No. 652,311. Patented June 26, 1900.

J. T. HOURIHAN.

ICE PLANING MACHINE.

(Application filed Apr. 15, 1899.)

(No Model.) 2 Sheets—Sheet 1.

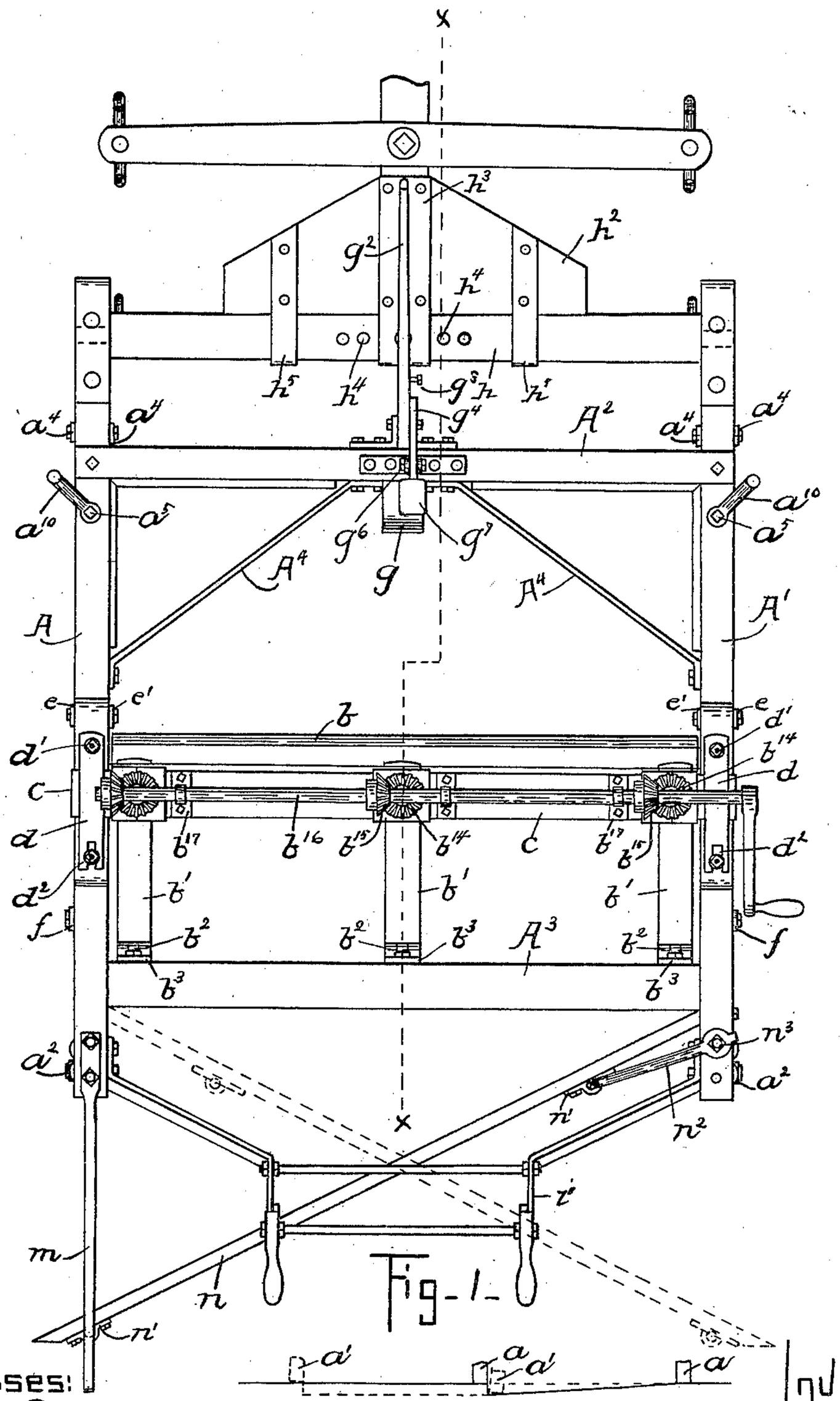

Fig-1-

Fig-2-

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(No Model.) 2 Sheets—Sheet 2.

Fig-3-

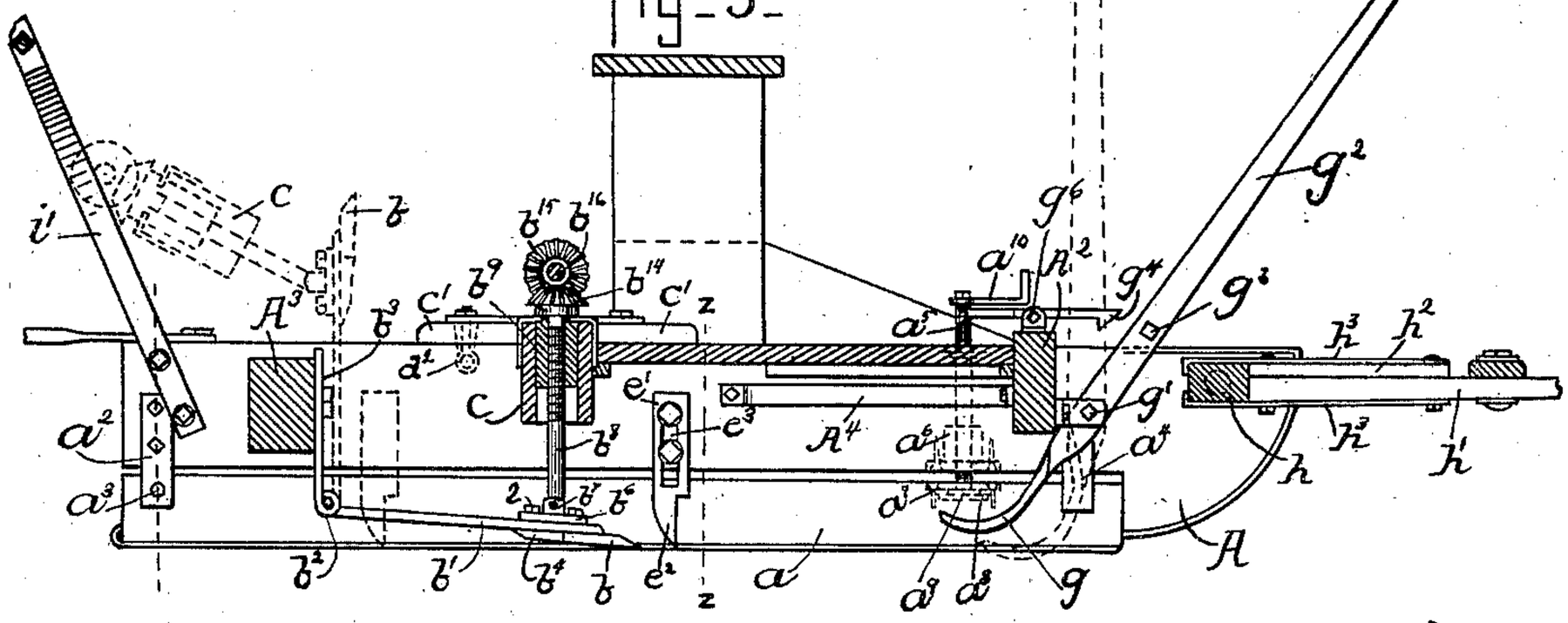

Fig-4-

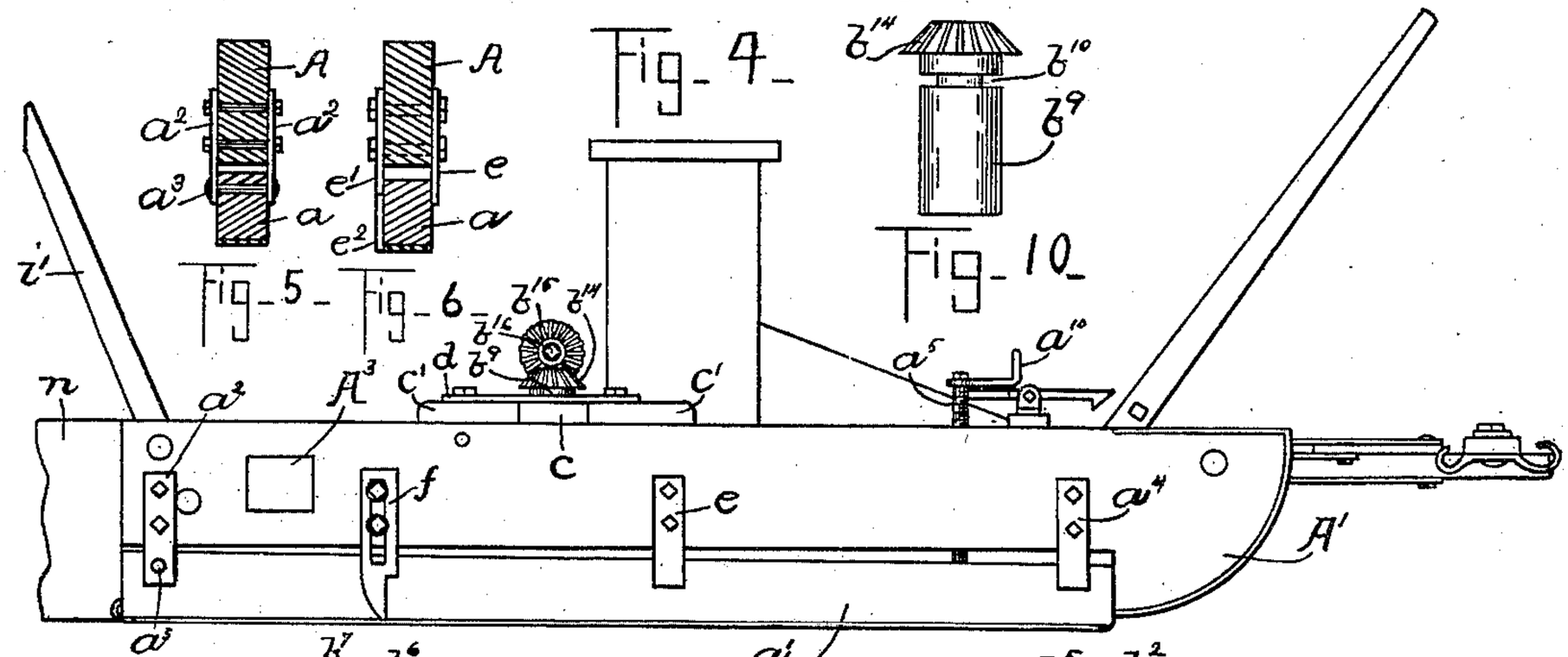

Fig-5-

Fig-6-

Fig-10-

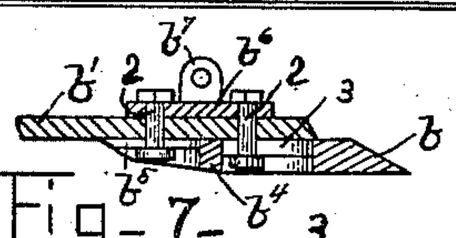

Fig-7-

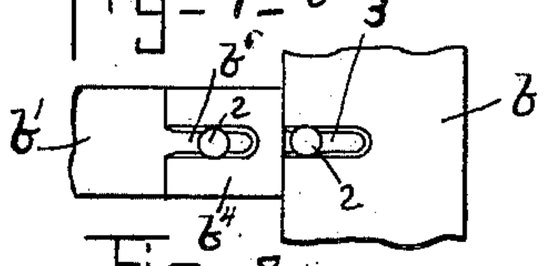

Fig-8-

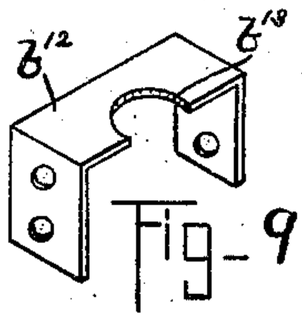

Fig-9-

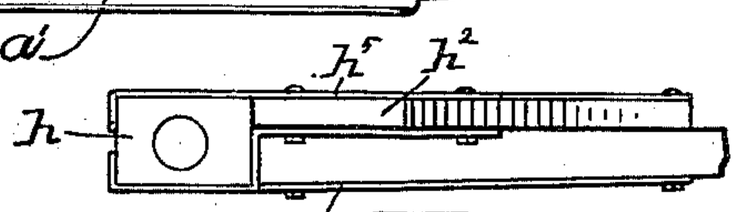

Fig-11-

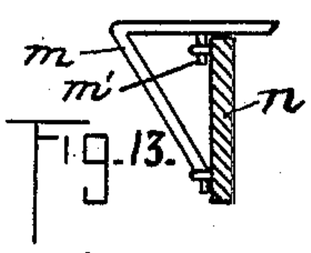

Fig-13-

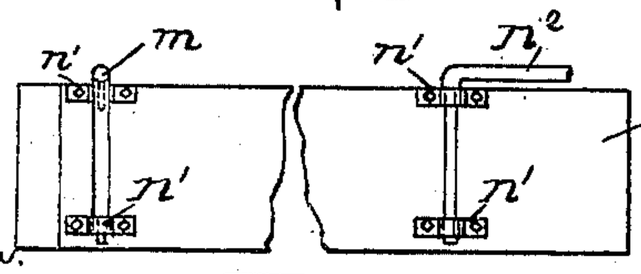

Fig-12-

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UNITED STATES PATENT OFFICE.

JOHN T. HOURIHAN, OF BOSTON, MASSACHUSETTS.

ICE-PLANING MACHINE.

SPECIFICATION forming part of Letters Patent No. 652,311, dated June 26, 1900.

Application filed April 15, 1899. Serial No. 713,124. (No model.)

To all whom it may concern:

Be it known that I, JOHN T. HOURIHAN, of Boston, county of Suffolk, and State of Massachusetts, have invented an Improvement in Ice-Planing Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters and numerals on the drawings representing like parts.

This invention relates to ice-planing machines; and it has for its object to improve the construction of the machine, to the end that a large sheet of ice may be planed evenly and smoothly and to a predetermined level, the machine kept from sluing as it advances, the planing-knife easily removed whenever desired for the purpose of sharpening or otherwise and also adjusted to its support to compensate for wear and also caused to occupy different elevations relative to the runners of the machine and also thrown up out of operative position to enable the machine to be transported, and, furthermore, to the end that the machine may be guided as it advances and its front end elevated whenever desired to raise the planing-knife free from contact with the ice—as, for instance, when turning the machine—and, furthermore, to the end that the planed ice in rear of the machine may be cleared as the machine advances.

The machine comprises, essentially, a runner-bearing frame and a planing-knife which extends from side to side of the machine; and the invention consists, essentially, in mounting the planing-knife on movable supports, whereby it may be thrown out of operative position whenever desired; also in holding said planing-knife rigidly in operative position for use and for adjusting it to different elevations while so held; also in making the adjusting device, by means of which the planing-knife is held in operative position and in different elevations relative to the runners, movable with the knife when the latter is thrown up out of operative position; also in providing ice-engaging guides in front and also at the rear of the planing-knife at each end thereof, which are adjustable and movable into and out of engagement with the ice, as may be required, said guides being employed for the purpose of guiding the machine and also for assisting in preventing the machine sluing as it advances; also in providing a front shoe which is movable from a position above to a position below the runners, and vice versa, and which is adapted to be held fixed in either position and when occupying a position below the runners will elevate the front end of the machine, so that the planing-knife will be held out of contact with the ice, and also in providing means for clearing the planed ice in rear of the machine, throwing the chips onto the unplaned ice, and thereby obviating the necessity of going over the ice a second time with a specially-constructed apparatus for clearing the ice.

Figure 1 shows in plan view an ice-planing machine embodying this invention; Fig. 2, a diagram showing in full lines the ice as it will appear as the machine makes its first cut and the relative position of the runners and showing in dotted lines the position of the runners when making the second cut. Fig. 3 is a longitudinal vertical section of the machine shown in Fig. 1, taken on the dotted lines *x x;* Fig. 4, a side view of the machine shown in Fig. 1; Fig. 5, a sectional detail of one of the side bars of the frame and runner carried by it; Fig. 6, a sectional detail of one of the side bars of the frame and runner carried by it, taken on the dotted line *z z;* Figs. 7 and 8, details of the knife and its support; Fig. 9, a detail of one of the straps on the cross-bar for holding the adjusting-nuts in position; Fig. 10, a detail showing one of the adjusting-nuts engaged by said strap; Fig. 11, a side view of a portion of the draft-frame at the forward part of the machine; Fig. 12, a detail showing the clearing-board at the rear of the machine. Fig. 13 is a detail of the means for holding one end of the clearing-board in place.

The runner-bearing frame consists, essentially, of the side bars A A′, arranged in parallelism and joined together by the cross-bars A^2 A^3 and braces A^4. Each side bar A A′ bears a runner *a a′*, which is made independent of the side bar bearing it, and said runners are connected with said side bars in an adjustable manner, whereby they may be independently adjusted to different elevations. As a means of thus adjustably connecting the

runners with said bars they may be pivoted thereto at their rear ends and their forward ends adjusted to different elevations.

As herein shown, a pair of vertically-disposed plates a^2 are bolted or otherwise secured to the opposite sides of each side bar at or near its rear end, and said plates project below the lower edges of the side bars and receive between them the rear ends of the runners, and pivot-pins a^3 pass through the projecting ends of said plates and through the runners, to thereby pivotally connect the rear ends of the runners with the side bars.

A pair of plates a^4, similar to the plates a^2, are secured to the opposite sides of each side bar A A′ at or near its forward end, the lower ends of which project below the lower edges of the side bars and receive between them the forward ends of the runners, although the projecting ends of said plates are not connected with said runners, but merely serve to form vertical guides for the runners.

Adjusting devices are provided for the forward ends of the runners a a', by means of which they are held in different positions, and as herein shown said adjusting devices consist of vertical screws a^5, passing through vertical holes in the side bars A A′ and projecting both above and below said side bars, and said screws turn in nuts a^6, (see dotted lines, Fig. 3,) which are set into and secured to the side bars along their lower edges adjacent the runners. The lower projecting ends of said screws a^5 pass freely through plates a^7, which are secured to the upper edges of the runners, and beneath said plates recesses a^8 are formed, which receive heads a^9, formed or provided at the lower extremities of the screws a^5. By means of said heads a^9 and plates a^7 the screws a^5 are connected with the forward ends of the runners and in a manner whereby said screws may be revolved. Hand-cranks a^{10} are attached to the upper ends of said screws a^5, by means of which they may be turned to raise and lower the forward ends of the runners. It is obvious that any other form or construction of adjusting device may be provided for accomplishing this result; but the form herein shown is simple and effective and the runners not only adjusted to different elevated positions, but also held in whatever position they may be set. The runners are thus supported by the frame and adjustable relatively thereto independently of each other.

A knife b, which is made as a flat blade or planing-knife, has its front edge beveled to serve as a cutting or planing edge, and said knife b is made of suitable length to extend from side to side of the frame between the runners a a'. The knife b is attached to knife-supports b', which are herein shown as flat arms pivotally connected at b^2 to the lower ends of vertically-disposed plates b^3, which are secured to the front side of the cross-bar A^3, there being three such pivoted or swinging arms b' supported by said cross-bar. These pivoted or swinging arms extend forward and hold the knife in proper position, as shown in Figs. 1 and 3, to plane the ice. The knife is secured to the under side of the forward extremities of said swinging arms b' by bolts 2, which pass through transverse slots 3, formed in said knife, and thence through the arms b', said slots thereby enabling the knife to be adjusted back and forth in the direction of the length of the slots. To more securely hold said knife and better enable it to withstand the strain to which it is put when planing the ice, heel-pieces b^4 are bolted to the under side of the swinging arms, against which the rear or heel edge of the knife abuts, and said heel-pieces b^4 are likewise formed with slots b^5 for the bolts, whereby they may be adjusted to correspond to the adjustment of the knife. Plates b^6 are secured to the upper sides of the extremities of said swinging arms, which bear ears b^7, and for simplicity of construction said plates b^6 are secured in position by the same bolts that are used to attach the knife and the heel-pieces to said arms. Screw-threaded rods b^8 (three in number) are loosely connected at their lower ends to said ears b^7, and said rods are disposed vertically, or substantially so, and their threaded ends enter internally-screw-threaded nuts b^9, which are set into and supported by a cross-bar c. The nuts b^9 (see Fig. 10) have cylindrical bodies, which enter correspondingly-shaped recesses in the cross-bar c, being thereby free to turn in said recesses, and they have at or near their upper ends circumferential grooves b^{10}, which occupy a plane just above or flush with the top of the cross-bar c, and the upper ends of said nuts, above the grooves, are formed as bevel-gears b^{14}. A pair of straps b^{12} (see Fig. 9) are provided for each nut b^9, which are bent angularly to receive the cross-bar c, to which they are attached, and which abut together to embrace the nut, and said straps b^{12} are formed with semicircular recesses b^{13}, which when abutting together receive the nut, and said semicircular recesses are made of a smaller diameter than the diameter of the recess in the cross-bar which receives the nut, and consequently the strap will project inward beyond the walls of said recess and will enter the circumferential groove b^{10} in the nut b^9. The nut is thus supported by said straps, which enter its circumferential groove, yet said nut is free to be revolved. Each nut has at its upper end a bevel-gear b^{14}, which is engaged by a bevel-gear b^{15}, secured to a horizontal rod or shaft b^{16}, extending crosswise the machine in parallelism with the knife, and said rod or shaft b^{16} has its bearings in standards b^{17}, erected on said cross-bar c. By turning the horizontal shaft b^{16} the nuts b^9 will be revolved, and the threaded rods b^8, which are in engagement with them, move longitudinally or up and down, according to the direction that said shaft is turned.

The threaded rods b^8 and nuts b^9 and the means employed for holding said nuts in position on the cross-bar and for operating said nuts serve as and constitute means for holding the swinging arms b' and knife borne by them in operative position and also for adjusting said knife to different elevations. As three swinging arms b' are herein shown, I have also provided three threaded rods b^8, nuts therefor, and means for holding and operating said nuts, all being mounted on the cross-bar c. By turning the shaft b^{16} it will be seen that the knife will be adjusted and held in different elevations relative to the runners and independently thereof.

I do not desire to limit my invention to the particular construction of the means herein shown for holding and operating the adjusting-nuts or, in fact, to the particular means herein shown for holding the knife and adjusting it to different elevations, as it is obvious that other means may be employed by which substantially the same results may be accomplished without departing from this invention.

When transporting the machine, it is desirable to raise the knife into "out-of-use" position, whereby it cannot come in contact with any obstacles, and as a simple way of carrying out this part of my invention the cross-bar c is made removable from the side bars A A' bearing it and when removed may be swung rearward, as represented by dotted lines, Fig. 3, the knife and its adjoining parts swinging on the axis of the arms b'. The cross-bar c is herein represented as resting upon the side bars A A' between blocks c c', which are secured to or which may form an integral part of said side bars, and said cross-bar c is held in position on said side bars by straps or plates d, which are pivotally connected to the blocks c' at one end, as at d', and detachably connected to the blocks c' at the opposite ends by means of bolts d^2. By detaching the bolted ends of said straps d they may be swung outward on their pivots d', to thereby permit the cross-bar c to be lifted from the side bars and swung into the dotted-line position, Fig. 3, together with all the parts attached to or borne by it.

The knife b is normally held when in use so that it shall occupy a position oblique to the plane of the tread-faces of the runners, as represented in the diagram, Fig. 2—that is to say, one end of the knife will occupy a position substantially flush with the tread of one runner, as a, and the opposite end of said knife will occupy a position below the tread of the other runner, and such obliquity may be varied more or less by the independent adjustment of the runners. The advantage of holding the knife in such relative position to the runners is that when making the first cut, both runners bearing on the surface of the ice, the cut will be slanting or oblique to the plane of the surface of the ice from side to side, and when making the second cut one of the runners will follow along in the deepest part of the first cut and the other runner will bear on the surface of the ice, and the said second and successive cuts will consequently be in a horizontal plane.

In Fig. 2 the full lines represent the runners when making the first cut and the dotted lines represent the runners when making the second cut.

A pair of vertical plates or bars e e' (see sectional detail, Fig. 6) are secured to the opposite sides of each side bar A A' immediately in advance of the knife b, the outside plate e projecting below the side bars a short distance only and the inside plates projecting below the side bars and terminating with an ice-engaging prong e^2 at a point below or flush with the tread-face of the runner. These plates e e' on each side bar serve to form vertical guides for the runners, and the inside plates having, as they do, an ice-engaging prong e^2 will serve to engage the ice just in front of the knife and may consequently be used in guiding the machine. The inside plates e' are formed or provided with vertical slots e^3, which receive the bolts by which they are secured to the side bars, and said slots e^3 permit vertical adjustment of the plates.

In rear of the knife b an outside plate f is secured to the outside of each side bar A A', and said plates f are constructed like the inside plates e'—that is to say, they each have vertical slots which receive the bolts by means of which they are attached to the side bars and have their lower ends terminating in an ice-engaging prong at a point below or flush with the tread-faces of the runners. Said plate may be vertically adjusted so that its ice-engaging prong may terminate above or below the tread of the runners. These rear plates f also serve as guides for the machine and also when in engagement with the ice will prevent the machine from sluing as it advances.

At the forward part of the machine a shoe g is provided, which is pivoted at g' to a bracket on the cross-bar A^2, and a hand-lever g^2 is formed integral with or connected with said shoe g, by means of which it is moved on its pivot. The shoe g may be moved to a position above or below the tread of the runners, and when below the tread of the runners the forward part of the machine will be slightly elevated in order that the planing-knife b may thereby be raised out of contact with the ice. In turning corners this shoe may be employed to elevate the forward end of the machine slightly instead of necessitating throwing up the knife by the removal of the cross-bar c. The hand-lever g^2 has on it a projection g^3, which is adapted to be engaged by a catch g^4, pivoted at g^6 to a stand on the frame and having a footpiece g^7 for operating it, and said projection and

catch serve as a means for locking the front shoe in its position to raise the forward end of the machine.

A cross-bar h, formed with trunnions at the ends, is pivotally connected with the forward ends of the side bars A A′, and said cross-bar has a pole h' attached to it. The pole h' has a flat board h^2 placed upon it, and above the board and also below the pole metallic straps h^3 are placed, and bolts pass through said straps, board, and pole to rigidly secure them together, thereby forming a rigid structure. The straps h^3 h^3, one above and the other below the pole, both extend rearwardly beyond the pole for a short distance, and their extremities are bent at an angle, as represented in Fig. 3, and said projecting ends of the straps receive between them the pivoted bar h, and a bolt passes through said straps and also through any one of a series of holes h^4 in the bar h, to thereby connect the pole to said bar. At each side of the pole the board h^2 has attached to it, above and below, a similar strap h^5, (see Figs. 1 and 11,) and said straps extend rearwardly for a short distance and have their extremities bent at an angle to receive and embrace the pivoted bar h, although said projecting portions are not bolted to said bar. At the rear end of the machine a pair of handles i may and preferably will be secured by means of a frame i', which is attached to the rear ends of the side bars A A′. Also at the rear end of the machine a clearing-board is provided, which is adapted to follow in the rear of the machine and clear the "cut" of chips, and said clearing-board is herein shown as a flat board n, set edgewise and disposed obliquely to the travel of the machine, and on one side of said board n—as, for instance, on its rear side—two pairs of ears n' are shown, having vertical holes through them, the ears of each pair being disposed one above the other, and the uppermost ears are near the upper edge of the board and the lowermost ears are near the lower edge of the board.

An arm n^2 is attached at n^3 to the rear end of one of the side bars, which projects inwardly toward the clearing-board, and said arm is bent downward at substantially right angles, and its downwardly-extended portion passes through the pair of ears n' at or near one end of the board. This connection is, however, detachable for purposes to be explained. An arm m is attached to the rear end of the other side bar, which extends rearwardly, and said arm m has a short downwardly-projecting pin m', which enters the uppermost ear at the opposite end of the clearing-board, and said arm m is bent downward, as represented in Fig. 13, and its lower end enters the lowermost ear. This connection is also detachable. The clearing-board will thus be securely held in an oblique position relative to the travel of the machine, with its forward end bearing against the side bar A′ and cross-bar A^3 at the junction of said bars, as shown in full lines, Fig. 1. Whenever it is desired to reverse the position of said clearing-board n for the purpose of clearing the chips in the opposite way, it will be detached from the arms n^2 and m. Then said arms will be detached from the side bars, and the arm n^2 will then be attached to the side bar A and the arm m will be attached to the side bar A′ and the clearing-board then placed in the dotted-line position shown in Fig. 1 and attached to said arms.

The machine will be provided with a seat which will be supported by the frame in any suitable manner.

I claim—

1. In an ice-planing machine, a frame, a pair of runners pivoted thereto at one end and adjustably supported at the opposite end and a planing-knife extending from side to side of the machine between said runners and forward of their pivots, substantially as described.

2. In an ice-planing machine, a frame, a pair of runners pivoted thereto at one end and connected with adjusting-screws at the opposite ends, means for turning said screws to independently adjust said runners and a planing-knife extending from side to side of the machine between said runners and forward of their pivots, substantially as described.

3. In an ice-planing machine, a frame comprising a pair of side pieces having runner portions at the front ends thereof and a pair of runners in rear of said runner portions pivoted to the rear part of the frame and adjustably supported to the forward part of the frame, and means for adjusting the forward ends of said runners from a position substantially flush with said runner portions to different elevations below said runner portions and a planing-knife extending from side to side of the machine between said runners and forward of their pivots, substantially as described.

4. In a planing-machine, a runner-bearing frame, a planing-knife, a pivoted support to the forward end of which the planing-knife is attached, a removable cross-bar, means supported by said cross-bar for holding said pivoted support with the planing-knife carried thereby in operative position and for adjusting said planing-knife to different elevations, said cross-bar adapted to be swung upon the pivoted support to bodily move the planing-knife from its operative to its out-of-use position, substantially as described.

5. In an ice-planing machine, a runner-bearing frame, a planing-knife disposed between the runners of said frame, arms to the forward ends of which said knife is attached, plates fixed to the frame to which the rear ends of said arms are pivoted, whereby said knife is adapted to be swung up out of operative position or adjusted to different eleva-

tions, and means for holding said planing-knife in operative position for use, substantially as described.

6. In an ice-planing machine, a runner-bearing frame, a planing-knife disposed between the runners of said frame, arms to the forward ends of which said knife is attached, plates fixed to the frame to which the rear ends of said arms are pivoted, whereby said knife is adapted to be swung up out of operative position or adjusted to different elevations, means for holding said planing-knife in operative position for use, and means for adjusting said planing-knife to different elevations, substantially as described.

7. In an ice-planing machine, a runner-bearing frame, a planing-knife disposed between the runners of said frame, arms to the forward ends of which said knife is attached, plates fixed to the frame to which the rear ends of said arms are pivoted, whereby said knife is adapted to be swung up out of operative position or adjusted to different elevations, means for holding said planing-knife in operative position for use, means for adjusting said planing-knife to different elevations, and means for adjusting said planing-knife in and out, substantially as described.

8. In an ice-planing machine, a runner-bearing frame, a planing-knife, swinging arms to which it is attached borne by said frame, adjusting-screws connected with said planing-knife, a cross-bar supported by the frame, revoluble bearing-nuts which coöperate with said screws for holding the planing-knife in different elevated positions and means for turning all of said nuts simultaneously, substantially as described.

9. In an ice-planing machine, a runner-bearing frame, a planing-knife disposed between the runners of said frame, swinging arms to the forward ends of which said knife is attached, a removable cross-bar supported by the frame above the knife, and means carried by said removable cross-bar loosely connected with said planing-knife for holding the knife in operative position, substantially as described.

10. In an ice-planing machine, a runner-bearing frame, a planing-knife disposed between the runners of said frame, swinging arms to the forward ends of which said knife is attached, a removable cross-bar supported by the frame above the knife, adjusting-screws connected with said planing-knife forward of the pivots of said swinging arms and nuts coöperating therewith which have their bearings in and are supported by said removable cross-bar, and means for turning said nuts, substantially as described.

11. In an ice-planing machine, a runner-bearing frame, a planing-knife disposed between the runners of said frame, swinging arms to the forward ends of which said knife is attached, a removable cross-bar supported by the frame above the knife, adjusting-screws loosely connected with said planing-knife forward of the pivots of said swinging arms and nuts coöperating therewith which have their bearings in said removable cross-bar, and means for turning said nuts to adjust the planing-knife to different elevations, substantially as described.

12. In an ice-planing machine, a frame, a pair of independently-adjustable runners borne by it, a planing-knife extending from side to side of the machine between said runners, arms to the forward ends of which said knife is attached, a plate fixed to the frame to which said arms are pivoted, whereby said knife is adapted to be swung up out of operative position or adjusted to different elevations, means for holding said knife in operative position for use, and means for holding said knife in different elevations relative to the runners, substantially as described.

13. In an ice-planing machine, a runner-bearing frame, a planing-knife, arms pivoted to the frame to the forward ends of which the planing-knife is attached, whereby said knife is adapted to be swung up out of operative position or adjusted to different elevations, and vertically-adjustable ice-engaging guide-bars located forward of and at each end of said knife and also rear of and at each end of said knife, substantially as described.

14. In an ice-planing machine, a runner-bearing frame, a planing-knife and an oblique clearing-board at the rear of the machine disposed obliquely from one side to the other and means for connecting it with the frame to clear at either side of the machine, consisting of a removable extension of the frame which engages and supports said board at one end and a brace which supports it at the outer end, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN T. HOURIHAN.

Witnesses:
B. J. NOYES,
JENNIE L. HUTCHINSON.