Feb. 24, 1970 P. S. KUSZNIR 3,497,214

OSCILLATING ARM EXERCISER

Filed Dec. 29, 1967

Fig. 1.

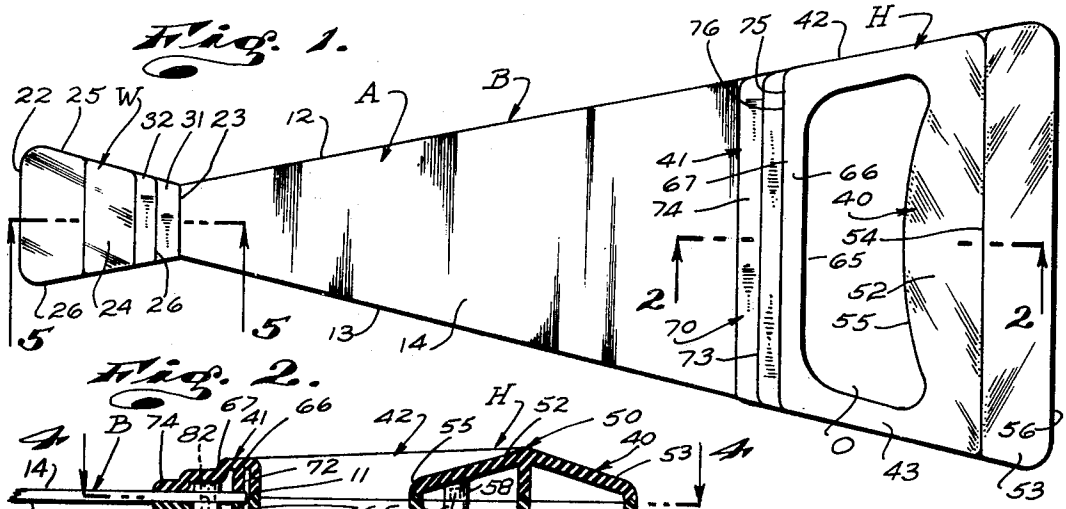


Fig. 2.

Fig. 3.

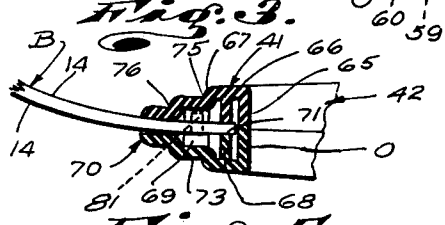


Fig. 4.

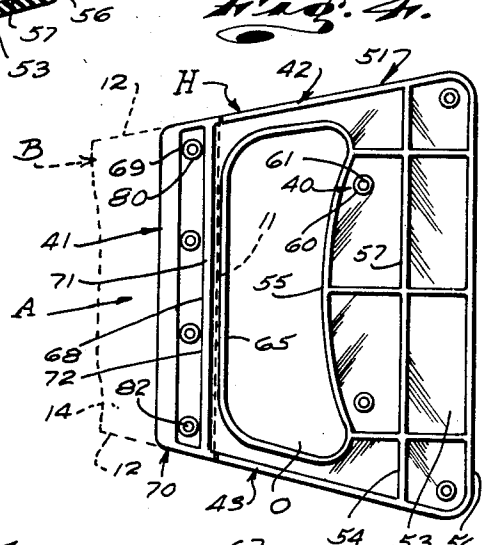


Fig. 5.

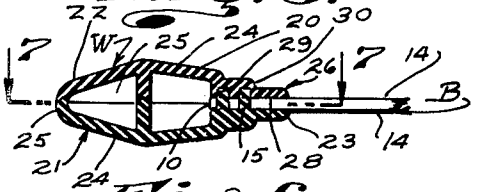


Fig. 6.

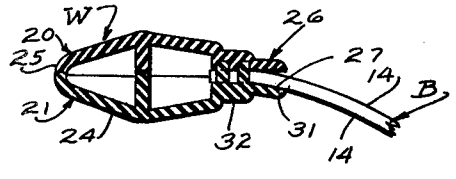


Fig. 8.

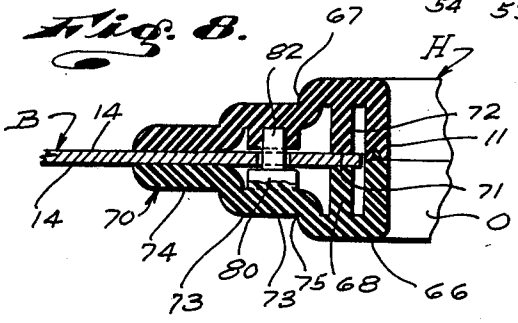
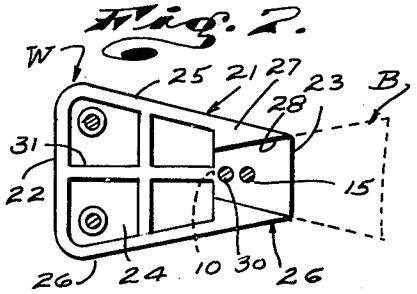


Fig. 7.



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OSCILLATING ARM EXERCISER

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ABSTRACT OF THE DISCLOSURE

A thin resilient blade of spring metal with a wider rear end than front end. A handle is attached at the rear end and a weight is attached at the front end. The handle has a friction clamp for preventing the rear end of the blade from moving relative to the handle. In front of the clamp is a pin to prevent lateral separation of the blade from the handle. In front of the pin and at the end of the handle are two flanges which resiliently grip the blade to permit flexing of that portion of the blade relative to the handle.

A similar prior art device has the principal shortcoming that the spring bodies or blades became work hardened and failed prematurely along those lines where they join or met their related weight means and handle.

Another shortcoming found in the old device is the tendency of the handle to turn in the hand of the operator. This tendency of the handle to turn in the operator's hand had to be overcome by the operator gripping the handle with great force. This required application of physical force and was so fatiguing and unpleasant that many persons using the device experienced hand or grip fatigue before they could get full advantage of the exercise intended to be obtained and soon refused to use the device at all.

An object of this invention is to provide an improved exercising device of the character referred to having novel mounting means between the handle and blade and between the weight and the blade which prevents premature work hardening and failure of the blade and which does not adversely affect the operation of the construction.

Another object of the invention is to provide a device of the character referred to having an improved handle construction or configuration which is such that the handle substantially conforms to the shape of a person's hand engaged about it and in such a manner that the tendency for the handle to turn in the person's hand, when the device is operated, is stopped by the skeletal structure of the hand and the exercise of excessive and fatiguing gripping forces to prevent turning is not required.

The foregoing objects and other objects and features of my invention will be fully understood from the following detailed description of a preferred form and carrying out of the invention, throughout which description reference is made to the accompanying drawings, in which:

FIG. 1 is a side elevation of my new device;

FIG. 2 is an enlarged, detailed sectional view taken as indicated by line 2—2 on FIG. 1;

FIG. 3 is a view similar to a portion of FIG. 2 showing the structure in another operating position;

FIG. 4 is a view taken as indicated by line 4—4 on FIG. 2;

FIG. 5 is an enlarged detailed sectional view taken as indicated by line 5—5 on FIG. 1;

FIG. 6 is a view similar to FIG. 5 showing the structure in another operative position;

FIG. 7 is a view taken as indicated by line 7—7 on FIG. 5; and

FIG. 8 is an enlarged view of a portion of the structure shown in FIG. 2.

The exercising device A that I provide includes, generally, an elongate body B, a handle H at one end of the body and weight means W at the other end of the body.

Referring to FIG. 1 of the drawings for geometric reference, the body B is an elongate, flat, horizontally extending leaf spring arranged in a vertical plane and having straight, vertically extending front and rear ends **10** and **11**, longitudinally forwardly convergent top and bottom edges **12** and **13** and flat, vertical side surfaces **14**.

The front end portion of the body or blade B is provided with a pair of longitudinally spaced, laterally opening apertures **15** and the rear end portion of the blade is provided with a plurality (four) of vertically spaced apertures **16** spaced longitudinally forward of the rear end **11** of the blade.

The weight means W is a molded plastic assembly comprising two opposing shell sections **20** and **21**. The shell sections **20** and **21** are substantially alike and have front and rear ends **22** and **23**, side walls **24** and top and bottom walls **25** and **26**. In the form of the invention illustrated the top and bottom walls **25** and **26** are rearwardly convergent and the side walls **24** have front and rear portions that are forwardly and rearwardly convergent with respect to the central vertical plane (the plane of the blade) of the construction. The forward ends of the forwardly convergent portions of the side walls **24** are turned laterally inwardly and join to define a rounded vertical front end edge **25** on the weight. The rear ends of the rearwardly convergent portions of the side walls join or have rearwardly extending pads **26** joined integrally thereon, which pads have flat, inwardly disposed, opposing surfaces **27**, each provided with a forwardly convergent, laterally inwardly and longitudinally inwardly and outwardly opening recess **28**, corresponding in plane configuration with the front end portion of the blade and equal in depth to about one-half the thickness of the blade.

The pad **26** of the shell section **20** is provided with a pair of longitudinally spaced, laterally inwardly opening sockets **29** to register with the apertures **15** in the blade and the pad **26** of the section **21** is provided with a pair of longitudinally spaced posts or pins **30** which project through the apertures **15** and into the sockets **29** when the construction is assembled and serve to secure the sections together in fixed relationship with each other and on and with the blade.

In addition to the foregoing, the sections **20** and **21** can, as illustrated be provided with registering and interlocking ribs **31** in their interiors which serve to reinforce and to weight the structure as desired.

The opposing edges of the sections **20** and **21**, remote from the pads or pad portions thereof are suitably fused or cemented together and, as illustrated, can be formed to establish a tongue and groove relationship for the purpose of assuring proper register and an improved mechanical lock therebetween.

In accordance with this invention, the pads **26** of the weight means, which occur at the opposite sides of the blade, at the forward end portion thereof, and normally in flat bearing engagement with the surfaces **14** of the body, have flat, plate-like, inner and outer portions **31** and **32**.

The outer portions **32** of the pads are of considerable thickness or lateral extent with respect to the longitudinal axis of the construction and accommodate the sockets and posts **29** and **30**. It is these related inner portions, with their related sockets and pins, which hold the blade and the shell sections in tight assembled relationship.

The outer inner portions **31** of the pads **26** are thin, flexible, flat, plate-like extensions or lips projecting longitudinally rearwardly from the outer portions and normally establish flat bearing engagement on the forward end portion of the blade immediately rearward of that portion

of the blade which is held securely between and by the forward portions 32 of the pads.

In operation, and when the forward end of the blade is flexed laterally into one side or the other, by movement of the mass of the weight means and as illustrated in FIG. 6 of the drawings, the inner portion 31 of the pad occurring on that side of the blade which opposes the direction in which the blade is flexed, is yieldingly flexed in the same direction by the blade. While being so flexed, the flexible lip or inner portion 32 yieldingly resists such flexing and yieldingly reinforces the adjacent portion of the spring blade.

The inner end portion of the lip portion 32 flexes more readily than the outer portion thereof which is joined integrally with the outer stiff portion of the pad, accordingly, the pad yieldingly flexes, particularly the inner portion thereof, distributing the bearing load between the weight means and the blade longitudinally of the blade and prevents excessive concentrated flexing of the blade along a single line which would result in premature work hardening and failure of the forward end portion of the blade.

The handle D is a sectional molded plastic assembly defining a rear, vertically extending hand grip portion 40 substantially diamond shaped in cross-section, a vertically extending blade mounting portion 41 spaced forward of the grip portion 40 and top and bottom or upper and lower substantially longitudinally extending, vertically spaced rail portions 42 and 43 extending between and joining the grip and mounting portions and cooperating therewith to define a finger receiving opening O.

The handle H, like the means W, comprises two substantially similar, opposing molded plastic shell sections 50 and 51 occurring on opposite sides of the central vertical plane of the construction. The vertically extending hand grip portion 40, which is substantially channel shaped in cross-section, is defined by the related opposing rear portions of the shell sections 50 and 51 and is characterized by or comprises a pair of substantially flat forwardly convergent, forward surfaces 52 and a pair of substantially flat rearwardly convergent rear surfaces 53. The adjacent forward and rear surfaces 52 and 53 join at obtuse angle and define vertically extending side corners or ridges 54 centrally of each side of the grip portion 40, one of which is adapted to occur in the transverse break in the palm of a user's hand which is defined by the knuckle joints when the hand is partially closed in a gripping position about the grip portion 40. The flat, forwardly inclined forward surface 52 related to said one ridge 54 establishes engagement with and supports the portion of the user's palm forward of the knuckle break and the innermost or first bones and related flesh of the four fingers. The rearwardly divergent forward surface 52 on the other side of the hand grip portion, remote from said one ridge 54 and related to the other ridge 54, is engaged by and supports the two outer bones of the user's fingers, the second joints of the fingers being broken about the forward vertical edge 55 of the hand grip portion.

In practice, the forward edges of the surfaces 52 are turned laterally inwardly and joined so that the forward edge 55 defined thereby is comfortably rounded. Still further, the forward edges of the surface 53 are curved, vertically rearwardly from the central longitudinal axis of the construction so that the edge 55 is arched or cambered rearwardly towards each end and at substantially the same arch or camber line along which the second joints of the user's fingers occur when his hand is closed and gripped about the grip portion 40.

With the above relationship of parts, it will be apparent that the hand grip portion is shaped so that it cooperatively fits into the closed grip of the user's hand and is locked against rotation therein by the skeletal structure of the hand and so that little muscular strength and effort is required to grip and hold the structure against rotation in the user's hand, as it is operated.

The rear edge 56 of the hand grip portion of the handle, defined by the rearwardly convergent rear surface 53, can be straight vertically and is preferably rounded in cross-section in the same manner as the edge 55.

The portions of the shell sections defining the hand grip portion 40 are provided with suitable internal reinforcing ribs 57. One section is provided with laterally inwardly projecting posts 58 with inwardly opening sockets 59 and the other is provided with laterally inwardly projecting posts 60 with inwardly projecting pins 61 which pins enter related sockets 59 to pin and hold the sections together.

The upper and lower rail portions 42 and 43 project forwardly from the upper and lower ends of the hand grip portion 40 and are established by opposing forwardly projecting, laterally inwardly opening U-shaped projections on the upper and lower ends of the shell sections 50 and 51. In the case illustrated, the rail portions are inclined to converge forwardly at the same angle as the edges 12 and 13 of the blade and occur in the same plane as the said edges of the blade.

The rails are box sections with side walls, inner walls joined with the forward edge 55 of the hand grip portion 40 and defining the top and bottom sides of the opening O and outer walls which extend rearwardly and overlie and close the upper and lower ends of the portion 40.

The mounting portion 41 of the handle structure includes a vertically extending rear wall 65, side walls 66, vertical front walls 67, clamp means 68, coupling means 69 and resilient spring flexure control means 70.

The vertical rear wall 65 occurs in a plane normal to the vertical plane of the construction and is integrally jointed with and extends between the forward ends of the inner walls of the rail portions 42 to define the front side of the opening O.

The side walls 66 project forwardly from the outer edges of the rear wall 65 and the front walls 67 project laterally inward from the forward edges of the side walls. There are two laterally spaced front walls 67. Each is in the nature of a laterally inwardly projecting flange along the forward edge of its related side wall.

The blade clamp means 68 includes a pair of vertically extending, laterally inwardly disposed, opposing blade engaging clamp surface 71 establishing tight clamped engagement with the opposite surfaces 14 of the body B. The rear end 11 of the blade opposes and is preferably spaced a short distance forward of the rear wall 65.

In the case illustrated, the clamp surfaces 71 are established by laterally inwardly projecting, vertically extending, elongate flanges 72 on the side walls 66, as clearly illustrated in the drawings.

The blade flexure control means 70 includes a pair of laterally spaced first or primary, forwardly projecting, vertically extending flanges 73 on the inner edges of the spaced apart front walls 67 and occurring in lateral spaced relationship from their related side surfaces 14 of the blade B and a pair of flat, laterally spaced second or secondary, forwardly projecting, vertically extending flanges 74 on the forward edges of the primary flanges and establishing flat bearing engagement on their related side surfaces 14 of the blade B at points spaced forward of the clamp means.

The primary flanges 73 are laterally inwardly offset from the planes of the related side wall 66 and the secondary flanges 74 are laterally inwardly offset from the planes of their related primary flanges whereby the said walls and flanges establish a forwardly and laterally inward step appearance and define a pair of longitudinally spaced, vertically extending corners or break lines 75 and 76 at each side of the handle, forward of the clamp means 68 and rear end 11 of the blade B.

The coupling means **69** includes a plurality of vertically spaced, axially aligned, laterally inwardly projecting blade engaging posts **80** on the primary flanges **73** and arranged in alignment with the aperture **16** in the rear end portion of the blade B, laterally inwardly opening sockets **81** in the ends of the posts **80** at one side of the blade and laterally inwardly projecting pins **82** on the ends of the post **80** on the other side of the blade and projecting through the aperture **16** and out the sockets **81**. With the above relationship of parts, it will be apparent that the blade is simultaneously held and retained in fixed relationship with the handle structure.

The several parts and/or portions of the flexure control means are formed integrally with their related shell sections **50** and **51**. The pins **82** are preferably cemented or welded in their related socket **81** and the several opposing engaging edges of the sections **50** and **51** are pivotally provided with mating tongues and grooves and are suitably cemented or welded together.

In operating and when the blade B is flexed laterally back and forth relative to the central vertical plane of the handle, the rear end portion of the body, clamped between the clamp surface **71** is held immovable relative to the handle. The portion of the blade between the secondary flanges **74** flexed laterally from the central flange of the handle and yieldingly flexes that primary flange **74** which occurs on the side of the blade towards which the blade is flexed, laterally outward. The primary flange which is thus flexed defines a yieldingly pivot line about which the blade flexes and causes the rear end portion of the blade to flex over a greater longitudinal extent, that is, to take a less arcuate or softer bend than it would take in the absence of the flex control means, whereby excessive acute flexing of the blade adjacent the clamp means and which would result in premature work hardening and failure of the blade will not occur.

The break lines **75** between the primary and secondary flanges prevents flexing of the secondary flanges **74** relative to the primary flange **73** without excessive strain being placed on the primary flanges.

In practice, when in operation and when the greater forces are applied between the blade and handle, the forces applied to the secondary flanges are transmitted to the primary flanges and tend to flex the primary flanges laterally outward. The primary flanges, being coupled together by the clamping means **69**, are considerably stiffer and afford greater resistance to flexing of the blade than do the flanges **74**, yet will flex slightly. The forces applied to the primary flanges are resolved in tensile forces into and through the coupling means and results in stretching or extending the coupling means, but not beyond the modular of elasticity of the material from which the handle structure is made.

It will be apparent that with the above relationship of parts, the flexure of the blade is suitably controlled to obtain maximum life from the blade and is so controlled that the operation and effect of the blade is enhanced and is not adversely cambered or buffered.

In practice and as illustrated in FIG. 8 of the drawings, the posts **80** are in slight spaced relationship from the blade and the pins **82** project freely through the openings **16** in the blade whereby coupling means **69** loosely retain the blade from displacement between the surfaces **71** of the flanegs **72** of the clamp means. Such looseness or play in the coupling means affords for freer flexure of the blade by reducing the buffering effect of the coupling means.

The noted looseness or play in the coupling means need not be initially established in the construction, but is created in the construction during an initial breaking-in period.

Having described only a typical preferred form and application of my invention, I do not wish to be limited or restricted to the specific details herein set forth, but wish to reserve to myself any modifications and/or variations which may appear to those skilled in the art and which fall within the scope of the following claims.

Having described my invention, I claim:

1. An exercising device including, an elongated resilient body with front and rear ends, weight means at the outer grip portion, clamp means, between the forward ends a handle at the rear end of the body, the body being in the form of a thin plate spring metal blade wider at its rear end than at its front end, the handle including an elongate hand grip portion normal to the central longitudinal axis of the body in a plane parallel with the plane of the body and spaced from the rear end of the body, forwardly projecting rail portions at the ends of the hand grip portion, clamp means between the forward ends of the rail portions engaging and immovably holding the rear end portion of the body, coupling means spaced forward of the clamp means to prevent lateral separation of the body from the clamp means and permitting flexing of the body relative to the coupling means, and resilient body flexure control means forward of the coupling means to control flexure of the rear end portion of the body.

2. A device as set forth in claim **1** wherein said hand grip portion is diamond shaped in cross-section with rounded front and rear, acute longitudinal edges, obtuse longitudinally extending side edges forwardly convergent front side surfaces between the front edge and related side edges and rearwardly convergent rear side surfaces between the rear edge and related side edges.

3. A device as set forth in claim **1** wherein said hand grip portion is diamond shaped in cross-section with rounded front and rear, acute longitudinal edges, obtuse longitudinally extending side edges forwardly convergent front side surfaces between the front edge and related side edges and rearwardly convergent rear side surfaces between the rear edge and related side edges, said outer edge being cambered longitudinally rearwardly whereby the hand grip portion substantially conforms to the angular skeletal configuration of a user's hand engaged about the hand grip portion.

4. A device as set forth in claim **1** wherein said clamp means includes laterally spaced, opposing clamp surfaces normal to the longitudinal axis of the body and in tight clamped engagement with the rear end portion of the body adjacent and along the rear end thereof, said means to control the flexure of the rear end portion of the body including laterally spaced, transversely extending, flexible flanges on the handle projecting forwardly beyond the clamp means and having laterally inwardly disposed, opposing surfaces engaging the opposite sides of the body along transverse lines spaced forward of the clamp means.

5. A device as set forth in claim **1** wherein said hand grip portion is diamond shaped in cross section with rounded front and rear, acute longitudinal edges, obtuse longitudinally extending side edges forwardly convergent front side surfaces between the front edge and related side edges and rearwardly convergent rear side surfaces between the rear edge and related side edges, said clamp means including laterally spaced, opposing clamp surfaces normal to the longitudinal axis of the body and in tight clamped engagement with the rear end portion of the body adjacent and along the rear end thereof, said means to control the flexure of the rear end portion of the body including laterally spaced, transversely extending, flexible flanges on the handle projecting forwardly beyond the clamp means and having laterally inwardly disposed, opposing surfaces engaging the opposite sides of the body along transverse lines spaced forward of the clamp means.

6. A device as set forth in claim **1** wherein said hand grip portion is diamond shaped in cross-section with rounded front and rear, acute longitudinal edges, obtuse longitudinally extending side edges forwardly convergent front side surfaces between the front edge and related side edges and rearwardly convergent rear side surfaces between the rear edge and related side edges, said outer

edge being cambered longitudinally rearwardly whereby the hand grip portion substantially conforms to the angular skeletal configuration of a user's hand engaged about the hand grip portion, said clamp means including laterally spaced, opposing clamp surfaces normal to the longitudinal axis of the body and in tight clamped engagement with the rear end portion of the body adjacent and along the rear end thereof, said means to control the flexure of the rear end portion of the body including laterally spaced, transversely extending, flexible flanges on the handle projecting forwardly beyond the clamp means and having laterally inwardly disposed, opposing surfaces engaging the opposite sides of the body along transverse lines spaced forward of the clamp means.

7. A device as set forth in claim 1 wherein said clamp means includes laterally spaced, opposing clamp surfaces normal to the longitudinal axis of the body and in tight clamped engagement with the rear end portion of the body adjacent and along the rear end thereof, said means to control the flexure of the rear end portion of the body including laterally spaced, transversely extending, flexible flanges on the handle projecting forwardly beyond the clamp means and having laterally inwardly disposed, opposing surfaces engaging the opposite sides of the body along transverse lines spaced forward of the clamp means, said coupling means including a plurality of transversely spaced apertures in the body on a line spaced between the clamp means and the front end of the flanges, and retainer pins between the rear portions of the flanges and extending through the apertures.

8. A device as set forth in claim 1 wherein said clamp means includes laterally spaced, opposing clamp surfaces normal to the longitudinal axis of the body and in tight clamped engagement with the rear end portion of the body adjacent and along the rear end thereof, said means to control the flexure of the rear end portion of the body including laterally spaced, transversely extending, flexible flanges on the handle projecting forwardly beyond the clamp means and having laterally inwardly disposed, opposing surfaces engaging the opposite sides of the body along transverse lines spaced forward of the clamp means, said coupling means including a plurality of transversely spaced apertures in the body on a line spaced between the clamp means and the front end of the flanges, and retainer pins between the rear portions of the flanges and extending through the apertures, said weight means including a block-like post with front and rear ends arranged at the front end of the blade and having laterally spaced rearwardly projecting flexible flanges in a parallel plane with the body and establishing bearing engagement on the opposite sides of the front portion of the body, coupler pins between the flanges forward of the rear ends thereof and engaged through apertures in the front portion thereof, said resilient flanges controlling the flexure of the forward portion of the blade.

9. A device as set forth in claim 1 wherein said clamp means includes laterally spaced, opposing clamp surfaces normal to the longitudinal axis of the body and in tight clamped engagement with the rear end portion of the body adjacent and along the rear end thereof, said means to control the flexure of the rear end portion of the body including laterally spaced, transversely extending,

flexible flanges on the handle projecting forwardly beyond the clamp means and having laterally inwardly disposed, opposing surfaces engaging the opposite sides of the body along transverse lines spaced forward of the clamp means, said weight means including a block-like post with front and rear ends arranged at the front end of the blade and having laterally spaced rearwardly projecting flexible flanges in a parallel plane with the body and establishing bearing engagement on the opposite sides of the front portion of the body, coupler pins between the flanges forward of the rear ends thereof and engaged through apertures in the front portion thereof, said resilient flanges controlling the flexure of the forward portion of the blade.

10. A device as set forth in claim 1 wherein said hand grip portion is diamond shaped in cross-section with rounded front and rear, acute longitudinal edges, obtuse longitudinally extending side edges forwardly convergent front side surfaces between the front edge and related side edges and rearwardly convergent rear side surfaces between the rear edge and related side edges, said outer edge being cambered longitudinally rearwardly whereby the hand grip portion substantially conforms to the angular skeletal configuration of a user's hand engaged about the hand grip portion, said clamp means including laterally spaced, opposing clamp surfaces normal to the longitudinal axis of the body and in tight clamped engagement with the rear end portion of the body adjacent and along the rear end thereof, said means to control the flexure of the rear end portion of the body including laterally spaced, transversely extending, flexible flanges on the handle projecting forwardly beyond the clamp means and having laterally inwardly disposed, opposing surfaces engaging the opposite sides of the body along transverse lines spaced forward of the clamp means, said coupling means including a plurality of transversely spaced apertures in the body on a line spaced between the clamp means and the front end of the flanges, and retainer pins between the rear portions of the flanges and extending through the apertures, said weight means including a block-like post with front and rear ends arranged at the front end of the blade and having laterally spaced rearwardly projecting flexible flanges in a parallel plane with the body and establishing bearing engagement on the opposite sides of the front portion of the body, coupler pins between the flanges forward of the rear ends thereof and engaged through apertures in the front portion thereof, said resilient flanges controlling the flexure of the forward portion of the blade.

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U.S. Cl. X.R.

272—81