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2,545,104

ICE JAM REMOVER FOR BRIDGES

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2 Sheets-Sheet 1

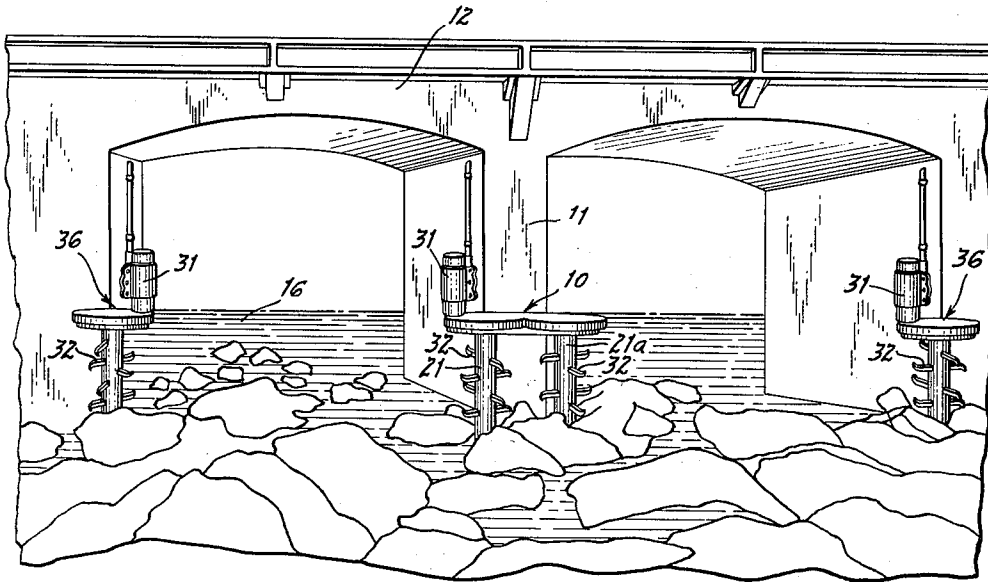


FIG. 1.

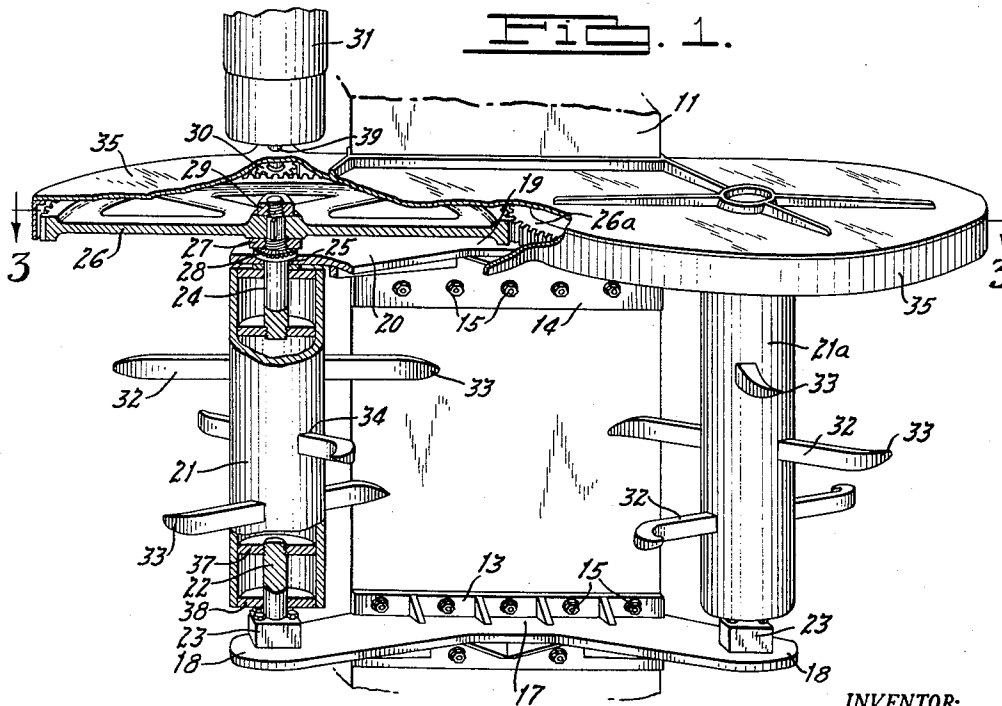


FIG. 2.

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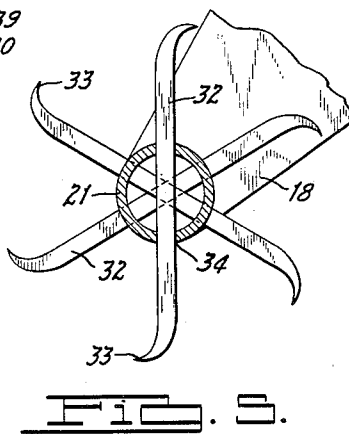
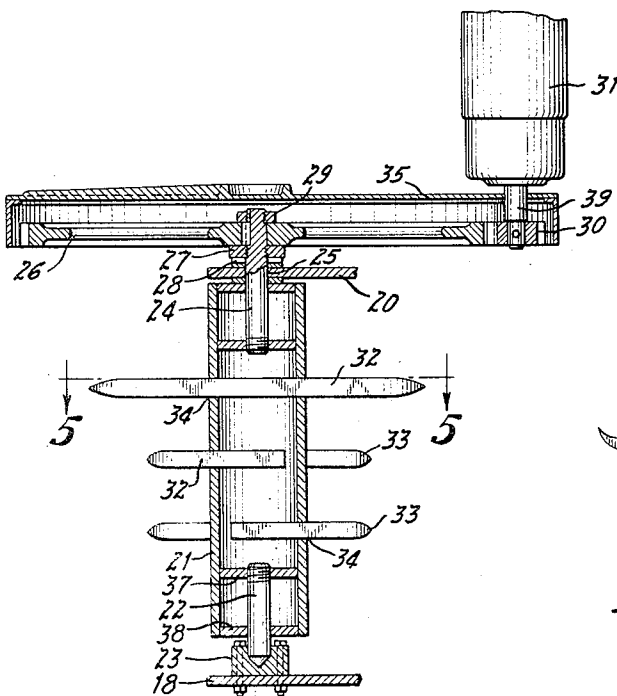
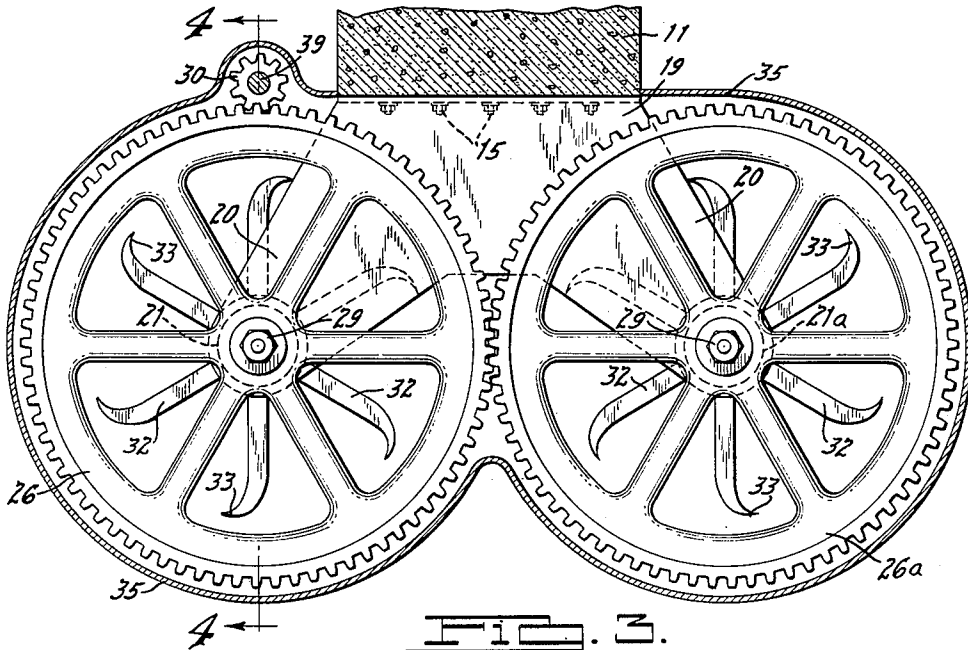
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ICE JAM REMOVER FOR BRIDGES

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3 Claims. (Cl. 14—76)

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My invention pertains to a device designed to prevent ice on rivers from piling up against the piers supporting bridges and thus to eliminate the danger of damage to and the destruction of the respective bridges.

As it is well known, ice floes carried by the flowing waters of rivers will often encounter said piers, pile up against the bridge structure and act as a barrier to the movement of other ice floes, and that of the body of water itself. As a result of the enormous pressure built up by the masses of ice, the structure of the respective bridge may be weakened with the result that the bridge may collapse.

It is to prevent such ice floes from accumulating against the bridge structure that I have designed my device. The device comprises rotary means adapted to engage floes as they encounter the stationary, supporting members of a bridge, and by clawing motion of its members steers them away from the bridge structure into the open channels of the moving water.

In designing my device, I have taken care to make it simple in structure, economical in operation, and yet, fully efficient for the purpose which it is to meet.

I shall now describe my ice-jam remover with reference to the accompanying drawings in which:

Figure 1 is a perspective view of a bridge equipped with a number of my devices mounted thereon;

Figure 2 is a perspective view of a complete unit of my device with some parts shown in section for better illustration thereon;

Figure 3 is a sectional view of line 3—3 of Figure 2;

Figure 4 is a sectional view on line 4—4 of Figure 3;

Figure 5 is a sectional view on line 5—5 of Figure 4.

Similar numerals refer to similar parts throughout the several views.

In describing my device, I shall first restrict myself to a species generally identified by numeral 10, and shown mounted in an upright position on pier 11, of bridge 12. The device requires a framework consisting of two vertical plates 13, and 14, which by means of bolts 15, may be secured to the face of pier 11, on the side facing the on-coming current of water, indicated in Figure 1, by numeral 16.

Projecting from the lower plate 13, outwardly with respect to pier 11, is a horizontal shelf 17, including at each end a tongue shaped arm 18,

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the arms diverging from each other and extending laterally beyond the limits of the pier structure. A similar shelf 19, with arms 20, projects from the upper mounting plate 14. The shelves

17 and 19 are spaced from each other and serve as means of support for vertical rotary cylinders 21 and 21a. Each cylinder is provided, at its lower end with a short axle 22, held in place by means of two discs 37 and 38, transversely set within the cylinder adjoining its lower end. At its lower end the axle rests in a bearing block 23, affixed to the upper surface of arm 18. At the upper end, each cylinder has an axle 24, extending outwardly therefrom and held within a bearing 25 in the respective arm 20. Mounted upon axle 24, in cylinder 21, and keyed to said axle is a large gear wheel 26. A nut 27 threaded upon said axle 24, under the hub portion of the wheel, rests on roller bearings 28, and serves as a means of adjusting the position of said wheel, vertically. Applicable from the top over the hub of the wheel is a retaining nut 29 which may be threaded upon the upright end of the axle 24.

Each of the cylinders carries a number of bars 32 passing diametrically through said cylinders disposed diametrically therein and passing outwardly therefrom through apertures 34, being welded in place. The ends of the bars are hooked in opposite directions in a horizontal plane and pointed to form claws 33 for engagement of ice floes. Single bars are disposed at different levels of the cylinders and are set at angle to the bars adjoining them above or below, as the case may be.

The gear wheel 26, is driven by a pinion 30 mounted on the shaft 39 of the electric motor 31, which is supported by said pier 11, above the upper surface of said wheel. Meshed with gear wheel 26, is a similar gear wheel 26a keyed to axle 24 in cylinder 21a, so that the rotation of wheel 26, will set wheel 26a spinning in opposite direction. Electric current for the operation of the motor may be supplied by cables from a point remote from the bridge and the operation of the motor may be controlled by means of a switch located either on or outside the bridge.

To protect the gear wheels from above, I have equipped my device with a guard or cover 35 which extends over said wheels and is affixed for that purpose to the upper mounting plate 14.

I shall now describe the operation of my device:

It will be assumed that my ice jam remover will be mounted upon a pier of a bridge at a

level to best encounter ice floes carried by water against said pier. Considering the fact that a part of the bulk of a floe is submerged, the device ought to be located at a level to permit its operation both above and below the surface of water which carries the floes.

Driven by the motor, the large gear wheels 26 and 26a, and the respective cylinders therebelow, will rotate in opposite directions, diverging from the central portion of the face to the sides thereof, the wheel on the left as shown in Figure 2, rotating in a clock-wise direction while the wheel 26a will rotate oppositely. Bars 32 mounted within the cylinders and projecting therefrom will rotate therewith, engaging by means of claws 33, ice floes adjoining said cylinders and steer them to the sides of the pier on which my device is mounted, and into the current of the water flowing by the pier.

To meet the problem of the variable levels of the water surface under the bridge, the rotating cylinders may be made much taller than illustrated in the drawings and provided with claw ending bars at spaced intervals vertically, along the whole length of said cylinders. As a result the device will be fully efficient at all times, irrespective of the level of water under the bridge.

While in Figure 2, I have shown two cylinders 21 and 21a, rotating in opposite directions it will be understood that only a single cylinder may be required at the terminal discs at each end of the bridge. Such a cylinder is identified in Figure 1, by numeral 36, where the rotation of the cylinder causes the claws 33 to engage ice floes to draw them past the pier into the flowing water currents.

In the drawings, I have shown all the cylinders rotating in a certain fixed position with respect to the piers of bridge 12. Obviously, in some cases where it should be desirable the cylinders could be mounted on the supporting plates in such a manner that the whole device could be shifted up or down. It is suggested that the mounting plates which are shown bolted to the pier could be mounted slidingly on vertical rails and that a worm gear could be used to raise the mechanism up or lower it down, depending upon the level of water under the bridge.

It will be understood that some other changes may be made in the construction of my device without departing from the inventive principle disclosed herein. What I, therefore, wish to claim is as follows:

1. An improved ice-jam remover for a pier of a bridge extending over a flowing body of water, said remover comprising a frame work mounted on the pier and including on the side facing the oncoming water, two horizontal shelves spaced vertically from each other and extending on each side of the face beyond its limits, a vertical cylinder mounted for rotation on each side of the face between the extended portions of the shelves, power means to rotate the cylinders in opposite directions diverging from the vertically central portion of the face of the pier, and a plurality of claws on each cylinder having claws bent in the direction of rotation of said cylinder.

2. In combination with a pillar of a bridge extending over a flowing body of water, a frame work mounted on the pillar, two upright cylinders mounted for rotation within the framework on the side of the pillar facing the flowing body of water, and straddling said side, power means to rotate the cylinders in opposite directions diverging from the vertically central portion of the face of the column and a plurality of bars, diametrically passing through the cylinders, the bars being spaced vertically from each other, and disposed above and below the surface of water, the ends of bars forming claws pointed in the direction of rotation of the respective cylinder.

3. In combination with a pillar of a bridge extending over a flowing body of water, a frame work mounted on the pillar, two members mounted upon the framework for rotation on vertical axles, said members being disposed on the side of the pier facing the flowing body of water and straddling said pier, means to rotate the members in opposite directions diverging from the midportion of the face outwardly towards its sides, and a plurality of bars projecting from each member radially, the bars being spaced from each other vertically and terminating in claws pointed in the direction of rotation of the cylinder on which they are mounted.

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The following references are of record in the file of this patent:

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