N. B. QUICK.

ICE CUTTING MACHINE.

APPLICATION FILED DEC. 7, 1912.

1,096,860.

Patented May 19, 1914.

3 SHEETS—SHEET 1.

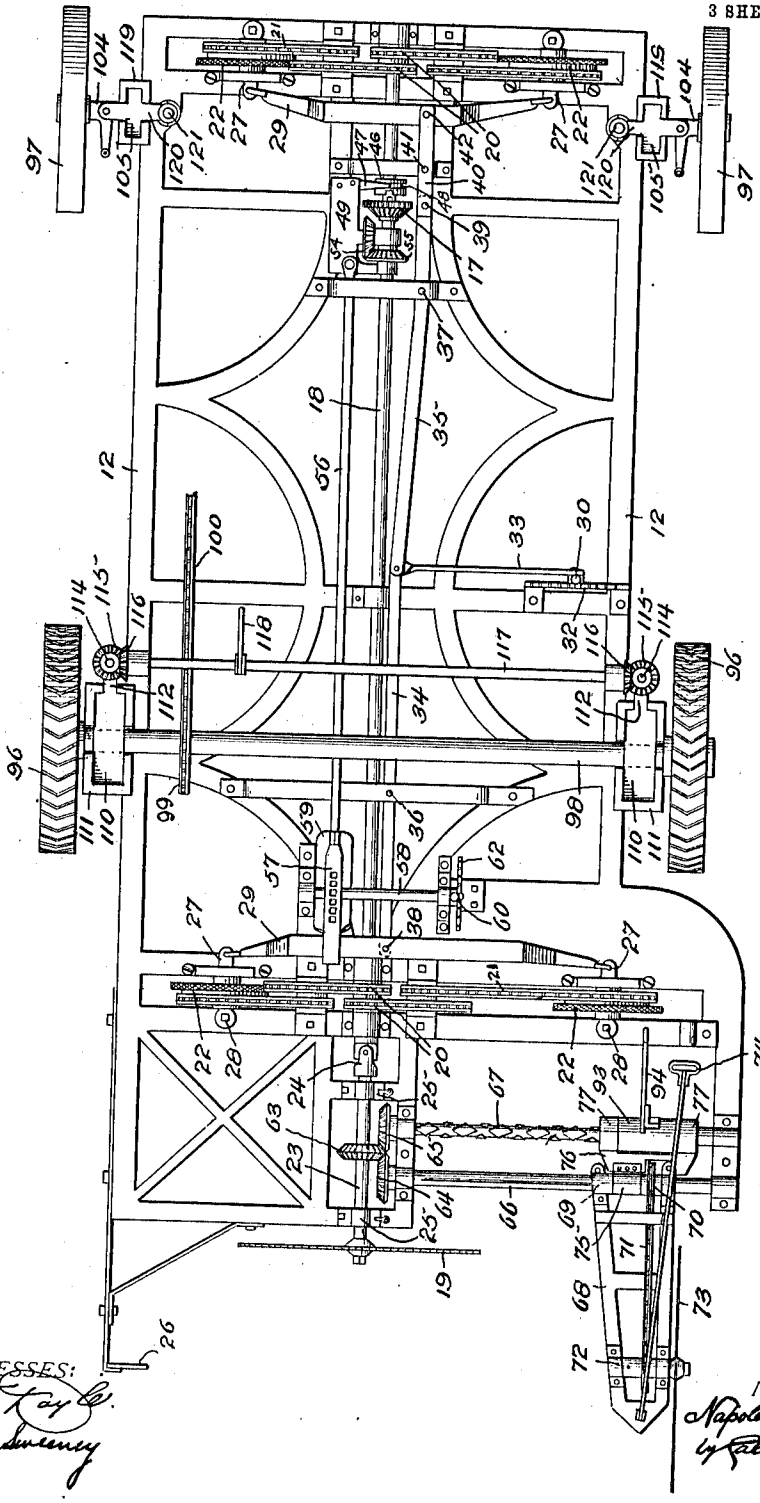


FIG. 1.

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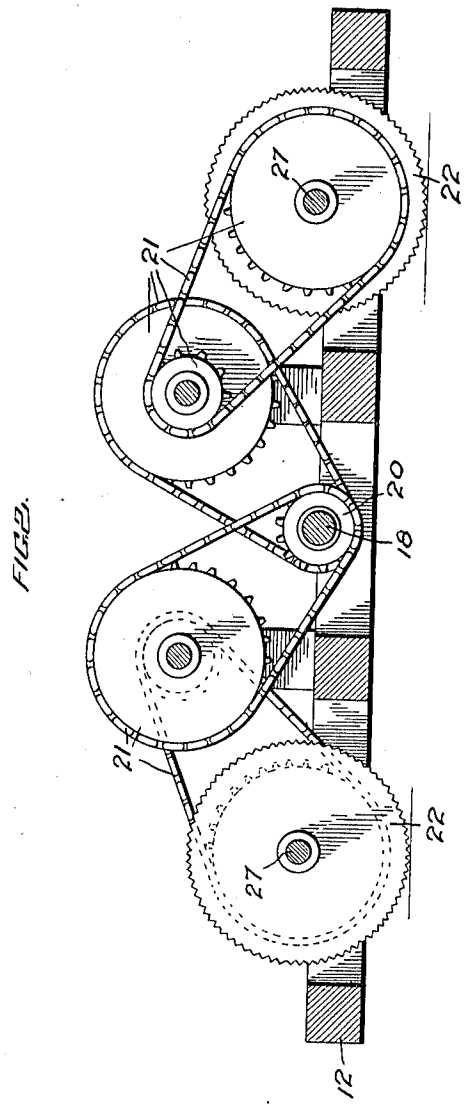


FIG. 2.

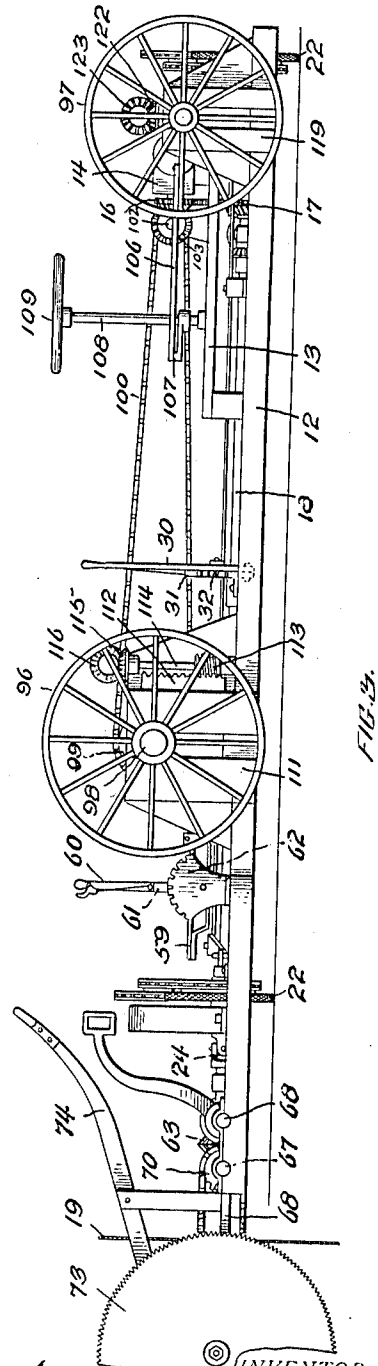


FIG. 3.

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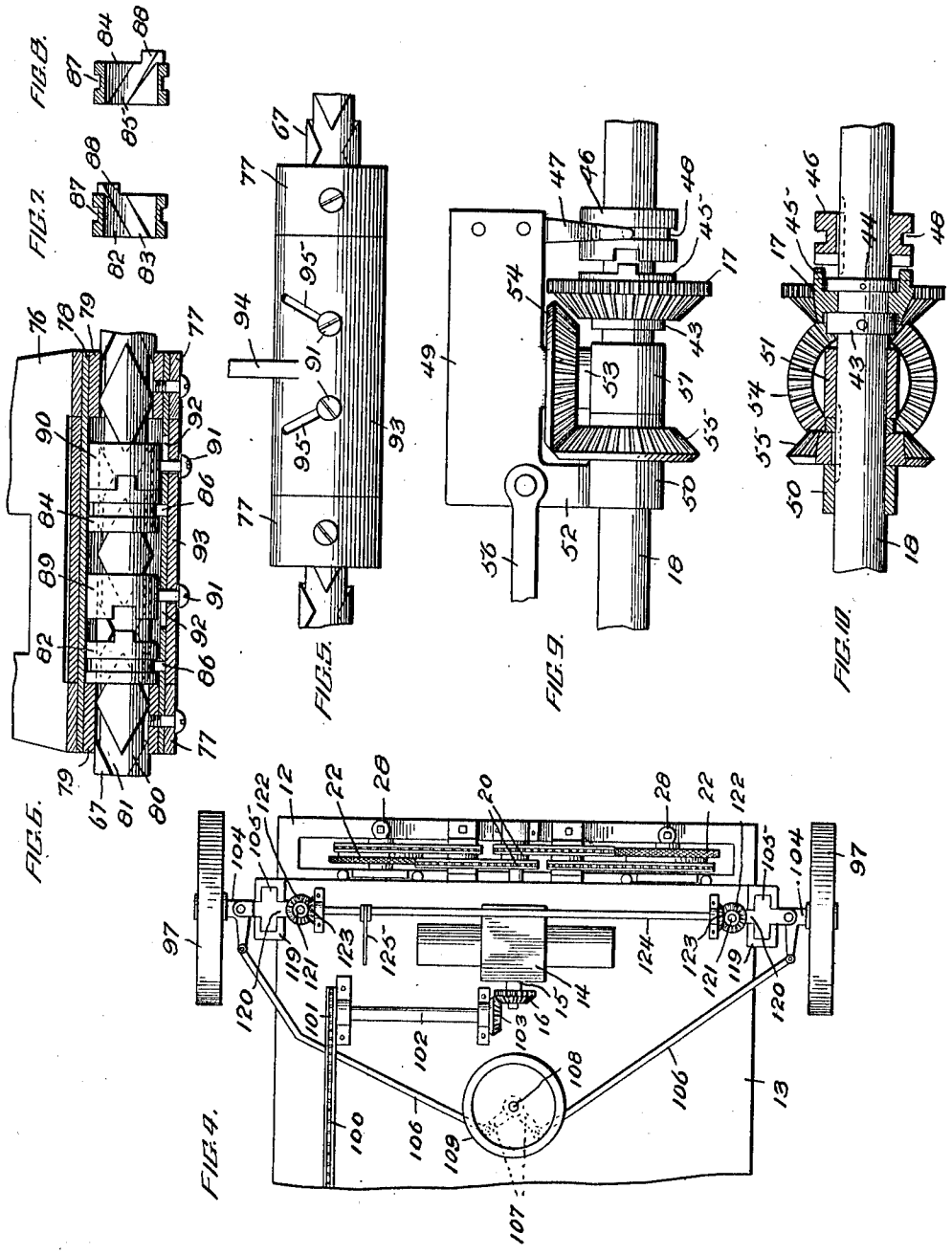
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3 SHEETS—SHEET 3.



WITNESSES

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UNITED STATES PATENT OFFICE.

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ICE-CUTTING MACHINE.

1,096,860. Specification of Letters Patent. Patented May 19, 1914.

Application filed December 7, 1912. Serial No. 735,561.

To all whom it may concern:

Be it known that I, NAPOLEON B. QUICK, a citizen of the United States, residing at Glen Spey, in the county of Sullivan and State of New York, have invented or discovered certain new and useful Improvements in Ice-Cutting Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to machines for cutting or harvesting ice upon ponds, rivers or the like, and more particularly to automatic machines of the type adapted to travel over the ice and provided with means for cutting the ice into blocks during such travel, said means usually comprising a main saw, adapted to make a longitudinal cut in the ice as the machine travels thereover and sever a strip therefrom, and a cross-cut saw adapted to divide the strip so severed into blocks of convenient length.

One object of the invention is to provide a construction in which the weight of the machine is supported at a considerable distance from the point at which the cutting is done, thereby eliminating the danger of breaking through the ice incidental to the necessity, heretofore usual in machines of this character, of supporting a considerable weight closely adjacent the edge of the ice.

Another object of the invention is to provide improved means whereby the main saw may be lifted out of the way when not in use.

A further object of the invention is to provide improved means for moving and controlling the cross-cut saw.

A still further object of the invention is to provide means whereby the machine may be conveniently transported under its own power to and from its place of operation.

These and other objects of the invention, together with means whereby the same may be carried into effect, will best be understood from the following description of one form or embodiment thereof shown in the accompanying drawings. It will be understood, however, that the construction shown and hereinafter described has been chosen for illustrative purposes merely, and that the invention may be embodied in other forms without departing from the spirit and scope thereof.

In said drawings: Figure 1 is a plan view of the machine with the motor and associated parts removed. Fig. 2 is an enlarged transverse sectional view showing one pair of the primary supporting or traction wheels and the mechanism for applying power thereto. Fig. 3 is a side elevation of the complete machine. Fig. 4 is a plan view of that portion of the machine shown at the right in Fig. 1 with the motor platform and associated parts in place. Fig. 5 is an enlarged detail elevation of the clutch device for controlling the movements of the cross-cut saw. Fig. 6 is a horizontal section of the parts shown in Fig. 5. Figs. 7 and 8 are detail sectional views of the cam engaging clutch members shown in Fig. 6. Fig. 9 is an enlarged detail view showing in plan the clutch mechanism controlling the main or power shaft of the machine. Fig. 10 is a vertical section of the parts shown in Fig. 9.

12 denotes the main frame of the machine which is of elongated form in plan, as shown in Fig. 1. Supported by the frame 12 adjacent one end thereof is a motor platform 13 (see Figs. 3 and 4) upon which is mounted a gasolene or other motor 14. The motor shaft 15 is provided with a gear or other transmission element 16 operatively connected with a corresponding transmission element or gear 17 on the main or power shaft 18, which is suitably journaled in the frame 12 and extends longitudinally thereof. At its end opposite the motor 14 said shaft 18 is provided with a main circular saw 19. At its end adjacent the motor 14, and also at a point intermediate said motor and the saw 19, said shaft 18 carries transmission elements or sprockets 20 connected by suitable chain and sprocket or other gearing 21 (see Fig. 2) with supporting and traction wheels 22 upon which the frame 12 is supported and moved over the ice in a direction transverse to its length. It will now be seen that, by reason of the elongated form of the frame 12, and the arrangement of the traction wheels 22, motor 14, shaft 18, and saw 19, the major portion of the weight of the motor and associated parts, which constitute the heaviest part of the machine, will be carried by the wheels 22 shown at the right in Fig. 1, and which are removed a considerable distance from the edge of the ice.

The end 23 of the shaft 18, upon which the saw 19 is mounted, is made in the form of a shaft section separate from but in alinement with the main portion of said shaft,

being connected therewith by a universal coupling 24, and being mounted in separable bearings 25 carried by the frame. When the saw 19 is not in use the bearings 25 may be opened and the shaft section 23 turned upwardly to move said saw 19 out of the way.

26 denotes a gage or guide arranged to engage the edge of the ice and control the width of the strip cut by the saw 19. In order to hold said guide in engagement with the edge of the ice, and for otherwise advantageously controlling the movements of the machine over the ice, it is desirable that steering means be provided. To this end the wheels 22 are mounted upon the short axles 27 each of which is pivoted at one end, as at 28, to the frame 12. The free ends of each pair of axles 27 at each end of the frame are connected by a bar 29.

30 denotes a controlling lever suitably pivoted to the frame, and preferably provided with a latch 31 coöperating with a toothed rack 32, by means of which said lever 30 may be secured in any desired position. Said lever is connected by a rod 33 with levers 34 and 35 pivoted respectively at 36 and 37 to suitable portions of the frame 12. The opposite end of lever 34 is directly pivoted at 38 to the connecting bar 29 shown at the left in Fig. 1. The opposite end of the lever 35 is pivoted at 39 to one end of a lever 40 pivoted at 41 to the frame 12, the opposite end of said lever 40 being pivoted at 42 to the connecting bar 29 shown at the right in Fig. 1.

By the construction just described, operation of the lever 30 in either direction will cause the axles 27 to be moved upon their pivots 28, thereby turning the traction wheels 22 to steer the machine. Only a slight turning of the wheels 22 is necessary inasmuch as it is intended that the machine move in approximately a straight line, the steering devices just described being provided merely to correct any tendency which the machine may have from any cause to move out of the line defined by the edge of the ice previously cut.

In order to reverse the direction of travel of the machine over the ice and the direction of rotation of the saw 19, and to hold the machine and saw stationary when desired, the following construction is provided. The gear 17 is formed with a bevel portion and is loosely mounted on the shaft 18, being held against longitudinal movement thereon by collars 43 and 44 fixed on said shaft (see Fig. 10). On its side opposite its bevel portion said gear 17 is formed with a clutch face 45 coöperating with a clutch hub 46 splined to the shaft 18 and longitudinally movable thereon by means of a clutch fork 47 coöperating with a groove 48 in said hub. The clutch fork 47 is carried by a slide 49.

50 and 51 denote guiding sleeves splined upon the shaft 18 and longitudinally movable thereon. Said sleeves are carried at the ends of the arms 52 and 53 projecting from the slide 49, whereby said slide is guided on said shaft 18 for longitudinal movement parallel thereto. The arm 53 is formed with a cylindrical portion upon which is loosely mounted a bevel gear 54 which meshes with a bevel gear 55 splined upon the shaft 18 and longitudinally movable thereon by the sleeves 50 and 51 between which said gear 55 is held.

With the parts in the neutral position shown in Figs. 1, 9 and 10, the gear 17 is entirely disconnected from the shaft 18 and turns idly thereon, leaving said shaft stationary. Movement of the slide 49 toward the left from the position shown will cause the clutch 46 to be engaged with the clutch face 45, thereby directly clutching the gear 17 to the shaft 18, and causing said shaft to be rotated in the same direction as said gear. Movement of the slide 49 toward the right from the position shown will cause the gear 54 to be brought into mesh with the bevel portion of the gear 17, whereupon the shaft 18 will be rotated through the gears 17, 54 and 55 in a direction opposite to the direction of rotation of said gear 17.

For operating the slide 49 there is secured thereto one end of a connecting rod 56 which extends longitudinally of the frame and is provided at its opposite end with a rack 57 meshing with a pinion on a shaft 58 journaled in said frame. Said rod 56 is guided in its movement by means of the rack 57 which engages the upper side of the pinion on the shaft 58 and by a yoke 59 secured to said rod and extending beneath said shaft and engaging the same. The shaft 58 is provided at its end with a controlling lever 60 preferably carrying a latch 61 coöperating with a toothed segment 62. By means of the lever 60 and the latch 61 the slide 49 may be so operated and controlled as to cause the shaft 18 to remain stationary or be rotated in either direction.

Fixed to the portion 23 of the shaft 18 is a double bevel gear 63 meshing with bevel gears 64 and 65 which are fixed respectively to the ends of shafts 66 and 67 journaled in the frame 12 and arranged parallel to the general line or direction of motion of the machine in its travel over the ice on the wheels 22.

68 denotes a frame supported on the shaft 66 by means of bearings 69 arranged to slide on said shaft 66 and to rotate freely thereon.

70 denotes a sprocket wheel splined upon the shaft 66 so as to rotate therewith but longitudinally movable thereon with the frame 68. Said sprocket 70 is connected by a chain 71 with a corresponding sprocket fixed to a shaft 72 journaled in the frame 68

adjacent the outer end thereof, and to which shaft is fixed the cross-cut saw 73. The frame 68 may be swung upon the shaft 66 to raise and lower the saw 73 by means of a handle 74 secured to said frame.

It will be understood that the cross-cut saw 73 is continuously driven through the shaft 72, chain 71, sprocket 70, shaft 66, and gears 64 and 63 from the main power shaft 18, and is raised and lowered by the handle 74 to divide into blocks the strip of ice severed by the saw 19 from the main field. Inasmuch as the forward movement of the machine over the field is a continuous one, it is necessary that the saw be moved rearwardly with respect to the frame 12 during the cutting operation so as to remain stationary with respect to the ice, and, after said cutting operation, be moved forwardly again so as to make a new cut. In order that the movements of this saw with respect to the frame may be positively controlled with reference to the speed and direction of travel of the machine, and in order conveniently to advance the saw for a new cut after one has been completed, the following means are provided. 75 denotes a sleeve slidably mounted on the shaft 66 between the sprocket 70 and one of the bearings 69. Said sleeve is secured to a slide 76 upon the shaft 67. Longitudinal movement of the slide 76 upon the shaft 67 causes the frame 68 to be correspondingly moved longitudinally of the shaft 66. The slide 76 is provided with hubs or bearings 77 carrying between them a sleeve 78 (see Fig. 6) within the ends of which are secured bushings 79 which slide and are guided upon the shaft 67. Said shaft 67 is provided with right and left spiral cam grooves 80 and 81. Cooperating with the cam groove 80 is a clutch member 82 (see Fig. 7) having an interior projection 83 entering said groove, and cooperating with the cam groove 81 is a similar clutch member 84 (see Fig. 8) having an interior projection 85 entering said groove 81. The cam members 82 and 84 turn freely within the sleeve 78 but are held against longitudinal movement with respect thereto by means of studs 86 projecting inwardly from said sleeve and engaging grooves 87 in said clutch members. Said members 82 and 84 are formed on their ends with clutch projections 88 adapted to enter corresponding notches in coöperating clutch members 89 and 90. Said clutch members 89 and 90 are arranged to slide longitudinally within the sleeve 78 but are held against rotation with respect thereto by means of studs 91 projecting from said clutch members and passing through longitudinal slots 92 in said sleeve. Mounted to turn upon the sleeve 78 between the hubs 77 is a controlling cam sleeve 93 provided with an operating handle 94 and in which are formed oppositely inclined cam slots 95 through which the studs 91 pass.

With the parts in the position shown in Figs. 5 and 6 the clutch members 82 and 89 are disengaged while the clutch members 84 and 90 are engaged so that the member 84 is held against rotation with respect to the sleeve 78. The projection 85 within the member 84 therefore coöperates with the cam groove 81 to move the slide 76 in one direction. Said member 84 being held against rotation by the member 90, and being held against longitudinal movement in the sleeve 78 by the stud 86, the projection 85 becomes, in effect, a fixed projection carried by the slide 76. At this time the member 82 is free to rotate, so that the projection 83 therein has no effect upon the foregoing operation. If the sleeve 93 be turned by the handle 94, the cam slots 95, coöperating with the studs 91, will cause the member 90 to be moved toward the right out of engagement with the member 84, and the member 89 to be simultaneously moved toward the left into engagement with the member 82, whereupon the slide 76 will be moved in the opposite direction by the cam groove 80 and projection 83 as will be obvious. It will now be understood that by properly manipulating the handles 74 and 94 the operator can cause the saw 73 to remain stationary during the forward travel of the machine while cutting off a block of ice and thereupon to rise and move forwardly into a position for another cut.

It has been customary to convey machines of this general character, as heretofore constructed, to and from the pond or other place of operation upon trucks or other vehicles provided for this purpose. In accordance with the present invention, however, means are provided whereby the machine may be transported or moved under its own power, otherwise than upon the primary traction or supporting wheels 22, which are intended to travel only over the ice, so that said machine will be adapted to propel itself over ordinary roads or elsewhere as may be desirable. To this end the machine is provided with secondary supporting wheels 96 and 97, preferably arranged substantially at right angles to the primary supporting or traction wheels 22, and being of any usual or well known form adapted to support the machine upon the ground.

The wheels 96 are driving or traction wheels and are carried by a transverse shaft 98 mounted in suitable bearings, hereinafter more fully described, and provided with a sprocket 99 connected by a chain 100 with a coöperating sprocket 101 (see Fig. 4) upon a shaft 102 mounted in suitable bearings on the platform 13 and provided with a bevel gear 103 meshing with a bevel portion of the gear 16 on the motor shaft 15. Suitable

clutch mechanism (not shown) may, if desired, be interposed at some point in the above described chain of mechanism to interrupt the connection between the wheels 96 and motor 14 when desired.

The wheels 97 are steering wheels and are mounted upon steering knuckles 104 of well known form carried by slides 105 hereinafter more fully described. The steering knuckles 104 are connected by rods 106 with arms 107 projecting from a steering post 108 journaled in the platform 13 and carrying at its upper end a steering wheel 109.

By the mechanism above described it will be seen that the machine can be propelled under its own power over an ordinary road and steered in the same manner as an ordinary motor vehicle.

In order to provide means whereby the machine may be supported and propelled at will upon either the primary traction wheels 22 or the secondary supporting wheels 96 and 97 the following construction is provided. The shaft 98 is mounted in journal boxes 110 arranged to slide vertically in guideways 111 mounted on the frame 12. Said boxes 110 are provided with racks 112 coöperating with worms 113 on upright shafts 114 suitably journaled in the frame 12. Said shafts 114 are provided with bevel gears 115 meshing with bevel gears 116 on a transverse shaft 117 also suitably journaled in the frame 12. The shaft 117 is provided with a ratchet lever 118 or any other suitable operating device whereby said shaft may be rotated to rotate the shafts 114 and raise and lower the journal boxes 110. Similarly the slides 105 which carry the wheels 97 are arranged in vertical guides 119 supported by the frame 12, and are provided with racks 120 coöperating with worms on vertical shafts 121 suitably journaled in the frame and carrying at their upper ends bevel gears 122 meshing with bevel gears 123 on a transverse shaft 124 suitably journaled on the platform 13 and provided with an operating or rotating device 125.

By the foregoing construction it will be seen that the wheels 96 and 97 may be raised to lower the frame and cause the same to be supported upon the wheels 22, or may be lowered to raise the frame and with it said wheels 22 and cause said frame to be supported upon said wheels 96 and 97.

It will be understood that the machine is driven to the pond or other place of operation upon the wheels 96 and 97 until it is upon the ice at the point where the cutting is to commence, after which said wheels 96 and 97 will be raised, causing the machine to rest upon the wheels 22 and operate in the manner previously described.

In addition to the foregoing function it will be seen that, by reason of the fact that the wheels 96 and 97 are arranged at right angles to the wheels 22, said wheels 96 and 97 may, if desired, be employed to move the machine laterally after completing one longitudinal cut into a position to commence a second.

For convenience the wheels 22 have been herein referred to as "primary" supporting wheels and the wheels 96 and 97 as "secondary" supporting wheels. It will be understood that this designation is purely arbitrary and that, for some purposes, the terms "primary" and "secondary" may be considered as interchangeable and as used in the claims are so intended except as otherwise limited.

Having thus described my invention, I claim:

1. An ice cutting machine comprising, in combination, an elongated frame, traction wheels upon which said frame is mounted for movement in a direction transverse to its length, a shaft extending longitudinally of said frame, a saw carried by said shaft at one end thereof, a motor carried by said frame adjacent the opposite end of said shaft and operatively connected therewith, and transmission devices carried by said shaft and operatively connected with said wheels.

2. An ice cutting machine comprising, in combination, a frame, a main shaft journaled in said frame and having a jointed end, a saw directly secured to said jointed end, and a motor carried by said frame and operatively connected with said shaft.

3. An ice cutting machine comprising, in combination, a frame, a main shaft extending across said frame and having a jointed end, a saw directly secured to said jointed end, a motor carried by said frame and connected with said shaft, traction wheels upon which said frame is mounted, and transmission devices carried by said shaft and operatively connected with said traction wheels.

4. An ice cutting machine comprising, in combination, a frame, a main shaft journaled in said frame, a separate shaft section arranged in alinement with said main shaft, a saw carried by said shaft section, separable journal boxes carried by said frame in which said shaft section is journaled, and a universal coupling connecting said shaft section and main shaft.

5. An ice cutting machine comprising, in combination, a frame, wheels upon which said frame is mounted for travel over the ice, a main shaft operatively connected with said wheels, the main saw operated by said main shaft, a pair of auxiliary shafts operatively connected with said main shaft and arranged parallel to the line of travel of said frame, a cross-cut saw operated by one of said shafts and arranged to slide longitudinally thereon, and means operated by the other of said auxiliary shafts for sliding

said cross-cut saw on said first named auxiliary shaft.

6. An ice cutting machine comprising in combination a frame, wheels upon which said frame is mounted for travel over the ice, a main shaft operatively connected with said wheels, a main saw operated by said main shaft, a cross-cut saw operatively connected with said main shaft, a movable support for said cross-cut saw, a second shaft operatively connected with said main shaft and provided with a spiral cam groove, and means coöperating with said groove for moving said support with respect to said frame in the direction of the line of travel of said frame on said wheels.

7. An ice cutting machine comprising, in combination, a frame, wheels upon which said frame is mounted for travel over the ice, a main shaft operatively connected with said wheels, a main saw operated by said main shaft, a pair of auxiliary shafts operatively connected with said main shaft and arranged parallel to the line of travel of said frame on said wheels, one of said auxiliary shafts being provided with a spiral cam groove, an auxiliary frame slidably mounted on the other of said auxiliary shafts, a cross-cut saw carried by said auxiliary frame and operatively connected with said last named auxiliary shaft, and means coöperating with said cam groove for sliding said auxiliary frame on said last named auxiliary shaft.

8. An ice cutting machine comprising, in combination, a frame, wheels upon which said frame is mounted for travel over the ice, a main shaft operatively connected with said wheels, a main saw operated by said main shaft, a cross-cut saw operatively connected with said main shaft, a movable support for said cross-cut saw, said support being guided for movement on said frame in the direction of the line of travel of said frame on said wheels, a second shaft operatively connected with said main shaft and provided with a spiral cam groove, a slide on said last named shaft, a member on said shaft having means coöperating with said cam groove, and means for clutching said member to said slide.

9. An ice cutting machine comprising, in combination, a frame, wheels upon which said frame is mounted for travel over the ice, a main shaft operatively connected with said wheels, a main saw operated by said main shaft, a cross-cut saw operatively connected with said main shaft, a movable support for said cross cut saw, said support being guided for movement on said frame in the direction of the line of travel of said frame on said wheels, a second shaft operatively connected with said main shaft and provided with right and left spiral cam grooves, and devices alternatively coöperating with said grooves respectively for moving said support.

10. An ice cutting machine comprising, in combination, a frame, wheels upon which said frame is mounted to travel over the ice, a main shaft operatively connected with said wheels, a main saw operated by said main shaft, a cross-cut saw operatively connected with said main shaft, a movable support for said cross-cut saw, said support being guided for movement on said frame in the direction of the line of travel of said frame on said wheels, a second shaft operatively connected with said main shaft and provided with right and left spiral cam grooves, members on said shaft having means coöperating with said grooves respectively, and means for clutching said members alternatively to said slide.

11. An ice cutting machine comprising, in combination, a frame, wheels upon which said frame is mounted to travel over the ice, a main shaft operatively connected with said wheels, a main saw operated by said main shaft, a cross-cut saw operatively connected with said main shaft, a movable support for said cross-cut saw, said support being guided for movement on said frame in the direction of the line of travel of said frame on said wheels, a second shaft operatively connected with said main shaft and provided with right and left spiral cam grooves, members on said shaft having means coöperating with said grooves respectively, and a rotary cam sleeve for clutching said members alternatively to said slide.

12. An ice cutting machine comprising, in combination, a frame, cutting mechanism carried by said frame, a set of primary supporting wheels for said frame, a set of secondary supporting wheels for said frame, a motor on said frame operatively connected with both sets of wheels, and adjusting means for causing said frame to be supported by either set of wheels.

13. An ice cutting machine comprising, in combination, a frame, cutting mechanism carried by said frame, a set of wheels adapted to propel said frame over the ice, a second set of wheels adapted to propel said frame over the ground, a motor, means for operatively connecting said motor with both sets of wheels for driving the same, and adjusting means for causing said frame to be supported by either set of wheels.

14. An ice cutting machine comprising, in combination, a frame, cutting mechanism carried by said frame, a set of traction wheels adapted to support said frame upon the ice, a motor operatively connected with said cutting means and traction wheels, means to operate said traction wheels to steer said machine in its travel over the ice, a second set of wheels adapted to support said frame upon the ground, said last named

set comprising a pair of traction wheels operatively connected with said motor and a pair of steering wheels, and adjusting means for causing said frame to be supported by either set of wheels.

15. An ice cutting machine comprising, in combination, a frame, cutting mechanism carried by said frame, a set of primary supporting wheels for said frame, a set of secondary supporting wheels for said frame, vertical guides carried by said frame, supports for the wheels of one of said sets mounted to slide in said guides, racks carried by said supports, vertical shafts arranged adjacent said guides and provided with worms coöperating with said racks, and shafts connecting said vertical shafts in pairs and geared thereto.

In testimony whereof I affix my signature, in presence of two witnesses.

NAPOLEON B. QUICK.

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