E. M. CARD.

ICE CUTTING MACHINE.

APPLICATION FILED APR. 12, 1907.

909,059.

Patented Jan. 5, 1909.

2 SHEETS—SHEET 1.

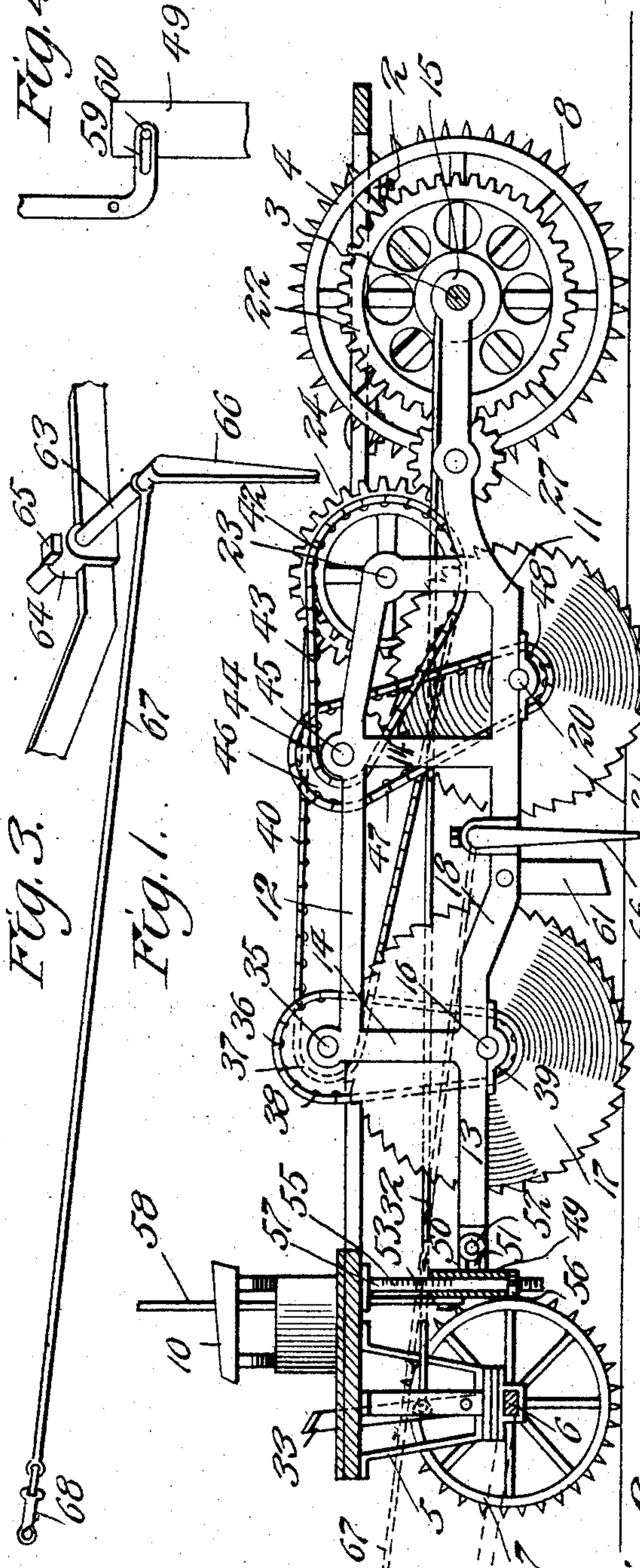

Fig. 3.

Fig. 1.

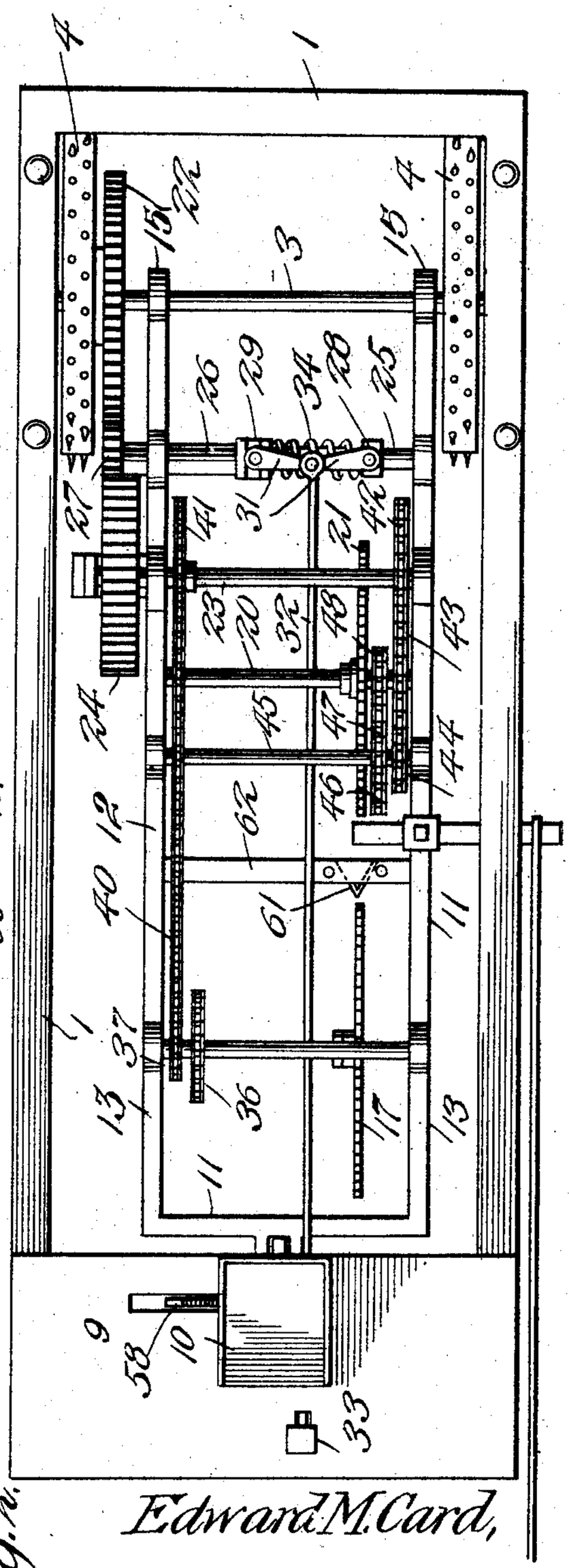

Fig. 2.

Witnesses

Geo. Ackmann Jr.

Frank B. Hoffman

Edward M. Card,

By Victor J. Evans

Attorney

E. M. CARD.

ICE CUTTING MACHINE.

APPLICATION FILED APR. 12, 1907.

909,059.

Patented Jan. 5, 1909.

2 SHEETS—SHEET 2.

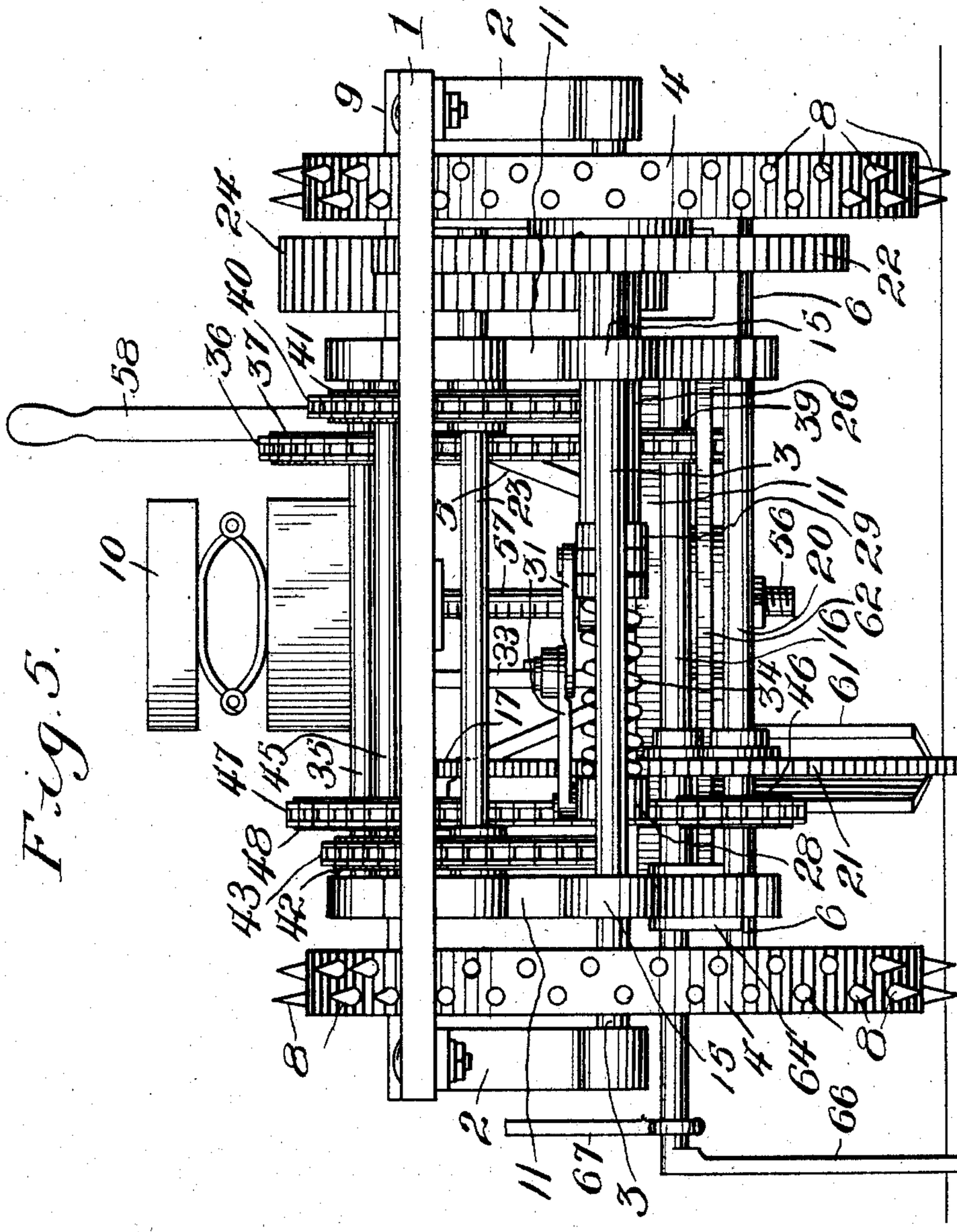

Fig. 5.

Witnesses

J. T. L. Wright.

D. W. Gould.

Inventor

Edward M. Card,

By Victor J. Evans,

Attorney

UNITED STATES PATENT OFFICE.

EDWARD M. CARD, OF MIDDLEFIELD, CONNECTICUT.

ICE-CUTTING MACHINE.

No. 909,059. Specification of Letters Patent. Patented Jan. 5, 1909.

Application filed April 12, 1907. Serial No. 367,744.

To all whom it may concern:

Be it known that I, EDWARD M. CARD, a citizen of the United States, residing at Middlefield, in the county of Middlesex and State of Connecticut, have invented new and useful Improvements in Ice-Cutting Machines, of which the following is a specification.

The invention relates to an improvement in ice cutting machines, comprehending specifically a construction in which the machine is adapted to be drawn over the ice and to accurately cut the same in desired widths during travel.

The main object of the present invention is the production of an ice machine in which the cutting parts are mounted for adjustment upon a movable frame, the construction including a means by which the adjustment of the frame is permitted and by which the normal or cutting position of the frame is determined in accordance with the work in hand.

Another object of the invention is the provision of the guide arranged for coöperation with one of the slots previously cut by the machine, which guide insures an accurate parallel cut by the machine, the guide being adapted through a suitable connection to the bit of the draft animal, for guiding said animal and controlling the line of travel of the machine in accordance with the slot previously cut.

With the above objects in view the invention consists in certain details of construction and combinations of parts which will be fully described in the following specification, reference being had particularly to the accompanying drawings, in which:—

Figure 1 is a side elevation of the machine with the main frame and other parts shown in longitudinal section. Fig. 2 is a plan view of the machine. Fig. 3 is a perspective view illustrating the guiding beams. Fig. 4 is a broken elevation showing the connection of the operating lever to the auxiliary frame adjusting sleeve. Fig. 5 is a rear end elevation of the improved ice cutting machine.

Referring particularly to the drawings, my improved ice cutting machine comprises a rectangular skeleton frame 1 from which near the rear end depends bearing brackets 2, the lower ends of which are formed to provide bearings for the reception of the rear axle 3 on which are mounted the ground wheels 4. At the forward end the main frame 1 is provided with a depending fifth wheel bearing 5 to which is secured in the usual manner a forward axle 6 carrying the ground wheels 7. The respective ground wheels are preferably of sufficient weight to insure regular even travel of the machine and are peripherally provided with a series of spurs or projections 8 to insure a certain forward movement of the wheels during the propulsion of the machine. The arrangement and particular shape of the spurs are not material to the present invention, as I contemplate forming the gripping tread of the wheels in any desired manner to avoid slipping of the wheels during the operation of the machine.

The relatively forward portion of the main frame may, if preferred, be provided with a platform 9 to receive the driver's seat 10 and to provide a suitable base on which the operator may be supported in controlling the machine.

In addition to the main frame 1 the machine also includes an auxiliary frame 11, preferably comprising upper and lower side bars 12 and 13 connected by vertical brace or tie strips 14, the rear end of the upper side bar terminating in advance of the rear end of the lower side bar, and the rear terminal of the latter being formed with bearing sleeves 15 to encircle the rear axle 3, as clearly shown in Figs. 1 and 2.

Adjacent the relatively forward end of the auxiliary frame I mount in the lower side bars thereof a shaft 16, on which is secured in any desired manner an ice cutting implement as a saw 17. Immediately in rear of the shaft 16 the lower side bars of the auxiliary frame are projected downward at an incline, as at 18, thereby disposing the relatively rear portion of the side bars on a lower plane than the relatively forward portion thereof. In the relatively lower portion of the side bars I form bearings for the reception of a second saw shaft 20 on which is secured in any desired manner a second ice cutting implement, as a saw, 21.

The respective saws 17 and 21 are of prac-

tically the same diameter and arranged in exact alinement longitudinally of the machine, so that both of the saws operate in a single ice groove, while the rear saw owing to its relatively lower support will cut deeper into the material than the forward saw.

Secured upon the rear axle 3 immediately adjacent one of the ground wheels 4 is a gear 22, and in advance of this gear and supported upon a shaft 23 mounted in the upper side bars of the frame is a second gear 24 of materially greater width than the gear 22. Intermediate the gears 22 and 24 I secure in the lower side bars of the auxiliary frame a fixed rod 25, on which is slidably mounted a sleeve 26 carrying at its outer end a pinion 27 arranged to mesh with the gears 22 and 24 and to impart movement to the gear 24 in the movement of the gear 22 under the travel of the machine.

It being desirable under some conditions, as when the machine is turning or when it is being transported to or from the ice field, to avoid actuating the gear 24 in the propulsion of the machine, I arrange the parts to disconnect the respective gears at the will of the operator. To this end I secure upon the rod 25 remote from the sleeve 26 a fixed collar 28, and to this collar and in an annular groove 29 formed in the inner head 30 of the sleeve 26 I secure links 31, which at their inner or proximate ends are connected to a rod 32 extending to the forward end of the main frame and connected to a foot lever 33 adapted for operation by the latter. A coil spring 34 encircles the rod 25 between the fixed collar 28 and the inner head of the sleeve, said spring being normally tensioned to maintain the pinion 27 in coöperative mesh with the gears 22 and 24. By this construction it is obvious that the operator by pressing the lever 33 can draw upon the rod 32 with the effect to move the sleeve 26 inward on the rod 25 and disengage the pinion 27 from the gear 22, the relatively greater width of the gear 24 precluding the disengagement of the pinion 27 from said latter gear in the movement described. The spring 34 will operate to restore the coaction between the gears and pinion.

In the relatively forward portion of the auxiliary frame, and in bearings carried by the upper side bars 12 thereof I mount a shaft 35 on which in alinement with the gear 24 I secure a double sprocket 36 and 37, the former being of materially greater diameter than the latter. The sprocket 36 is connected by a sprocket chain 38 to a comparatively small sprocket wheel 39 fixed on the forward saw shaft 16, while the sprocket 37 is connected through the medium of a sprocket chain 40 to a sprocket wheel 41 mounted on the gear shaft 23.

The shaft 23 at the end opposite the gear 24 is provided with a second sprocket 42 corresponding in size to the sprocket 41 and connected by a sprocket chain 43 to a comparatively small sprocket 44 fixed upon a shaft 45 mounted in the upper side bars of the auxiliary frame in advance of the rear saw shaft 20. A second sprocket 46 is secured upon the shaft 45 and connected through the medium of a sprocket chain 47 to a smaller sprocket 48 fixed upon the rear saw shaft 20, the sprocket 46 being of materially greater diameter than the sprocket 44.

By the construction described and by the arrangements and sizes of the respective sprocket wheels it will be obvious that in the forward travel of the machine an extremely rapid revolution will be imparted to the respective saws, thereby providing a most effective operation of the latter in cutting the ice.

The relatively forward end of the auxiliary frame is movably connected to a sleeve 49, the latter being preferably formed with a rearwardly extending ear 50 having an elongated slot 51 to receive a pin 52 or other connection from the auxiliary frame. The sleeve 49 is slidably mounted upon a rod 55 removably secured in the platform 9 and threaded at its lower end for the reception of an adjusting nut 56. The relatively upper portion of the rod 55 is graduated at 57, and the movement of the sleeve, and therefore of the forward end of the auxiliary frame is controlled by the operator through the medium of an L-shaped lever 58, the angle arm 59 of which is formed with an elongated slot to receive a pin 60 projecting from the sleeve. By this construction the operator by proper movement of the lever 58 may elevate the sleeve on the rod 55 thereby raising the forward end of the auxiliary frame and simultaneously elevating the respective saws clear of the surface over which the machine is traveling. By the adjustment of the nut 56 it is obvious that the depth of the saws may be controlled, as said nut will limit the downward movement of the frame when released from the control of the operator. The graduations 57 are so arranged that the operator may adjust the nut to control to the fraction of an inch the cutting depth of the saws.

As the respective saws are trained in alinement, that is operating in the same slot, it is obvious that means must be provided for so distributing the chips cut by the forward saw as to avoid their interfering with the effective operation of the rear saw. To this end I mount a V-shaped deflector 61 on a cross-bar 62 adjoining the lower frame bars of the auxiliary frame, the apex of the deflector being toward and in alinement with the cutting edge of the forward saw, the inclined blades of the deflector serving to

direct the chips cut by the forward saw beyond the operative plane of the rear saw.

In connection with the machine described, I provide a guide whereby to accurately gage the cutting distance of the machine from the slot last formed. This guide comprises a bar 63 slidably mounted in a bearing 64 carried on the lower frame bar of the auxiliary frame. The bar 63 is graduated to determine its relation to the cutting plane of the saws and is adapted to be secured in fixed position within the bearing 64 through the medium of a set screw 65. The outer or relatively free end of the bar 63 is provided with a depending guide plate 66, preferably of tapered formation and terminating at its lower end in approximate alinement with the lowest cutting plane of the forward saw. A rigid connection 67 extends forward from the guide plate 66 and is terminally provided with a snap hook or other connector 68 to permit engagement with the bit ring of the draft animal. The guide plate 66 is adapted for insertion in the ice slot last formed by the machine and will of course accurately guide the machine in the formation of the next slot or cut, the connector 67 serving to also guide the draft animal and prevent his movement from deflecting the machine from the proper path of travel. The adjustability of the guide relative to the cutting plane of the saws permits the operator to form the respective cuts at any desired distances apart.

The construction described provides an effective ice cutting machine so arranged that the operator may readily control the cutting depth of the machine and may at will elevate or depress the cutting parts as desired.

It is to be understood that I contemplate the use of any desired form of ice cutting implement, though for the purposes of the present invention I prefer to use circular saw blades the cutting teeth of which are of the greatest thickness at the hook or entrance points, from which points the teeth gradually decrease in thickness until they equal the thickness of the blade proper. By this means an easy running saw is provided in that the comparatively greater thickness of the cutting points insures an easy clearance of the saw from the cut in use.

While preferring the specific details of construction and arrangement of parts herein described and shown, it is to be understood that I do not limit myself specifically thereto, but contemplate as within the spirit of the present invention all such changes and modifications as may fall within the scope of the appended claims.

Having thus fully described the invention, what is claimed as new is:—

1. An ice cutting machine comprising a main frame, ground wheels supporting the frame, an auxiliary frame movably mounted at its rear end upon the axle of the rear ground wheels, an ice cutting implement carried by the auxiliary frame, a sleeve removably connected to the forward end of the auxiliary frame, a rod depending from the main frame and adapted to be slidably embraced by the sleeve, means mounted on the main frame for moving the sleeve on the rod, and means carried by the rod for limiting the downward movement of the sleeve.

2. An ice cutting machine comprising a main frame, ground wheels supporting the frame, an auxiliary frame movably mounted at its rear end upon the axle of the rear ground wheels, an ice cutting implement carried by the auxiliary frame, a sleeve removably connected to the forward end of the auxiliary frame, a rod depending from the main frame and adapted to be slidably embraced by the sleeve, means mounted on the main frame for moving the sleeve on the rod, and means carried by the rod for limiting the downward movement of the sleeve, said latter means serving to limit the downward movement of the auxiliary frame and thereby the cutting depth of the implement.

3. An ice cutting machine comprising a main frame, an auxiliary frame movably mounted wholly within the main frame, a plurality of longitudinally alined ice cutting implements carried in the auxiliary frame, means for simultaneously operating said implements in the forward movement of the machine, and a chip deflector arranged between the respective implements, whereby the chips cut in the operation of the forward implement are deflected from the cutting path of the next implement in rear of the forward implement.

4. An ice cutting machine comprising a main frame, an auxiliary frame movably mounted wholly within the main frame, a plurality of longitudinally alined ice cutting implements carried in the auxiliary frame, means for simultaneously operating said implements, and a chip deflector comprising a V-shaped member secured to the auxiliary frame and having its apex disposed toward and directly in rear of the forward cutting implement, whereby the chips severed by said implement are deflected laterally beyond the cutting planes of the implements.

5. An ice cutting machine comprising a main frame, an auxiliary frame movably mounted wholly within the main frame, a gear shaft mounted in the auxiliary frame, a cutter shaft mounted in the auxiliary frame in advance of and below the gear shaft, a cutter mounted on said shaft, a second cutter shaft mounted in advance and on a plane above the first cutter shaft, sprockets mounted on opposing ends of the gear shaft, chain connections between said sprockets and the respective cutter shafts, a gear car-

ried by the gear shaft, ground wheels supporting the main frame, a gear operated in the movement of said ground wheels, an intermediate gear meshing with the gear on the gear shaft and the gear operated by the ground wheels, and means for adjusting said intermediate gear, the gear on the gear shaft being of greater thickness than the gear operated by the ground wheels, whereby the intermediate gear may be freed from mesh with the ground wheel gear without disconnecting it from the gear shaft gear.

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

EDWARD M. CARD.

Witnesses:
DAVID W. GOULD,
JOHN L. FLETCHER.