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Sprandel

[11] **3,910,700**

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[54] **MOTORIZED ARCHERY SIGHT AND RANGE FINDER**

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[51] **Int. Cl.²** **F41G 1/00**

[58] **Field of Search** 33/265; 356/21; 74/425

[56] **References Cited**

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[57] **ABSTRACT**

A motorized sight and range finder for archers, consisting of an attachment having a vertical slide on which two sliders are vertically movable. The sliders have sight bars which enable the archer to sight the game between them. One sight bar also has a bull's-eye sight, to zero-in on the body of the game. A pivoted drive member on the slide is connected to the sliders in a way to not only vertically adjust the latter but also to automatically vary the spacing between them. Game which is far away and appears small, requires close spacing of the sight bars which results in their being automatically positioned vertically to a lower level, together with the bull's-eye sight, so as to provide for a higher trajectory of the arrow, and vice versa. A gear train connected with the drive member actuates the latter. The train is driven by an electric motor powered from a battery. A reversing switch in the motor circuit controls the forward and reverse rotation of the latter. The gear train, motor, switch and a portion of the drive member are enclosed in a small housing carried by the slide.

9 Claims, 7 Drawing Figures

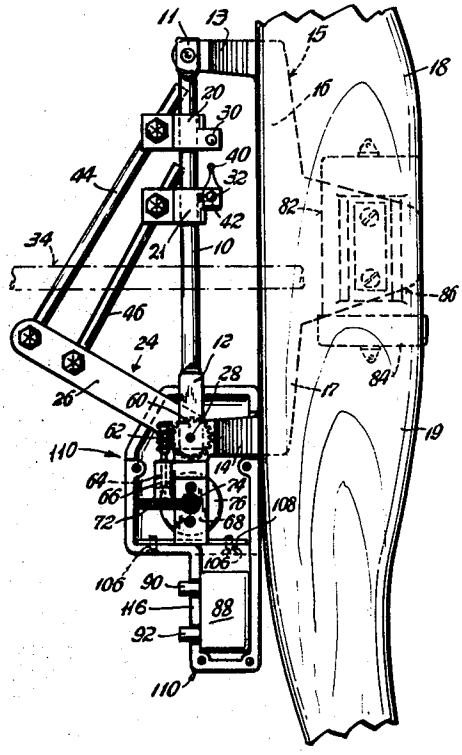


Fig. 1

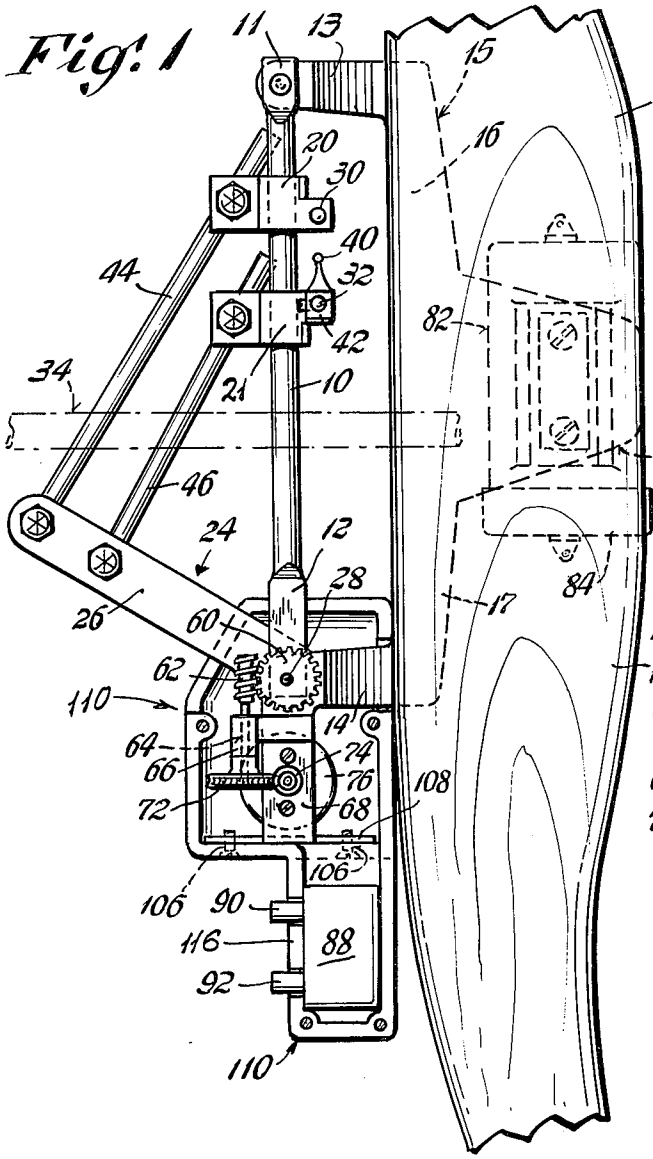


Fig. 2

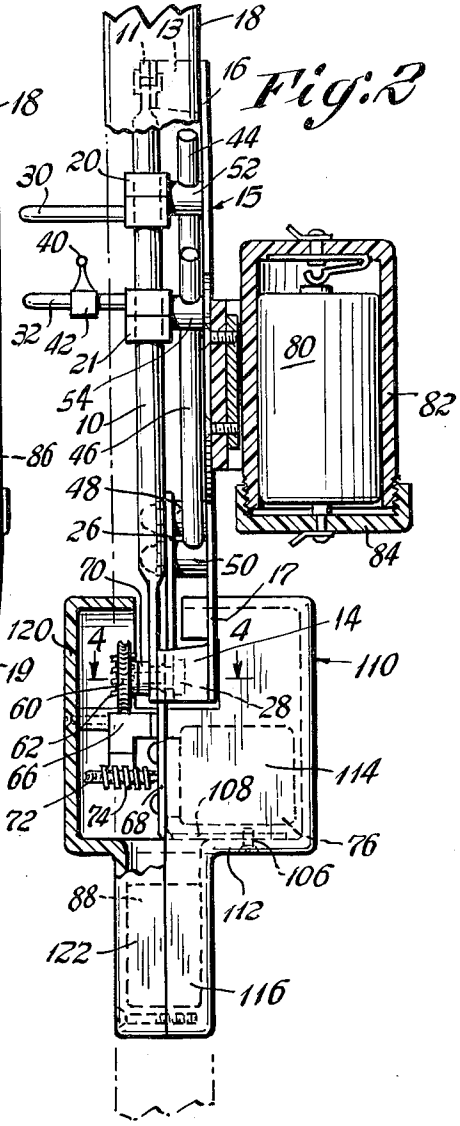


Fig. 5

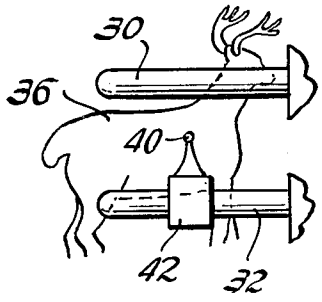


Fig. 6

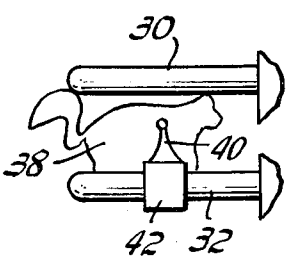


Fig. 7

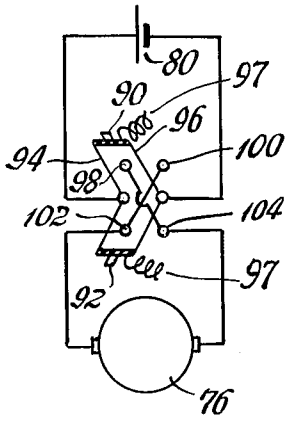


Fig. 3

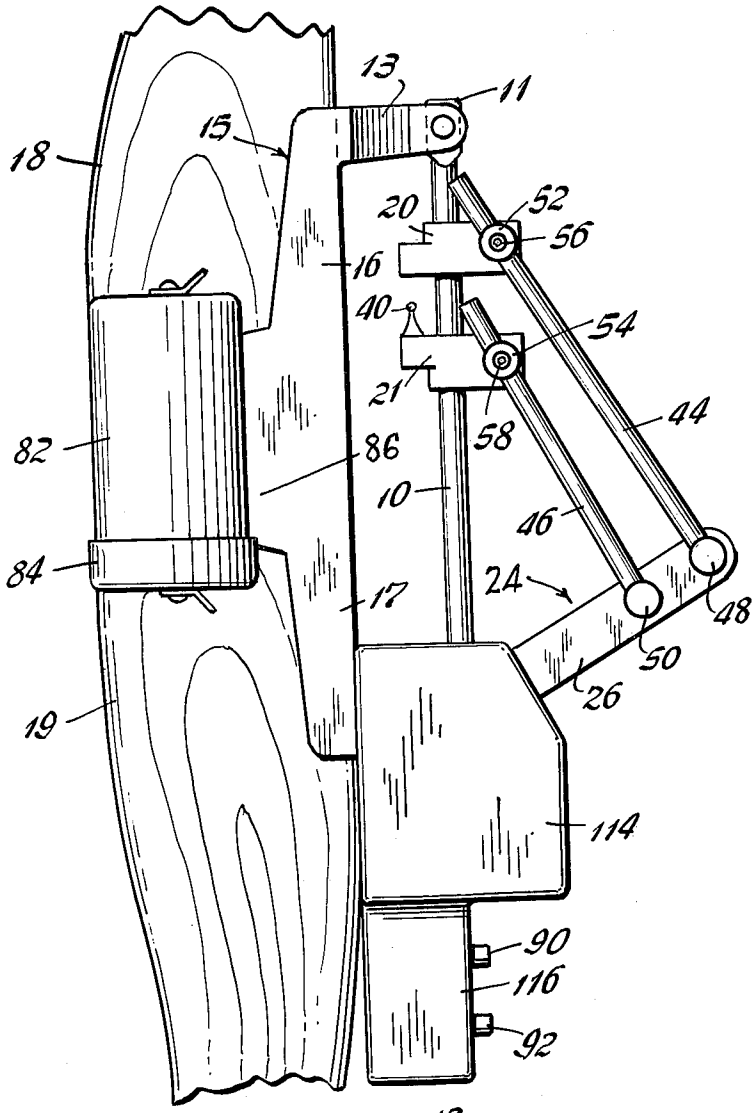
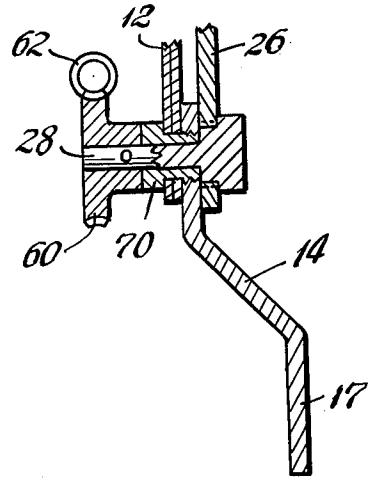

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58
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114
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116
92

Fig. 4


12
62
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28
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70
14
17

MOTORIZED ARCHERY SIGHT AND RANGE FINDER

NO CROSS REFERENCES TO RELATED APPLICATIONS PERTINENT PRIOR ART

1. U.S. Pat. No. 3,666,368, dated May 30, 1972 and entitled Archery Sight and Range Finder.

BACKGROUND

This invention relates to archery sights and range finders, and more particularly to devices of this type which are in the form of motorized attachments, intended to facilitate improvement of the aim of the archer. In the past various types of archery sights have been proposed and produced. In general the objective has been to produce an arrow trajectory which was correctly related to the distance of the game from the archer. While prior devices have worked somewhat well, their usefulness has been limited in many instances. Some devices, although simple and inexpensive, lacked the required accuracy, so that uniformly good results were not obtainable. Moreover, they were not always easy to operate. With other devices where the accuracy was improved, the arrangements were complicated, costly, and in many cases not readily operated or quick enough in adjustment.

SUMMARY

The above disadvantages and drawbacks of prior archery sighting devices are obviated by the present invention, which has for one object the provision of an improved power actuated archer's sight and range finder that can be quickly and easily operated by the archer when game is sighted, so as to instantly automatically indicate the correct orientation of the bow and give the arrow an accurate trajectory for striking the game. Another object of the invention is to provide an improved motor-operated archer's sight and range finder as above characterized, which can be readily preadjusted to adapt it to animals or game of different sizes and configurations, thereby to make for universal application of the device. These objects are accomplished by the provision of an elongate rod or slide and mounting means for securing the same in a vertical position on the central portion of the bow, said slide having spaced-apart vertically-movable sliders provided with sight bars adapted to be disposed adjacent the line of sight as the bow is held and the game is being sighted. The sight bars are shifted to closely frame the animal or game between them. One of the sight bars also carries a bull's-eye type sight which is arranged to be disposed in the space between the bars so that it can be aligned with game. Mounted on the vertical slide is a drive member which can be power adjusted, such member being connected to the sliders in a novel manner so as to not only vertically adjust the latter but also to automatically vary the spacing between them. Pivotal links which are connected between the powered drive member and the sliders effect this unique movement of the latter, one slider moving at a faster rate than the other in order to vary the spacing. When the sight bars are brought closer together by actuation of the drive member, the orientation of the bow becomes such that the arrow has a higher trajectory, thereby to automatically adjust to the greater distance between the game and the archer. A closer positioning is required of the sight bars in framing the game as the latter appears smaller, with increases in the distance and vice versa. Thus, when framing the game between the two sight bars, there is had an automatic compensation for the distance or range between the archer and the game. The drive member is operated by a gear train which is of the speed reducing type. Carried by the slide is an electric motor connected to the gear train to drive the same, as well as a reversing switch and circuit means connecting the motor to a battery. The battery is carried by the bracket which mounts the slide, and the latter has a housing in which the drive member, gear train, electric motor and reversing switch are all mounted.

Other features and advantages of the invention reside in the provision of an improved, power actuated, semi-automatic sight and range finder as above characterized, wherein simple and straight-forward linkages, gearing and mechanical movements are incorporated, thereby to prevent maladjustment or malfunctioning; and a sight and range finder which is sturdy and durable, quiet in its operation, easily and quickly reversible actuated by the archer, and capable of being preset by use of targets of different sizes, so as to enable an accurate aiming of the bow to be had for the various different sizes of game.

Still other features and advantages will hereinafter appear.

In the drawings, illustrating one embodiment of the invention:

FIG. **1** is a side elevational view of the sight and range finder attachment of the invention, positioned on central portions of a bow, only fragmentary portions of the latter being shown in side elevation. Part of the housing has been removed to reveal the interior.

FIG. **2** is a rear elevational view of the archery sight and range finder attachment, shown with portions in section to reveal details.

FIG. **3** is a reverse side elevational view of the sight and range finder attachment, this view being a mirror image of the illustration of FIG. **1.**

FIG. **4** is a fragmentary horizontal section taken on the line **4—4** of FIG. **1.**

FIG. **5** is a fragmentary rear elevational view of the sight bars of the attachment, shown adjusted to frame a large game animal such as a deer.

FIG. **6** is a fragmentary rear elevational view of the sight bars disposed in more closely spaced relation and arranged to frame a smaller game animal such as a skunk.

FIG. **7** is a schematic circuit diagram of the power unit of the attachment.

Referring first to FIGS. **1–3,** in accordance with the present invention the motorized sight and range finder attachment comprises an elongate vertical slide **10** which is preferably constituted as a straight bar mostly of circular cross section. The slide or bar **10** has flattened portions **11** and **12** respectively at its upper and lower ends, constituting mounting means attachable to arms **13** and **14** of a mounting bracket **15** having portions **16** and **17** adapted to engage and to be secured to central portions **18, 19** respectively of an archer's bow. The portions **16** and **17** can, for example, be attached to the bow portions **18, 19** by taping them thereto, or by other suitable means. On the bar **10** are two vertically movable sliders **20** and **21** in the form of bored blocks through which the bar extends.

Pivotally carried at the lower end of the vertical slide **10** is a drive member **24** comprising an arm **26** carried

by a shaft **28** turnable in the flat portion **12** of the slide **10.**

The vertically movable sliders **20, 21** are provided respectively with horizontally extending sight bars **30,** 32 arranged to be parallel to each other and to be located adjacent the path of vision of an archer who is sighting game with the bow in shooting position. The sight bars **30, 32** can be constituted of luminescent material adapted to glow in darkness. In FIG. **1** the approximate position of an arrow is indicated by the broken outline labeled **34,** and it will be understood that the archer's line of sight is at a level somewhat above that defined by the arrow.

When the sight bars **30, 32** are vertically moved in spaced relation to each other (together with the sliders **20, 21** which carry them) this will enable an archer to sight an animal or game between them. For example, in FIG. **5** the sight bars **30, 32** are shown as outlining or framing the body of a large game such as a deer **36.** In FIG. **6,** the sight bars **30, 32** are shown as more closely spaced, and as framing a small game such as a skunk **38.** Should the deer **36** be located a great distance from the archer, the outlining of the deer's body as indicated in FIG. **5** would require the sight bars **30,** 32 to be more closely spaced with respect to each other, and the same thing is true of the small animal **38** in FIG. **6,** Also the reverse is true, meaning that if the distance between the game and the archer is less, the game will appear larger in size, and the sight bars **30,** 32 will then be spaced further apart in order to frame the body of the animal.

In accordance with the invention, one sight bar, preferably the lower bar **32,** is provided with the bull's-eye type sight **40** which can be carried by a hub **42** adjustably secured to the bar **32** by means of a set screw (not shown). The bull's eye sight **40** can also be constituted of luminescent material adapted to glow in the darkness. To effect the proper shifting or positioning of the sight bars in response to actuation of the drive member **24,** the invention provides a pair of connector links **44,** 46, said links being pivotally joined to the actuator arm **26** of the drive member by hubs **48, 50** and being respectively pivotally connected to the upper and lower sliders **20, 21** by means of transversely bored hubs **52,** 54. The links **44, 46** extend through and are adjustable in the transverse bores of the hubs **52, 54,** and are secured in adjusted positions thereto, by Allen set screws **56, 58.** With the arrangement shown, adjustment or operation of the drive member **24** will shift the sliders **20,** 21 in such a manner that they are not only vertically adjusted along the slide **10,** but also automatically brought either closer together or further apart. This takes care of the requirement that game which is far away and which appears small, requiring a close spacing of the sight bars **30, 32,** automatically results in their being positioned vertically at a lower level, together with the bull's-eye sight **40,** so as to provide for a higher trajectory of the arrow as needed to reach the more remote game. Also, the opposite is true for game which is located closer to the archer. Such game, appearing larger, will require a greater spacing of the sight bars **30, 32** from each other, and this will result in their being automatically positioned vertically to a higher level, together with the bull's-eye sight **40,** so as to provide for a lower trajectory of the arrow since the distance or range is less.

Referring to FIGS. **1** and **3** it will be seen that the outermost link **44** is connected to the arm **26** at a point more remote from the pivot shaft **28.** Also, the inner link **46** is connected to the arm **26** at a point closer to the pivot shaft **28** for the drive member. Thus, for any given movement of the member **24,** the link **44** will shift the upper slider **20** a greater distance than the link **46** will shift the lower slider **21.** Therefore, the distance between the two sliders, and consequently the distance between the two sight bars **30, 32** will vary as the member **24** is shifted either clockwise or counterclockwise as viewed in FIGS. **1** and **3.**

Also, in accordance with the present invention, a simple and effective adjustment means is provided by which a given spacing of the sliders **20, 21** and therefore spacing of the sight bars **30, 32** may be had initially. As shown in FIG. **3,** the arm **26** is provided with the pair of hubs **48, 50** which are turnably carried by the arm, and which have transverse bores to receive and fixedly secure the lower end portions of the links **44, 46** respectively. In a like manner, the sliders **20, 21** have the hubs **52, 54** which are pivotally carried by the sliders and which have transverse bores to loosely receive the upper portions of the links **44, 46.** By virtue of the provision of the set screws **56, 58** in the hubs **52,** 54, a quick and easy adjustment of the bow-sight is had, and this construction constitutes an important feature of the invention since each of the sliders **20, 21** can be individually adjusted by merely applying an Allen wrench to the set screws. The invention thus provides a unique adjustment whereby either or both of the sliders **20, 21** can be advantageously adjusted to provide the maximum effectiveness and accuracy during trail runs using, for example, an archery target. I have found that the adjustment of both sliders by means of the above set screw construction is important, this being done after the bow-sight attachment has been secured to the bow.

According to the present invention, a unique, simplified and especially effective power drive is provided to operate the drive member **24** in a manner to effect quick and easy adjustment of the sight bars **30, 32.** The power drive has the advantages of being especially simple, small and compact, and of providing a high step-down speed ratio whereby reliable operation can be had at all times, in both raising and lowering the sight bars. The power means is carried entirely by the bracket **15,** and is caged in a novel housing which encloses all parts except the dry battery.

Referring to FIGS. **1–3** there is shown a speed-reduction gear train coupled to the drive member **24,** such train comprising a worm gear **60** affixed to the shaft **28** and meshing with a worm **62** which is on a shaft **64** turnable in a bearing **66** that is mounted on a downward extension **68** of the bracket arm **14.** The shaft **28** is carried in a bearing **70** mounted on the lower, flat portion **12** of the slide bar **10.**

The shaft **64** also carries a worm gear **72** which meshes with a worm **74** carried on the shaft of an electric motor **76** that is mounted on the extension **68** as by screws as shown.

By the above arrangement there is had a double worm reduction whereby the motor **76** can have a relatively high speed while still driving the member **24** at a desirable low speed but with appreciable power.

For the purpose of providing power for the motor **76** I provide a dry cell **80** mounted in a casing **82** having

a removable cap **84**, the casing **82** being secured to a large tab portion **86** of the mounting bracket **15**. Interposed in the electrical circuit between the battery **80** and the motor **76** is a reversing switch **88** having forward and reverse push buttons **90, 92**, said buttons being normally biased outward or to the left as viewed in FIG. **1**, thereby to normally maintain open the motor energizing circuit. The push buttons **90, 92** of the switch **88** can be used to actuate angular contact blades **94, 96** shown diagrammatically in FIG. **7**, said blades being biased to a centralized position as shown by helical compression springs **97**. When the push button **90** is depressed, the blades **94, 96** will respectively engage switch contacts **98, 100** and when the button **92** is depressed, the blades **94, 96** will respectively engage switch contacts **102, 104**. The blades **94, 96** are so arranged that if the two buttons are pressed on at one time, the blades will not be able to simultaneously engage all of the switch contacts **98, 100, 102,** and **104** (which would otherwise short circuit the battery **80**). The connections of the switch **88**, motor **76** and battery **80** are illustrated diagrammatically in FIG. **7**, which represents a standard reversing switch circuit having a motor and power source.

The gear train and reversing switch are enclosed in a novel two-part housing which is secured to the mounting bracket **15** by a pair of screws **106**. For this purpose, the downward extension **68** is folded and formed to provide a horizontal support portion **108** adapted to receive the screws **106**. One casing half **110** has a bottom horizontal wall **112** underlying the support portion **108** and receiving the mounting screws **106**, as seen in FIGS. **1** and **2**. The casing half **110** is in the form of an open shell with a larger, upper portion **114** enclosing the motor **76**, and with a smaller, depending portion **116** enclosing and mounting one-half of the reversing switch **88**. The other casing half **118** is also shell-like, having a larger upper portion **120** enclosing the gear train, and a smaller, depending portion **122** enclosing the remainder of the reversing switch **88**. The push buttons **90, 92** project through aligned notches in the lower casing portion **116, 122** as is well understood.

The sight and range finder as above set forth may be advantageously initially adjusted as follows: If the game which is being hunted is of large size, such as for example the deer, illustrated in FIG. **5**, the archer will initially adjust the sight by use of a target of, say, 18 inches in diameter. At a distance of **20** yards from an 18 inch target, the archer will now shift the member **24** by pressing a button **90, 92** while aiming an arrow at the center of the target and sighting the latter, so as to bring the bull's-eye sight **40** exactly in line with the target bull's-eye or center. In doing this, the archer may also have to shift the bull's-eye sight **40** horizontally on the sight bar **32** by first loosening and then tightening a set screw thereof. This lateral or horizontal adjustment is often referred to as a windage setting. An arrow can now, if desired, be shot at the target, and depending on whether it strikes too far left or right, the bull's-eye sight **40** is readjusted horizontally until the best accuracy is obtained, for the horizontal or windage adjustment.

Upon the alignment of the sight **40** being accomplished in the foregoing manner, the member **24** is not again moved or powered during the initial adjustment of the device, and it is important to observe this precaution. The archer now adjusts the links **44** and **46**, and the sliders **20, 21** by loosening and tightening the set screws **56, 58** so as to exactly frame the upper and lower edges of the target between the sight bars **30** and **32** respectively, while sighting the target with an arrow drawn back in the bow. This completes the adjustment procedure.

As the device is not set, the archer will find that great accuracy will be had in shooting, from a distance of **60** yards to all lesser distances. All that is necessary is to frame the animal accurately between the sight bars **30**, 32 by operating the switch buttons **90, 92** and thereafter zero-in by aligning the bull's-eye sight **40** with the game as shown in FIG. **5**.

The same procedure is followed to initially adjust the device for small game, except that a smaller target is used, for example a 6 inch target, and adjustment made at a distance of 10 yards from the target.

It will now be seen from the foregoing that I have provided a novel and improved power-operated combination archery sight and range finder which is of universal application, being adaptable for use with both large and small game by proper preadjustment. The device is in the form of an attachment by which it can be incorporated on various types of bows, and when properly installed and adjusted, can be easily and quickly actuated to enable the archer to properly orient the bow for accurate aiming at the game. Relatively few parts are involved in the construction, and the parts needed may be economically fabricated and quickly assembled into a rugged and foolproof organization which will provide for accurate shooting and will not readily get out of order or malfunction. The attachment of the device can be quickly effected by the use of friction tape, vinyl electrical tape or the like, as will be readily understood.

Variations and modifications are possible without departing from the spirit of the invention.

I claim:

1. An archery sight and range finder comprising, in combination:

a. an elongate slide,

b. means for mounting the slide vertically on a central portion of an archer's bow,

c. a pair of sliders carried by and vertically movable on the slide,

d. a drive member pivotally carried by the slide and having an actuating arm,

e. a pair of links pivotally connected to said actuating arm at spaced-apart points thereon,

f. said links being respectively pivotally connected to the sliders whereby movement of the arm shifts the sliders at different rates along the slide to vary the spacing between them and simultaneously reposition them vertically,

g. a pair of projecting sight bars disposed alongside each other respectively on said sliders and arranged to be located at the path of vision of an archer who is sighting game with the bow in shooting position,

h. said sight bars thereby having a variable spacing and variable vertical positioning by virtue of their being carried by the respective sliders, whereby game can be visually located between the sight bars,

i. a bull's-eye type sight carried by one of said sliders and disposed between the sight bars, for alignment with the game being sighted,

j. a gear train comprising a worm gear rigidly connected to the drive member to operate the latter at a reduced speed, comprising a worm engaged with the worm gear, a second worm gear rigid with said worm, and a second worm engaged with the second worm gear,

k. an electric motor having its shaft rigid with the second worm of the gear train to drive the same,

l. an electric battery,

m. a reversing switch having forward, reverse, and open positions,

n. circuit means connecting the battery to the motor through said reversing switch,

o. a housing below and carried by said slide, in which the drive member, gear train, electric motor and reversing switch are all mounted, said housing including a depending portion of smaller girth in which the reversing switch is disposed, and

p. a pair of spring-biased push buttons connected to the reversing switch and protruding from a wall of the depending portion of the housing in a location enabling them to be easily and quickly actuated for effecting adjustment of the sliders.

2. A device as in claim **1,** wherein:

a. the sight bars comprise luminescent material adapted to glow in darkness.

3. A device as in claim **2,** wherein:

a. the bull's-eye sight comprises luminescent material.

4. An archery sight and range finder as in claim **1,** and further including:

a. adjustment means for changing the effective length of at least one of said links.

5. A device as in claim **1,** wherein:

a. the sliders have hubs projecting from them in directions opposite to the projecting directions of the sight bars,

b. said links being connected to said hubs.

6. A device as in claim **1,** wherein:

a. said slide comprises a round rod,

b. said sliders comprising bored blocks through which the slide rod extends, and comprising hubs pivotally attached to the blocks,

c. said links comprising round bars secured in said hubs.

7. A device as in claim **6,** and further including:

a. releasable fastener devices for holding the links in adjusted positions in said hubs.

8. A device as in claim **1,** wherein:

a. the drive member comprises an arm pivoted at one end, and

b. hubs pivotally carried by said arm and having respectively secured thereto the said links.

9. A device as in claim **1,** wherein:

a. the slide has a bracket to which the housing is attached, and has bearings for said first worm and second worm gear.

* * * * *