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BORESIGHTING TARGET
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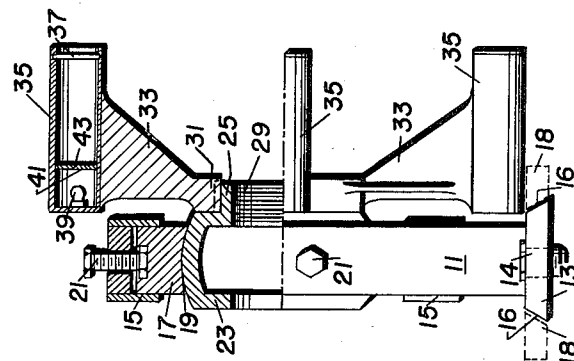


FIG. 2

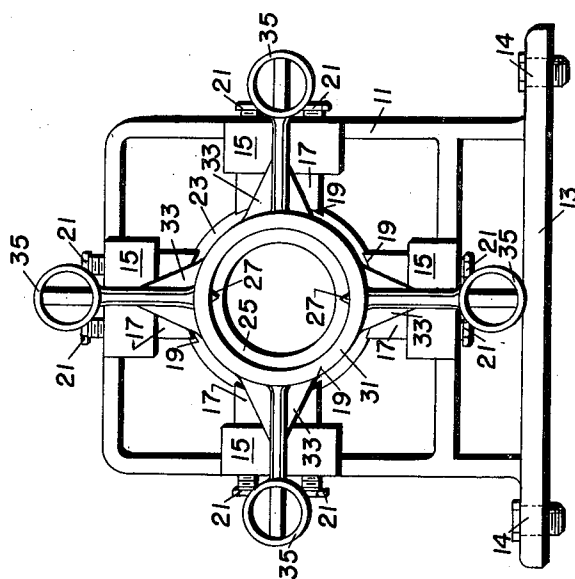


FIG. 1

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BORE SIGHTING TARGET

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This invention relates to improvements in boresighting targets, and more particularly to improvements in sighting devices adapted to square and center a target to a center line.

Sighting devices presently employed to center a target to a center line, as in boresighting, require pursuit of the following procedure: a master target and a boresight bracket are set up at opposite ends of the shaft center line, in accordance with blueprint measurements and data. A plurality of targets, which are square plates having cross-lines at right angles to each other, intersecting at the center of a small hole on a machined face of said plates are then set up at intervals along the shaft line. After sighting the master target with the boresight and setting the hairlines of the said boresight, the intermediate targets are moved into line, one at a time, by clamping them to a provided bracket and hammering or tapping them into aligned position according to telephoned instructions from the observer at the boresight. When centered, the target is drilled and bolted in place.

The disadvantages of the devices and method presently employed are numerous: Targets must be repainted constantly and the grooves scraped and refilled with plaster-of-Paris. Despite precautions, the paint employed often causes glare as it reflects light, thus creating a false impression of the location of the cross-line. Also, rain and damp weather cause the paint to peel and discolor the plaster-of-Paris, making accurate reading more difficult.

Frequently, boresighting must be accomplished aboard a ship. Due to ship movements, each time a line is boresighted the targets have to be released, moved and redrilled. If external lights employed to illuminate the target cast a beam at an angle thereto, it is more difficult to center the target. Further, both lights and the drill machine employed must be carried to each target, involving numerous set-ups.

The greater the distance between the target and the boresight, the greater is the width of the area covered by the hairlines. Accordingly, at distances, the hairline will cover an area wider than the cross-line, thereby multiplying errors in setting the target. In addition, at substantial distances it is difficult to see the cross-lines clearly and sharply; in present practice, at great distances the line must be boresighted in two or more sections, increasing the possibility of error due to moving the boresight for a second or third setting thereof.

A further disadvantage of present practice is

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the fact that targets cannot be squared to the shaft centerline. The rake of the target will be the rake of the bracket, which can only be approximate due to ship movement and due to the fact it is merely welded in position. This will cause deflections and inaccuracies in wires stretched between these targets.

Several men are required to accomplish the operation under present practices, since lights and telephone must be held at the target, the crude and tedious tapping or hammering of the target performed and the drilling machine used. There is also substantial wastage of material: Hundreds of wire clamps, having a high breakage rate, must be employed during the months before the final boresighting and proof-marking are done. Scores of target clamps must be made for the process and many are lost, since they cannot be carried along conveniently with the lights, drill machine and other equipment and must be abandoned or clamped to the bracket until needed again.

All of the foregoing disadvantages of present practices are substantially overcome by this invention.

The primary object is to provide a simple and accurate boresighting device adapted to square and center a target to a shaft center line.

Another object is to provide a sight adapted to carry measuring instruments for proofmarking, centering and squaring an object.

Still another object is to provide a sight operable accurately regardless of movements of the surface upon which the work is positioned.

Another object is to provide a sight affording accuracy in use without regard to external light sources and glare.

Another object is to provide a sight of convenient size and minimum number of parts in lieu of the bulky, cumbersome and complex devices presently employed.

A further object is to provide a sight that is accurate over great distances.

Another object is to provide a sight which in use will effect a saving in time and labor.

Further objects and advantages of this invention, as well as its construction, arrangement and operation will be apparent from the following description and claims in connection with the accompanying drawing, in which

Fig. 1 is an elevation of a boresighting target, showing a preferred embodiment of the invention; and

Fig. 2 is a side view thereof, partly in section.

Similar numerals refer to similar parts throughout the several views.

A frame 11 is mounted on a base 13, which is provided with a plurality of bolts 14 adapted to secure said base to a standard and beveled longitudinal walls 16 adapted to secure said base between the walls of a frame guide 18 affixed to said standard. Said frame 11 is provided with a plurality of paired guides 15, spaced 90° apart, extending inwardly from said frame. A plurality of shoes 17, each adapted to ride between a pair of said guides, are each provided with a concave face 19 distal said frame adapted to engage the periphery of a mounting ring hereinafter described, and are secured to a plurality of set screws 21 extending through the walls of said frame, said set screws being adapted to extend and retract said shoes.

A mounting ring 23 preferably in the shape of a medial segment of a sphere, is carried between said shoes. Spaced points on the periphery of said ring 23 are contiguous with the concave faces 19 of said shoes so that said ring is both rotatable about its axis and translatable to any plane oblique to the plane of the face of the frame within the limits prescribed by the width of the segment constituting said ring. Said ring 23 is provided with an annular flange 25 upon a face thereof adapted to carry the ring of a crown hereinafter described, a plurality of key slots 27 in said flange adapted to retain said crown ring against rotational displacement relative said ring 23, and a threaded axial bore 29 adapted to receive a plug clamp or a measuring instrument.

The crown comprises a ring and sighting assemblies: A ring 31 adapted to engage frictionally the periphery of the flange 25 is provided with a plurality of keys, which are engaged by the key slots 27. Radially disposed fins 33 spaced 90° apart extend from the periphery of said ring 31 and beyond the frame 11 and carry sighting assemblies distal said ring. Said sighting assemblies each comprises a tube 35 disposed at a right angle to the plane of the face of said ring, a disc having a first radial slot 37, also radial said ring, mounted at one end of said tube, a source of light such as a bulb 39 mounted at the other end of said tube and energized by suitable means (not shown), a light-diffusing disc 41 adjacent said source of light and intermediate said tube, and another disc having a second radial slot 43 adjacent said diffusing disc and spaced from said first slot, said second slot being disposed parallel to said first slot.

The operation of the device is performed as follows: After the centers for the master target and the boresight are ascertained and established from blueprint measurements and data, the shaft line is boresighted. Then, at desired intervals, a plurality of frames 11 are set up, centered and squared approximately, and fixed into permanent position in guides 18 by securing bolts 14 to the standard. (It is to be observed that the ring 23 is adjustable in the frame 11 by adjusting the set screws 21, so that ship movements can be compensated for by moving and rotating the ring without disturbing the frame from its fixed position.)

When boresighting, the crown is set upon the ring of one of the frames. Movements of said crown in a plane perpendicular to the shaft centerline are then accomplished by shoe adjustments, while by rotation of the ring in the shoes said crown is set square to the shaft centerline. By virtue of the construction above described, the

boresight hairlines are aligned readily with their respective end slots 37 and intermediate slots 43, the diffused light facilitating observation. At such time, the crown and the ring are squared and centered to the shaft centerline. In this position, the ring 23 is secured by locking it in the shoes 17, the crown removed and the procedure repeated successively at the other frames set up along the line.

If it is desired to stretch a wire along the centerline, a plug clamp can be inserted in the threaded bore of the ring 23 after said ring has been centered and squared as above described. Alternatively, a machined shaft carrying measuring instruments can be inserted in said bore, thereby permitting quicker and more accurate results than could be obtained by measuring from a stretched wire.

It is apparent that the sight above described is adapted for use on any type of construction or assembly job where, due to the distances involved, wires are stretched for centerline measurements, or where long pipes or rods are suspended for the purpose of aligning spaced equipment which is to be joined by a connecting or quill shaft, such as a turbine, and reduction gear pinion. It is further apparent that the sight above described can carry a machined shaft which mounts a revolving arm. For squaring and centering operations, suitable dial indicators can be affixed to said arm, which can then be used for proofmarking, centering and other operations of like nature, wherein the dimensions and distances involved are complicating factors.

Various modifications and changes can be made in the subject device without departing from the scope of the invention.

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

We claim:

1. A boresighting target comprising a frame, a plurality of paired guides in spaced relation extending inwardly from the walls of said frame, a plurality of shoes engaged by said guides and reciprocable independently radial the center of said frame, means for moving said shoes, a member intermediate said shoes and adapted to be rotated and translated between said shoes, said member being provided with an axial bore, and a crown having a plurality of spaced radially extending fins mounted on a face of said member.

2. A boresighting target comprising a frame, a plurality of paired guides in spaced relation extending inwardly from the walls of said frame, a plurality of shoes engaged by said guides and reciprocable independently radial the center of said frame, means for moving said shoes, a member intermediate said shoes and adapted to be rotated and translated between said shoes, said member being provided with an axial bore and a flange peripheral a face of said member, and a crown mounted on said flange, said crown having a plurality of spaced radially extending fins, said fins carrying means for aligning a distant object at right angles to the plane of said crown.

3. A boresighting target comprising a frame, a plurality of paired guides in spaced relation extending inwardly from the walls of said frame, a plurality of shoes engaged by said guides and reciprocable independently radial the center of said frame, a member in the shape of a medial segment of a sphere intermediate said shoes and

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adapted to be rotated and translated between said shoes, said member being provided with an axial threaded bore and a flange peripheral a face of said member, a crown comprising a ring mounted on said flange, radial fins 90° apart extending from said ring and carrying tubes distal said ring, said tubes being disposed at right angles to the plane of said crown and being provided with spaced radial slots also radial said ring.

4. A boresighting target comprising a frame, a plurality of paired guides in spaced relation extending inwardly from the walls of said frame, a plurality of shoes having concave faces engaged by said guides and reciprocable independently radial the center of said frame, a member in the shape of a medial segment of a sphere intermediate said shoes and adapted to be rotated and translated between said shoes, said member being provided with an axial threaded bore and a flange peripheral a face of said member, a crown comprising a ring mounted on said flange, radial fins 90° apart extending from said ring and carrying tubes distal said ring, said tubes being disposed at right angles to the plane of said crown, each tube being provided with a first radial slot also radial said ring positioned at one end of said

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tube, a source of light at the other end of said tube, a light diffusing disc intermediate the ends of said tube and another disc having a second radial slot also radial said ring positioned intermediate said disc and said first slot.

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