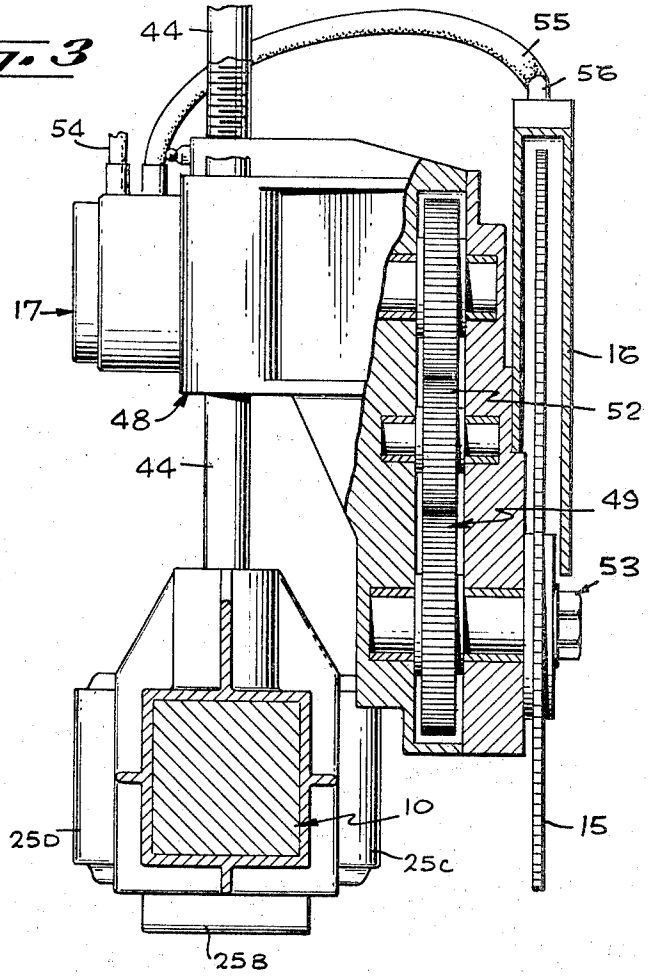
April 16, 1968 E. J. DEMPSEY ETAL 3,378,307

CIRCULAR SAW FOR CUTTING CONCRETE SURFACES

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Fig. 3



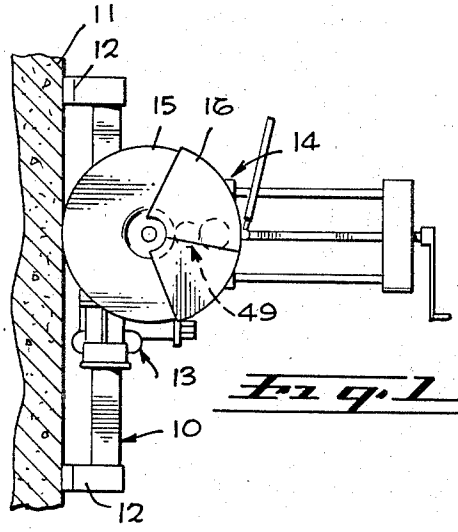


Fig. 1

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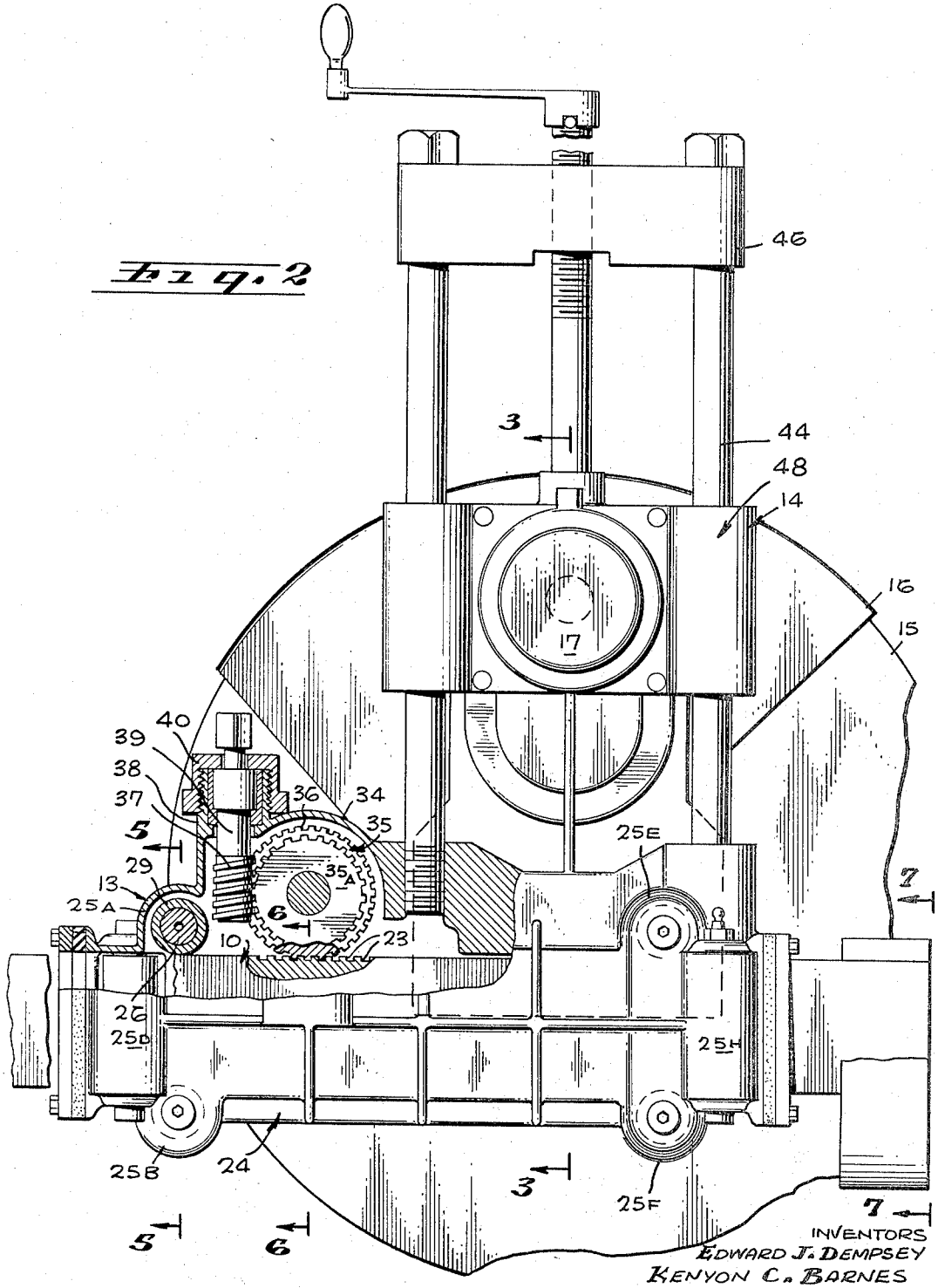
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CIRCULAR SAW FOR CUTTING CONCRETE SURFACES

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Fig. 2



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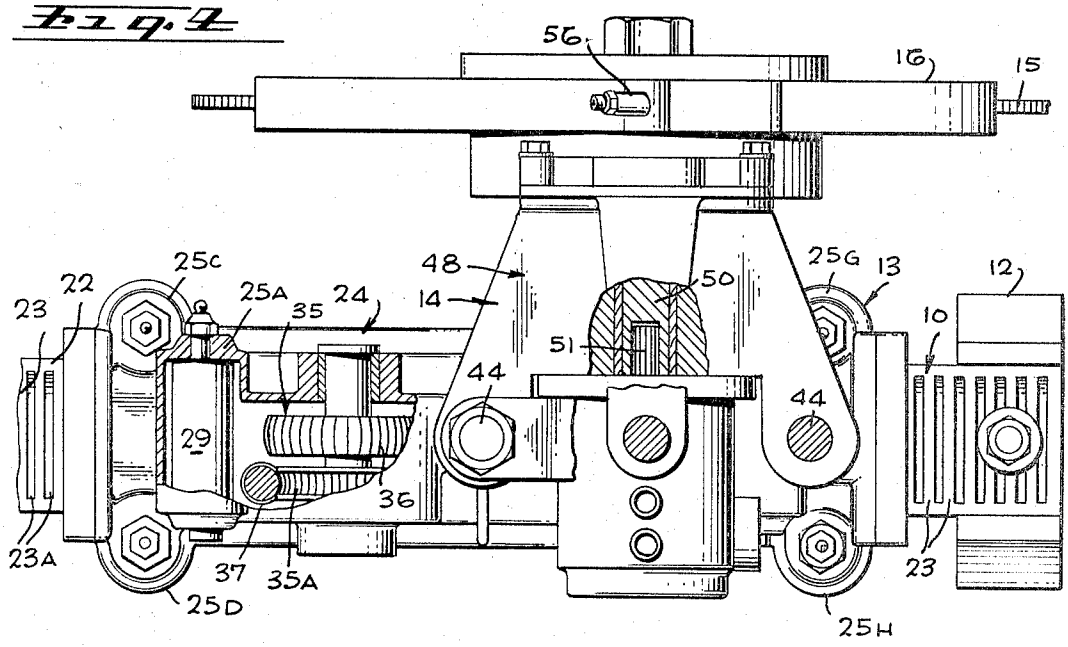
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CIRCULAR SAW FOR CUTTING CONCRETE SURFACES

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Fig. 4



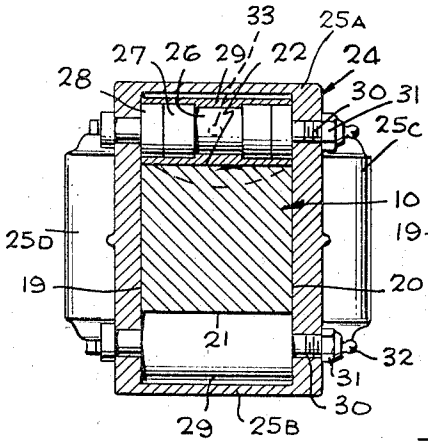


Fig. 5

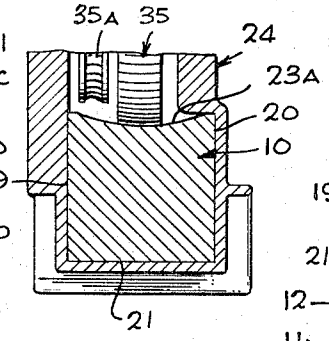
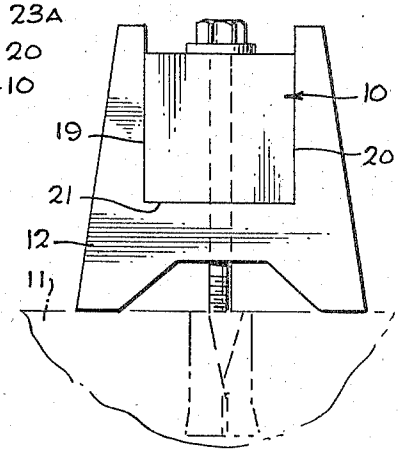


Fig. 6

Fig. 7



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3,378,307

CIRCULAR SAW FOR CUTTING CONCRETE SURFACES

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1 Claim. (Cl. 299—75)

ABSTRACT OF THE DISCLOSURE

A rectangular rail spans a pair of stanchions which are firmly secured to a concrete surface to be cut. Movably mounted to the rail is a truck, which carries a circular saw movable toward and away from the concrete surface. The rail is provided with rack teeth which mesh with a drive gear mounted in the truck. The drive gear is rotated by a pinion which is in turn meshed with a worm. The worm is turned to move the truck back and forth along the rail and also to lock it in place against unwanted displacement.

This invention relates generally to power-driven, abrasive wheel devices for cutting a longitudinal kerf in concrete and similar surfaces.

It is a common and well-known expedient to drive a circular abrasive wheel into stone and concrete for the purpose of cutting a kerf. Modern highways are poured in continuous ribbons and then severed into longitudinal sections by such devices to provide expansion joints.

Although the use of mobile devices for surface cutting is well established, there has been a notable lack of equipment provided for the purpose of cutting walls and other surfaces wherein gravity becomes a problem instead of an assistance.

In remodeling work in particular, it is necessary to remove portions of a building, for example, in order to make alterations in the building. Conventional air hammer cutting produces a ragged edge and takes considerable time as well as requiring the use of tools light enough to hold manually, or the provision of assistance devices.

It is an object of this invention to provide concrete cutting equipment which employs a track that may be established along the surface and adjacent an area to be cut, and then employing that track to guide and direct a cutting device.

It is a further object of this invention to provide an improved track and housing combination to contain drive apparatus for moving the housing along the track as a carriage without interference from chips and debris of the cutting operations.

It is a still further object of the invention to provide concrete cutting apparatus operable along any surface with a minimum of human physical strength and stamina requirements, and a maximum of cutting control.

In accordance with these and other objects which will become apparent hereinafter, a preferred form of the present invention is disclosed in the accompanying drawings wherein:

FIGURE 1 is an illustration of the apparatus made according to the principles of this invention as employed to cut into a vertical wall;

FIGURE 2 is a side elevation of the apparatus from the side opposite the cutting wheel with parts broken away to reveal internal structure;

FIGURE 3 is a view taken substantially along line 3—3 of FIGURE 2;

FIGURE 4 is a top-plan view of the apparatus with the parts broken away to reveal internal structure;

FIGURE 5 is a section taken along line 5—5 of FIGURE 2;

FIGURE 6 is a section taken along line 6—6 of FIGURE 2; and

FIGURE 7 is an end view of the track and mounting device as viewed along line 7—7 of FIGURE 2.

FIGURE 1 is a general view of the apparatus in operation, and illustrates a track **10** mounted along a vertical wall **11** upon stanchions **12**.

The stanchions **12** are secured to the face of wall **11** by any suitable means. In some instances drilled holes may be placed in the wall to provide anchor clamps, as shown in FIGURE 7, but in other cases the wall must be preserved intact and auxiliary holding apparatus will be employed. The invention resides in the construction and operation of the device rather than the particularly selected means for holding the device to a wall upon which the operation is to be performed.

Also, in the FIGURE 1 a truck carriage means **13** is mounted to reciprocate upon the track **10** and carry a cross-carriage **14**. A power-driven abrasive blade **15** is mounted upon and carried with the cross-carriage **14** in a lateral direction with respect to the path of the truck carriage **13**. A guard **16** protects the workman from contact with the blade **15** and from flying debris, as well as acting as a water-directing screen.

A motor **17**, best seen in FIGURES 2 to 4, is provided on the carriage **14** to drive the blade **15**.

The illustrated embodiment of the invention employs a square cross-section track **10**, as best seen in FIGURES 3 and 5. The track **10** has smooth walls **19**, **20**, and **21**, and a toothed top wall **22**. For the particular purposes of the present invention, the top wall **22** is milled to provide a series of teeth **23** separated by segmental slots **23A**. Therefore, the track is in the form of a square cross-section rack.

The slots **23A** do not extend the entire width of the top wall **22** and, therefore, an interrupted smooth edge track of the top wall **22** remains on each side of the resultant teeth **23**.

Truck carriage means **13** is composed of a cast housing **24** in the particular embodiment illustrated in the drawings. By casting, the various compartments and structures desired for the present invention are easily accomplished.

The housing **24** includes a series of roller domes **25** lettered alphabetically A through H. The housing has a longitudinal through opening defined by interior walls dimensioned to fit in a reasonably-close fit to the walls **19**–**22** of the track **10**. A cluster of four of the roller domes **25A** through **25D** are assembled around one end of the passageway and the domes **25E** through **25H** around the other.

Refer to FIGURE 5 specifically for an illustration of the construction of the roller domes, wherein two rollers **26** are set forth within the domes **25A** and **25B**.

Each roller **26** is composed generally of twin roller bearings **27**, each with an oil seal **28** on the exterior side thereof, between the side of the bearing and the wall of the dome.

The rollers **26** have a shell **29** which is tubular in exterior form and dimensioned to receive and hold the bearings **27** laterally spaced from one another within the shell.

A bolt **30** passes through opposite side walls of the roller dome in which a roller **26** resides, and is held tightly by means of a nut **31**. The exterior dimension of the bolt is proportioned to fit the internal race of the two bearings **27** and, thus, support the roller shell **29**.

The bolt is tubular over a part of the length from the nut toward the cap of the bolt, and a grease fitting **32** is applied to the end of the bolt which projects through the nut **31**. The passageway through the bolt ends midway of the roller in an outlet **33**, which is shown in phantom outline in the roller dome **25A** of FIGURE 5. Therefore,

the area within the dome may be filled with grease in order to lubricate the bearings and seal out the water and dust of the environment around the bearing.

By the placement of the four rollers at each end of the housing passageway, the housing becomes entirely mobile, but is held rigidly to the track **10** for guidance.

The rollers which run upon the top wall **22** are supported by the remaining edges of the top structure on each end of the milled slots **23A**. Thus, the top structure of track **10** remains strong, and all of the teeth are securely bound at their ends, and the roller is adequately supported on a rolling surface. Furthermore, an important function is served in the formation of an arcuate segment milled as the slot **23A** in that dirt which does accumulate in the track is easily brushed out of the teeth by a brush or air, without corners in which dirt can be trapped.

The cutting of material such as concrete and stone requires a careful steady feed of the blade **15** into the material being cut. This invention provides both a highly-controllable drive force under the complete control of the operator, and also provides holding power to hold the wheel in any position regardless of gravity force.

The drive member of the invention may best be seen in FIGURES 2 and 4. A cab **34** is provided as part of the internal enclosure of the housing **24** and in that cab is journaled a gear wheel **35**, having teeth **36** formed to operate with the specially-cut and formed milled teeth **23**. Rotational drive of the wheel **35** will, therefore, carry the truck carriage means **13** along the track **10**.

A worm gear **37** is journaled in a tower **38** for this drive purpose. The teeth of worm **37** are in drive relationship with a gear wheel **35A**. Wheel **35A** is secured to a common shaft with wheel **35**. The gear **37** has a stem **39** which extends from the tower housing **38** and is fitted with a cap **40**. Cap **40** is formed to receive a ratchet wrench, socket, or similar hand tool to impart a slow and controlled rotative drive. Thus, it will be apparent that the considerable gear reduction between the worm gear **37** and the wheel **35** will produce immense power, as well as a very slow movement of the truck carriage means **13**. This will prevent sudden impact which may shatter the abrasive blade **15**.

The worm gear **37** is but one example of a one-way drive mechanism, i.e. a drive train through which movement can be imparted from only one direction. While it is necessary that the truck be movable along the rail in both directions, it is important that the truck remain immobile with respect to the rail in the absence of control rotation of the cap **40**. This immobilization is particularly important where the rail is vertically mounted and the force of gravity acting on the truck etc. must be overcome without the maintenance of a rotative force on the cap **40**.

The cross-carriage **14** is formed by means of rods **44** which are secured to the housing **24** and held spaced at the free ends thereof by a spacer **46**. The rods **44** are, therefore, held in a rigidly and accurately-spaced parallel relationship. A carriage **48** is fitted to slide along the rods **44** to carry the motor **17** and the blade **15**. To save weight, rods **44** are preferably hollow rods.

The motor **17** illustrated as being a two-cycle, water-cooled, gasoline engine as one example of a suitable power source. The power source has been successfully supplied by air and electric motors. The motive power is generally chosen according to the environment and power sources available.

Refer to FIGURE 3. Here it will be seen that a gear

train **49** is employed to reduce the normally-high speeds of small power sources to a suitable rotative drive speed for the blade **15**. As an example, a blade large enough to cut a twelve-inch kerf should run about 1,750 r.p.m. as a maximum. However, a small motor of sufficient power may run at speeds up to 3,500 r.p.m. At the top of the train **49**, as best seen in FIGURE 4, is a bearing spindle **50** into which a splined shaft **51** from the power source is fitted. Thus, the power source may be removed and a new power source installed in moments of time without expensive dismantling of the entire equipment.

One or more intermediate gears **52** translate the power to a final gear and wheel mounting spindle combination **53**.

In the use of a water-cooled gasoline engine, a water supply line **54** to engine **17** brings cool water, and the heated exhaust water is carried through an outlet **55** to a spray nozzle **56**, located at the top of the guard **16**. Thus, the water serves a dual function. Such cutting operations are generally flushed with water and thus one source does two operations.

If an engine **17** is employed which does not require cooling water, then the source **54** may be connected directly to the tube **55**, or to the nozzle **56**.

While the instant invention has been shown and described herein in what is conceived to be the most practical and preferred embodiments, it is recognized that departures may be made therefrom within the scope of the invention which is, therefore, not to be limited to the details disclosed herein, but is to be afforded the full scope of the invention as hereinafter claimed.

What is claimed is:

1. Concrete cutting equipment comprising:

a pair of spaced stanchions;

an elongated rail of rectangular cross-section mounted on and spanning said stanchions, said rail being of sufficient rigidity to resist torsional bending during operation of the saw and having transverse rack teeth thereon;

means for securing said rail to said stanchions;

means for securing the stanchions directly to the surface to be cut;

a truck surrounding said rail and having mating surfaces engaging all sides of said rail and movable therealong;

a drive gear mounted on said truck in engagement with said teeth;

one-way drive means for moving said truck along said rail;

a carriage mounted on said truck and movable thereon toward and away from said surface; and

a circular saw rotatably mounted on said carriage.

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