

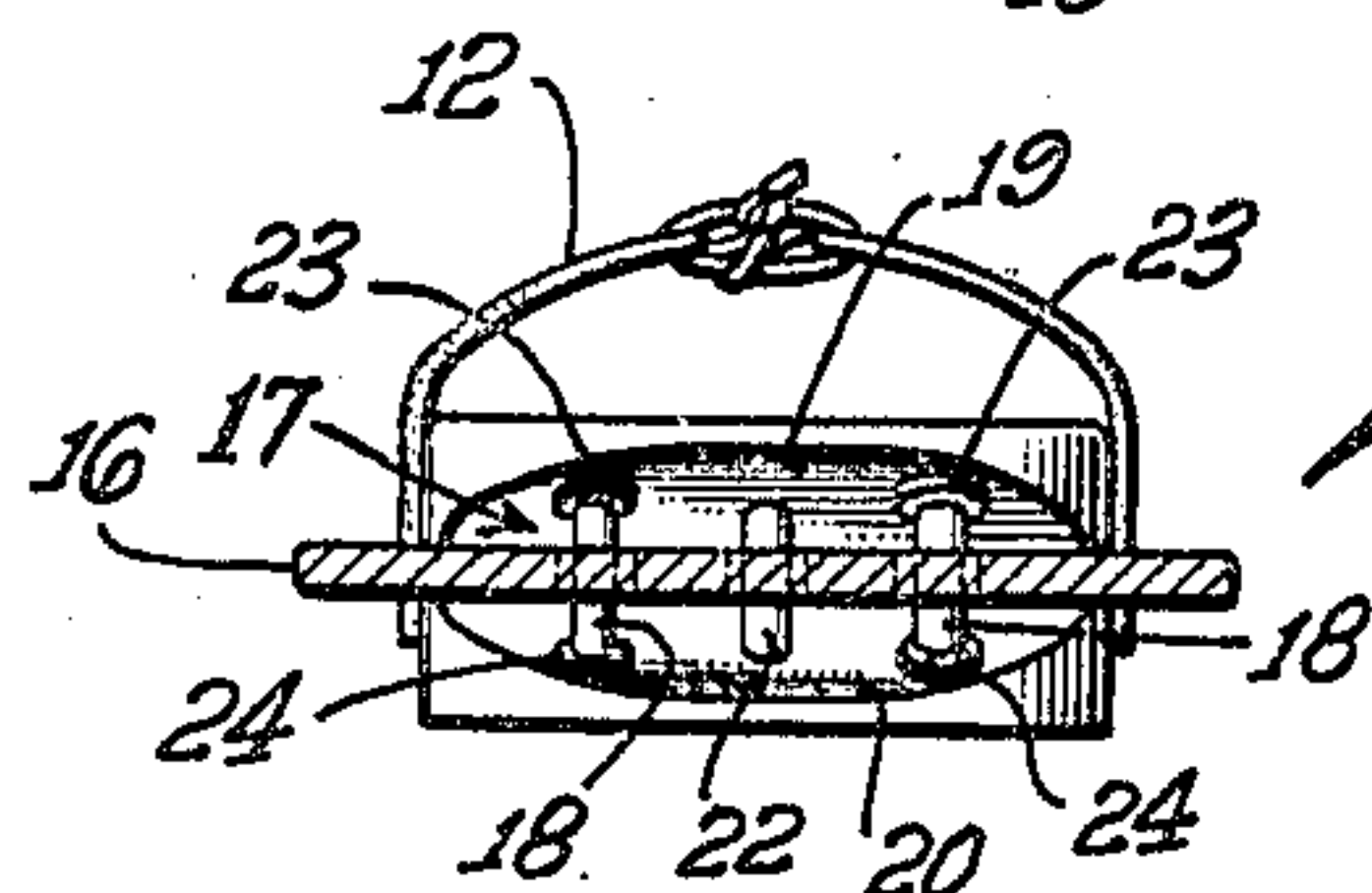
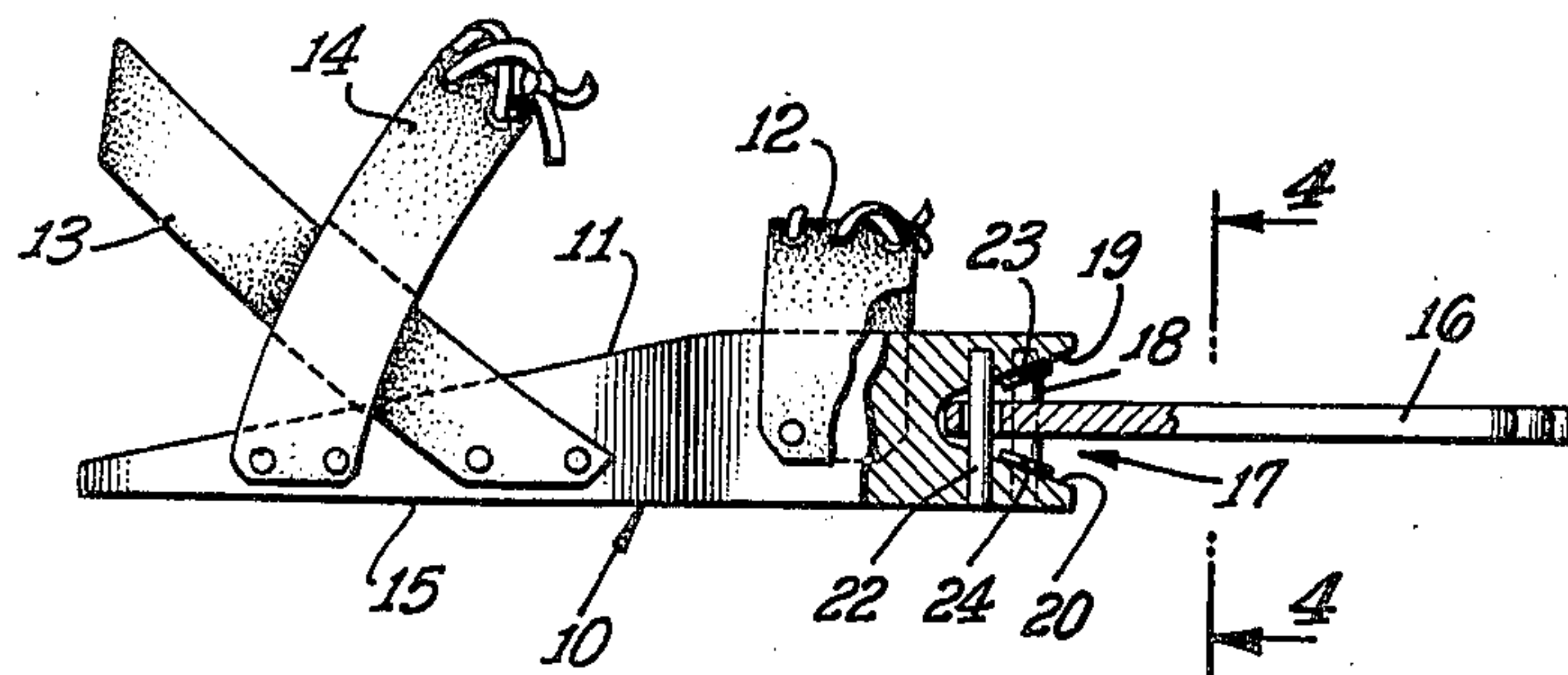
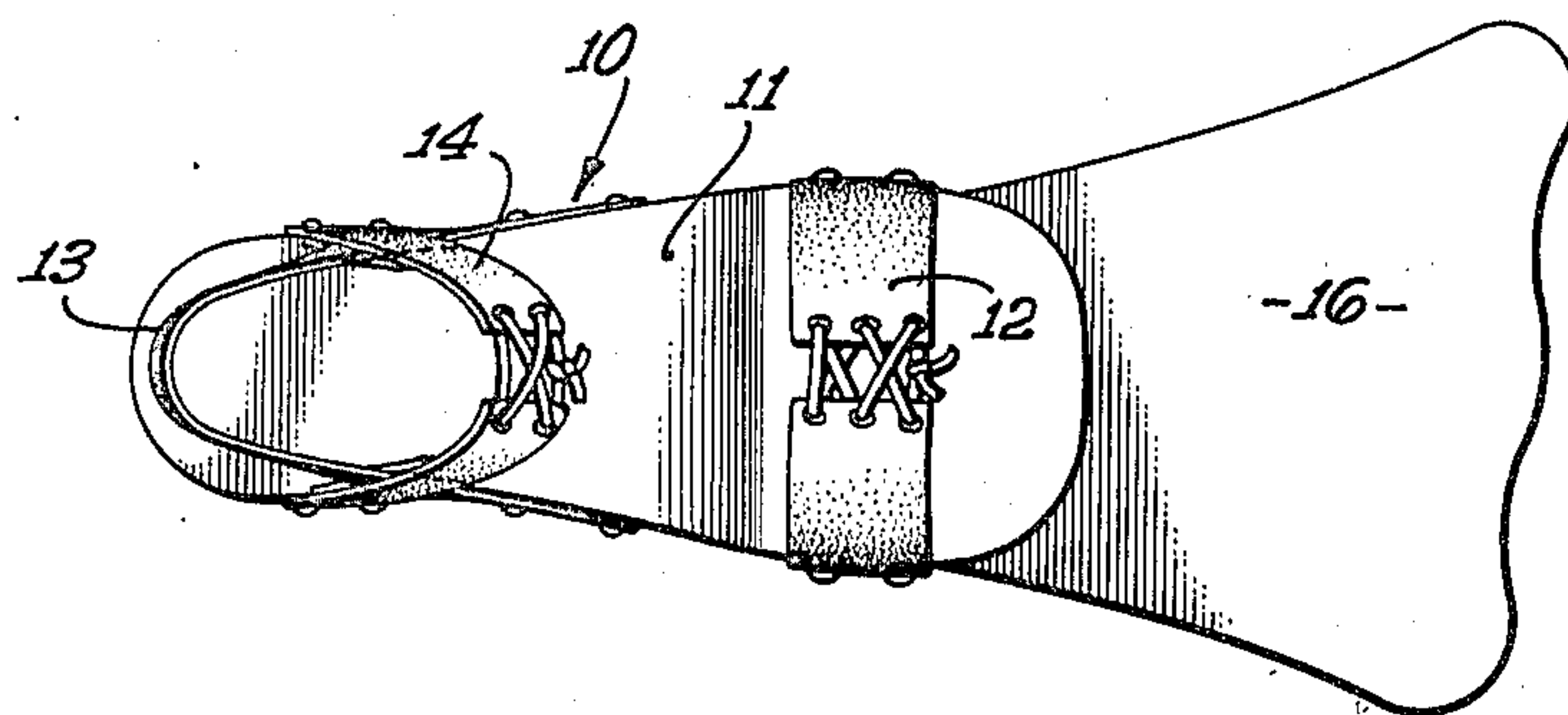
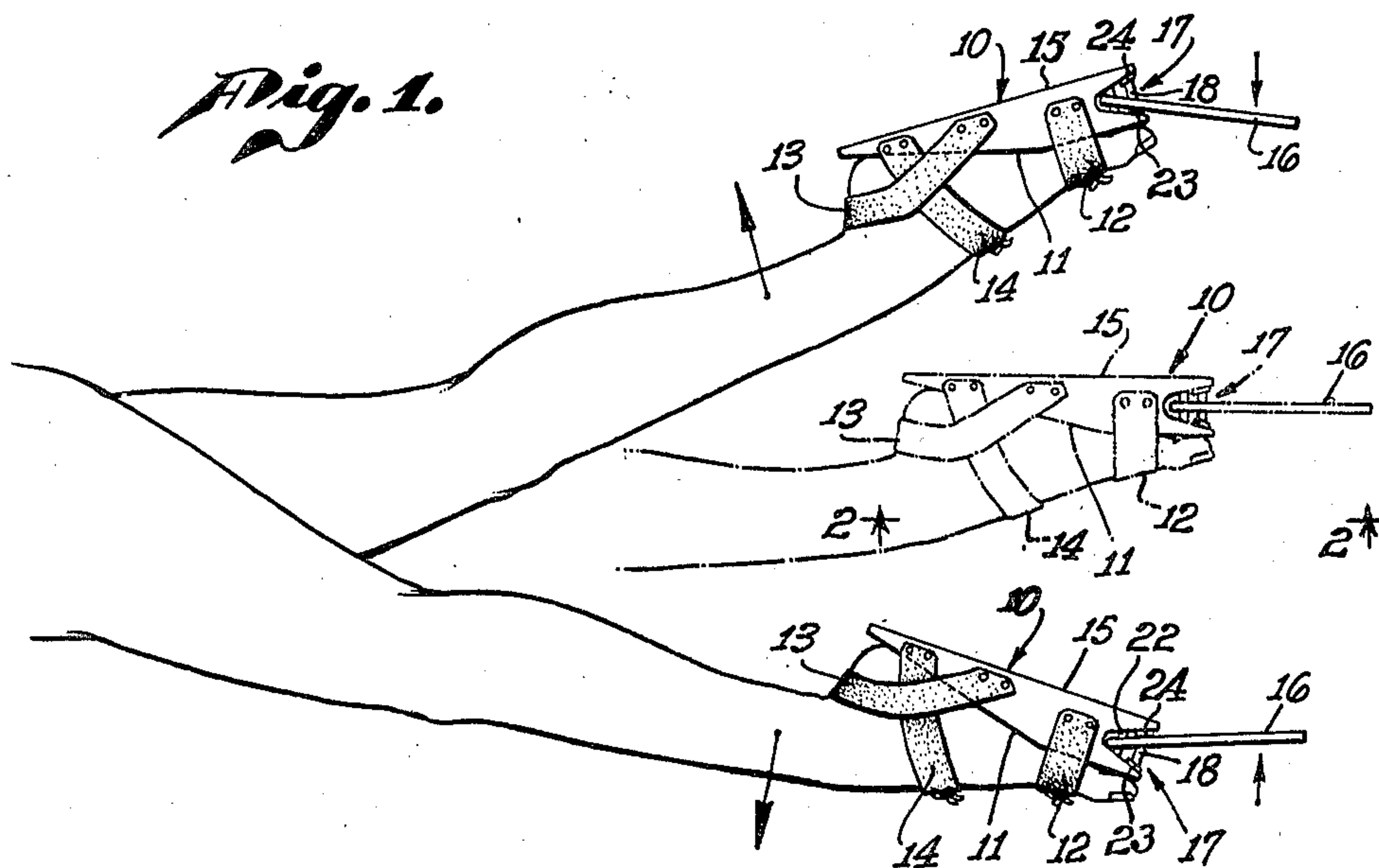
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PROPULSION DEVICE FOR SWIMMERS

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## UNITED STATES PATENT OFFICE

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## PROPULSION DEVICE FOR SWIMMERS

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The present invention relates to devices for assisting swimmers in propelling themselves through the water, and is more particularly concerned with devices of that character adapted for attachment to the feet.

It is an object of the present invention to provide an improved propulsion device adapted for attachment to the feet of a swimmer, embodying fins mounted for pivotal movement with respect to the swimmer's feet and being so disposed thereon as to lie more nearly in alignment with the swimmer's legs.

A further object of the present invention is to provide a propulsion device adapted for attachment to the feet of a swimmer, embodying comparatively rigid fins mounted for pivotal movement with respect to the swimmer's feet and being so disposed thereon that each fin has upper and lower portions that are substantially in alignment with the swimmer's legs so as to cause the swimmer's propulsion to be more porpoise like in character.

It is another object of the present invention to provide a propulsion device adapted for attachment to the feet of a swimmer, embodying comparatively rigid fins mounted for pivotal movement through a fixed angle of such extent as to impose a minimum of drag or fatigue on the swimmer upon oscillation of the legs while producing a minimum of shock incident to reversal of direction of movement of the legs.

This invention possesses many other advantages and has other objects which may be made more easily apparent from a consideration of one embodiment of the invention. For this purpose there is shown a form in the drawing accompanying and forming part of the present specification. This form will now be described in detail, illustrating the general principle of the invention; but it is to be understood that this detailed description is not to be taken in a limiting sense, since the scope of the invention is best defined by the appended claims.

Referring to the drawing:

Figure 1 is a view showing a pair of propulsion devices applied to the feet of a user;

Figure 2 is an elevational view of one of the devices taken as indicated by line 2—2 of Figure 1;

Figure 3 is a side elevation of the device, partly in section; and,

Figure 4 is a transverse section taken on line 4—4 of Figure 3.

As disclosed in the drawing, the propulsion device consists of a main body 10 having a

last-like shape so as to conform to the human foot. The body has a surface 11 adapted to be engaged by the sole of the foot and is provided with a toe strap 12 at its forward end for securing it to the front end of the foot and crossing heel and ankle straps 13 and 14 for securing it to the rearward portion of the foot. The body 10 is also provided with a suitable and preferably flat base surface 15 to enable the wearer to walk without difficulty.

A fin 16 is oscillatably or pivotally carried at the toe end of the body 10, where it is received within a generally V-shaped slot 17. The fin 16 is guided in its oscillatory movement by a pair of spaced guideways in the form of pins 18 extending between the sides 19 and 20 of the slot 17 and passing loosely through holes in the fin. A suitable pin 22 extends across the slot inwardly of the guideways 18 and passes loosely through a hole at the rear of the fin to provide a fulcrum point about which the fin can oscillate or pivot.

The sides 19 and 20 of the V-shaped slot 17 constitutes stops for positively determining the amplitude of oscillation of the fin 16 with respect to the body 10. If desired, washers or pads 23 and 24 of suitable material may be placed on the guideways 18 adjacent the respective sides 19 and 20 of the slot 17 to function as yieldable stops and avoid any sudden impact that might result from contact between the comparatively rigid fin and the rigid body.

As has just been indicated, the body 10 and the fin 16 are made of comparatively rigid material, which nevertheless is preferably buoyant in water, so that the swimmer feels very little if any additional weight on his feet while swimming. Such material may be wood, or a synthetic resin.

The propulsion devices are made up in pairs corresponding to the right and to the left foot of the swimmer. Each device is fastened to the appropriate foot by means of the straps 12, 13 and 14. As the swimmer oscillates his legs vertically, each fin attached to the body of the device is alternately moved by the resistance of the water in the direction opposite to that in which the leg and foot are moving. That is, when the leg is moving upwards, the fin 16 is swung downwards relative to the body into engagement with the stops 23 at one side of the slot 17. Conversely, downward movement of the leg causes the fin 16 to swing about its pivot in an upward direction with respect to the body to the extent limited



by its engagement with the stops 24 at the other side of the slot.

It is to be noted that the sole engaging surface 11 of the body 10 lies in a plane making an angle with the median plane of the fin 16 within its associated slot 17, the two planes diverging from one another in a direction leading from the heel portion of the body 10 to its toe portion. Although the foot is distended during swimming, the provision of the angular positioning of the sole engaging surface of the body 10 with respect to the fin 16 results in the fin occupying both upward and downward positions relative to the body that are more nearly in alignment with the swimmer's leg. This causes the fins to be oscillatably related to the swimmer's legs more nearly in the fashion of the tail fin of a porpoise to its body, resulting in greater propulsion efficiency than if the median plane of the fin in the body slot were parallel to the sole engaging surface of the body.

That the inclination of the sole engaging surface of the body to the median position of the fin causes the latter to coordinate its movements and operate in conjunction with the leg more nearly like a porpoise's tail fin and body is evident from an inspection of Figure 1. This figure discloses that the sole of the foot, even when distended, makes an appreciable angle with the leg. This angle is compensated for within a reasonable degree by the angle between the fin and the sole engaging surface of the body, resulting in substantial alignment of the fin with the body when it passes through its median position.

The angle of movement of the fin 16 with respect to the body 10 is chosen to prevent undue fatigue or strain on the swimmer and shocks to his system. If this angle were too small, the fin would be substantially rigid with the body and the swimmer could propel himself through the water only with difficulty. On the other hand, if this angle of movement were too great the fin would strike the stops with such force as to cause shocks to be transmitted to the swimmer. The selection of a proper angle through which the fin can swing on the body overcomes these two difficulties. Such angle may be of the order of ten degrees of swinging movement on each side of the median position of the fin. Larger and smaller angles of movement can also be used within limits, and efficient propulsion devoid of shocks is still obtainable. The angle of movement of the fin on each side of its median plane should not be less than five degrees nor more than thirty degrees to accomplish the desired results.

I claim:

1. A propulsion device for swimmers comprising a body adapted to engage the sole of the swimmer's foot, and a substantially rigid fin mounted on said body at its toe end for pivotal movement thereon through a fixed angle.
2. A propulsion device for swimmers comprising a body adapted to engage the sole of the swimmer's foot, a substantially rigid fin pivotally mounted on said body at its toe end, and means on said body engageable with said fin for positively limiting its pivotal movement with respect to said body.
3. A propulsion device for swimmers comprising a body having a surface adapted to engage the sole of a swimmer's foot, a fin pivotally mounted on said body at its toe end and having a median position with respect to the body lying in a plane making an angle with said surface, said plane and surface diverging from one another in a direction leading from the heel portion of the body to its toe portion.
4. A propulsion device for swimmers comprising a body having a surface adapted to engage the sole of the swimmer's foot, a substantially rigid fin pivotally mounted on said body at its toe end for pivotal movement thereon through a fixed angle, said fin having a median position with respect to the body lying in a plane making an angle with said surface, said plane and surface diverging from one another in a direction leading from the heel portion of the body to its toe portion.
5. A propulsion device for swimmers comprising a body adapted to engage the sole of the swimmer's foot, said body having a slot in its toe end, a substantially rigid fin pivotally mounted on said body in said slot, said fin being engageable with the sides of said slot positively limiting its pivotal movement with respect to said body.
6. A propulsion device for swimmers comprising, a body adapted to engage the sole of the swimmer's foot, and a substantially rigid fin mounted on said body for pivotal movement with respect thereto between limits, at one limit said fin lying in a plane diverging from the sole of the swimmer's foot; and at the other limit lying in a plane converging with said sole, in a direction from the heel to the toe of the foot.
7. A propulsion device for swimmers comprising, a body adapted to engage the sole of the swimmer's foot, and a substantially rigid fin mounted on said body for pivotal movement with respect thereto between positions in planes diverging in opposite directions from the plane of said sole.

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