to be followed with the distance measured along the respective sides. When the machine is set in motion, the operator may determine when the traction wheel is to be shifted to a new angle by observing at what time the odometer reading agrees with the prescribed reading on his chart. The chart also indicates the angle through which the steering column is to be pivoted so that the proper adjustment may be made in conjunction with the protractor scale 26 and the index 27.

The resetting mechanism M for the odometer D provides means for restoring the odometer to a zero reading. Odometers of the resetting type are of standard construction and do not require a detailed explanation. The type preferably employed in the present combination utilizes a series of indicator elements, such as numbered drums 39 which may be rotated by the shaft 37 to integrate the number of shaft turns and to indicate the corresponding distance traversed by the carriage. A resetting button 40 is operative, when pulled down, to disengage the shaft 37 from the drums 39, allowing the drums to return to their initial position.

The operator may actuate the button 40 by manually depressing the lever 32 so as to restore the odometer to a zero reading at any desired time. It often is desirable to operate the reset button 40 each time the steering means S is actuated to propel the carriage C in a new direction. As shown in the drawing, this may be accomplished by disposing a forked end 41 of the lever 32 adjacent to the button 40 in such a manner that the slight reciprocatory movements of the detent 31, produced when the rings 35 and 28 pivot relatively to one another, operate the button 40. Accordingly, the operator's chart may be tabulated in terms of the lengths of the individual sides of the polygonal outline to be followed, rather than in the summations of the lengths of the respective sides. When the length of one side has been traversed and the traction wheel reaches an apex or corner, the steering means is actuated until the index 27 or detent 31 indicates the new direction of movement. During the steering operation the detent 31 will be reciprocated one or more times by interaction with the grooves 29, with the result that when the carriage starts in the new direction, the odometer reading is zero.

With the present arrangement, the traction wheel and its support may float vertically within the sleeve 14 to compensate for irregularities

in the table T', and the transmission connection between the traction wheel and the odometer D is not disturbed because of the flexible nature of the shaft 37. Since rollers 24 are located at a point adjacent to the outer periphery of the handwheel 22 they cause no interference with the cable 37 when the handwheel is turned, as the cable extends through the handwheel 22 at a point within the space formed by the tines 30.

The invention is susceptible of numerous modifications without departing from the spirit of the invention or sacrificing its advantages.

I claim:

1. A reproducing machine comprising a tool-supporting carriage movable in varying directions in a plane relative to a work surface; propelling means adapted to propel said tool-supporting carriage in said plane; guiding means adapted to control the angle of such relative movement; means for maintaining said guiding means at a selected direction angle; an odometer, said odometer being provided with calibrations indicating carriage travel in standard units of lineal measurement; and odometer driving means adapted to actuate said odometer in accordance with the extent of carriage travel.

2. A guiding unit for a reproducing machine carriage supported for movement in varying directions in a plane, said unit comprising steering means adapted to control the direction of carriage movement; an odometer; odometer driving means adapted to actuate said odometer in accordance with the extent of carriage travel; odometer-resetting means; and cooperating means on said steering means and said odometer-resetting means for actuating said odometer-resetting means by said steering means.

3. A guiding unit for a reproducing machine carriage supported for movement in varying directions in a plane relative to a work surface, said unit comprising manually operable steering means adapted to control the angle of carriage movement; means for securing said steering means in a selected position; a distance indicator adapted to register the extent of carriage travel; resetting means on said odometer; and means operable by said steering means to restore said distance indicator to a zero position whenever the position of said steering means is changed.

4. A guiding unit for a reproducing machine carriage supported for movement in varying directions over a work surface, said unit comprising a traction head having a traction wheel engaging said surface; steering means for said traction wheel; means for maintaining said steering means in a selected angular position; an odomotor coordinated with the motion of said carriage and calibrated in standard lineal units; and means for driving said traction wheel and said odometer in timed relation.

5. A guiding unit for a reproducing machine carriage supported for movement in varying directions over a work surface, said unit comprising a traction head having a traction wheel engaging said surface; steering means for said traction wheel; means for maintaining said steering means in a selected angular position; an odometer; and driving connections between said traction head and said odometer, whereby said odometer is actuated when said traction wheel rotates, said odometer being calibrated in terms of lineal units of carriage motion.

6. A guiding unit for a reproducing machine carriage supported for movement in varying directions over a work surface, said unit comprising a traction head having a traction wheel engaging said surface; steering means for said traction wheel; means for securing said steering means in selected positions to maintain said traction wheel motion along predetermined angles; an odometer actuated by the motion imparted to said carriage; and odometer resetting means operable by movement of said steering means from one setting to another, to reset said odometer to a zero position.

7. A guiding unit as claimed in claim 6 including a protractor scale cooperative with said steering means, said securing means comprising a cooperating detent and indentations spaced at regular intervals about said scale.

8. A guiding unit for a reproducing machine carriage supported for movement in varying directions over a work surface, said unit comprising a traction head having a housing fixed to said carriage; a traction wheel support pivotally mounted on said head; a traction wheel journalled to said support for rolling engagement with said surface; steering means for turning said traction wheel and said support about an axis substantially normal to said surface; means for maintaining said steering means in a selected angular position; driving means for said traction wheel; an odometer mounted on said support and pivotal therewith; and a connection between said odometer and said driving means, whereby said odometer registers the motion of said carriage imparted by said wheel.

9. A guiding unit for a reproducing machine carriage supported for movement in varying directions over a work surface, said unit comprising a traction head having a housing fixed to said carriage: a traction wheel support pivotally mounted on said head; a traction wheel journalled to said support for rolling engagement with said surface; steering means for turning said traction wheel and said support to control the angle of carriage movement; driving means for said traction wheel; an odometer mounted on said support being free to turn therewith; a driving connection between said odometer and said driving means; and registering means operative between said support and said housing adapted to locate said support at predetermined angles relative to said housing.

10. A guiding unit for a reproducing machine carriage supported for movement in varying directions over a work surface, said unit comprising a traction head having a housing fixed to said carriage; a traction wheel support pivotally mounted on said head; a traction wheel journalled to said support for rolling engagement with said surface; steering means for turning said traction wheel and said support about the axis of said support to control the angle of carriage movement; driving means for said traction wheel; an odometer mounted on said support; a driving connection between said odometer and said driving means; and resetting means for said odometer, operable by motion of said steering means to restore said odometer to its zero reading.

11. A guiding unit as claimed in claim 10 wherein said resetting means comprises a series of circumferentially disposed notches and a detent cooperative between said support and said housing, said detent being movable in and out of said notches as said support is pivoted, and including release mechanism on said odometer operable by the movement of said detent to return the in-

dicator elements of said odometer to their zero position.

12. A guiding unit for a reproducing machine of the type having a tool-supporting carriage propelled in varying directions in a horizontal plane along a course simulating a predetermined path, said guiding unit comprising a support adapted to be secured to said carriage; a steering column swivelled to said support; a steering wheel for directing said steering column; and a protractor scale and index operative between said column and support to indicate the swiveling motion of said column.

13. In a reproducing machine having a carriage and means for propelling said carriage in selected directions, means for reproducing a polygonal outline by successively determining the angle and distance of carriage movement, which comprises means for selecting and maintaining a first direction of carriage movement; an odometer for indicating the distance of carriage travel in said first direction; said selecting means being operable upon completion of said first distance to select and maintain a second direction of carriage movement; and said odometer being operable to indicate the distance of carriage travel in said second direction, whereby successive angles and sides may be reproduced from the dimensions thereof.

14. A guiding unit for a reproducing machine carriage supported for movement in varying directions in a plane, said unit comprising steering means adapted to control the direction of carriage movement; means for maintaining said steering means in a selected angular position; means on said carriage responsive to the extent of carriage travel in the direction controlled by said steering means; an odometer mounted on said carriage; and odometer driving means cooperating with said carriage travel responsive means and adapted to drive said odometer in accordance with the extent of carriage travel.

15. A reproducing machine comprising a tool supporting carriage movable in varying directions in a plane relative to a work surface; propelling means adapted to propel said tool supporting carriage in said plane; guiding means adapted to control the direction angle of such relative movement produced by said propelling means; means for maintaining said guiding means at a selected direction angle; an odometer; and odometer driving means cooperating with said propelling means and adapted to drive said odometer in accordance with the extent of carriage travel.

16. Means for guiding and controlling a tracer to travel along a pattern consisting of intersecting lines, which comprises means for selecting and maintaining a first direction of tracer travel along one of said lines; and means for indicating the distance of tracer travel in said first direction; said selecting means being operable upon completion of said first distance of tracer travel for selecting and maintaining a second direction of tracer travel along another of said lines; and said indicating means being operable for indicating the distance of tracer travel in the second direction.

17. Means for guiding and controlling a tracer to travel along a pattern consisting of intersecting lines, which comprises means for selecting and maintaining a first direction of tracer travel along one of said lines; and means for indicating the distance of tracer travel in said first direction; said selecting means being operable for selecting a second direction of tracer travel along another of said lines, and operable upon completion of said first distance for maintaining said second direction; and said indicating means being operable for indicating the distance of tracer travel in said second direction.

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