

TAUT WIRE MEASURING APPARATUS (1)

by

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(Extract from an article published in the *Field Engineers Bulletin* No. 7,
U. S. Coast and Geodetic Survey, June 1934).

Just prior to the departure in March, 1933, of the *Oceanographer* for the working grounds in the Gulf of Mexico, a "Taut Wire Measuring Apparatus" was received on board this vessel.

Contrary to the reel on our deep sea sounding machines, the drum or reel of this apparatus does not revolve. The wire is unwound from the reel by a flyer which revolves around the drum. (See figures facing pages 74 and 75 of *The Hydrographic Review*, Vol. IX, No. 2, November 1932).

The drum is secured to the drum standard bracket by a drum center consisting of a central ring and three arms. The central ring is held to the standard bracket by a heavy set screw and each arm carries two set screws on a pad at the end to engage a female pad on the drum.

The spindle through the center of the standard bracket carries the flyer on the drum end and a double brake wheel on the opposite end.

The dynamometer wheel has a lug on each side, through which a vertical guide rod passes. The wheel travels up and down the guide rods according to pressure exerted by the brake. The operator varies the brake pressure at will to keep an even tension on the wire.

The other parts need no description.

The manufacturer's instructions for the apparatus are as follows:

PREPARATION OF GEAR FOR USE AND ATTENTION REQUIRED WHILST RUNNING. — It is assumed that the drumstand and gear have been placed correctly in their respective positions on the ship according to the drawing, also that the wire drum which, when fully wound, contains 140 nautical miles of wire, has been placed on the stand and the flyer connected to the brake spindle.

NOTE. — The iron centre, with three arms, should be fitted in drum previous to lifting on the drumstand.

TO PREPARE GEAR FOR USE. — The end of the wire is led over the flyer wheel, between the lead rollers, over and three-quarters round the large "v" counter wheel, up over the first lead wheel, under the dynamometer wheel, over the after lead wheel and between the stern rollers. The wire is then made fast to the end of the rope on one of the special fire-bar anchors, as pattern supplied. Heave any slack of the wire back until the rope is at the stern rollers, and put the brakes on by turning the fly nuts. The gear is now ready for use.

NOTE: CARE SHOULD BE TAKEN — that, when reeving the wire, the vertical part between the measuring wheel and first lead wheel is led on the port side of the horizontal lead on; otherwise ends of splices will foul and ruck up. That the wire, when being passed under the dynamometer wheel, is led above the pins connecting the two sides of the dynamometer. That, when reeving the wire, a slight friction is kept on the brakes, otherwise kinks are liable to be formed. That, when not running, the drum be always covered to prevent the wire rusting.

(1) See also *The Hydrographic Review*, Volume IX, No. 2, November 1932, p. 74.

TO START AND RUN GEAR. — Remove brass hexagon cap from flyer wheel spindle, screw on STAUFFER lubricator provided for the purpose in place of cap, and fill boss of wheel with motor grease. When full, unscrew lubricator and replace hexagon cap. The rest of the gear should be freely lubricated with the exception of brake straps. (These need only a drop or two of oil). Start the gear about one mile before the position is reached from which a measurement is to be made. Lower the anchor by hand to a few feet from the water line, and if any sea be running the anchor should be kept clear of it. Release the brakes until the flyer revolves freely. Do not take the brakes right off, otherwise the flyer will overrun the wire and throw it off. Should this happen the wire must be cut and a fresh start made.

NOTE. — The best way to cut the wire when running is to choose a straight portion of it, hold a piece of iron under, and tap the wire quickly with a cold chisel or other sharp instrument while the strain has been slightly increased. After a run of about one mile the strain should be increased to about 38 pounds. This should be sufficient for depths up to 1,000 fathoms. Should it be required to run the whole length of the wire off, the bottom end, where it is fixed to the drum with a wooden peg, should be examined previously to ensure that it has not jammed too tightly, otherwise the flyer might be bent. Always keep the brake cover on — a heavy shower of rain on brakes and straps might cause the flyer to be released suddenly and throw the wire off.

INDICATOR. — The indicator registers .001 nautical miles for each revolution of the measuring wheel.

INSTALLATION ON BOARD.

When this shipment was received we were all concerned as to how and where to install it. The individual parts are large, heavy and awkward to handle aboard ship. The reel loaded with wire weighs about 2400 pounds alone.

Before attempting to install this gear aboard ship, it was set up on the dock in Port Arthur to ascertain the space required and also to allow the personnel to become familiar with the assembly. This preliminary set-up on the dock gave the information necessary for the installation aboard ship. The weight of the gear prevented its installation on the house top, which otherwise would have been an ideal location. The room required for the installation prevented installing it on the quarter deck, which left the alleyways the logical site. The apparatus was finally installed in the port alleyway with the reel abreast of the after end of the main deck house and the dynamometer abreast of the after deck house.

Accompanying the gear and forming a part of it was a heavy davit and a standard to handle the reel. These parts were not used, the gear being installed in a location which permitted the use of the after launch davit to handle the reel.

The reel or drum standard was installed permanently with $1\frac{1}{4}$ " holding-down bolts through the deck and underlying plate. The drum and brake wheels can be removed and stowed elsewhere if necessary or desirable. The dynamometer was installed semi-permanently only. It is comparatively light and can be moved with ease. It was mounted on athwart-ship skids which in turn are wedged and screwed to the deck. In mounting the dynamometer, care should be taken to have it as near as possible on an even keel, using wedges as necessary. Whenever the dynamometer is inclined, even when the ship is rolling, the lugs of the dynamometer wheel will bind against the guide rods, prevent any movement of the wheel and render it impossible to tell the strain carried on the wire.

OPERATION. — The operation of the gear is simple after the installation has been made. The flyer moves around the reel on the brake spindle as an axis and unwinds the wire. The rapidity of rotation of the flyer depends directly on the speed of the ship. Obviously the wire, if the gear is operating correctly, will be paid out at the same rate at which the ship is moving "over the ground". On the *Oceanographer* we steam at 90 revolutions per minute when operating the gear. This gives us a speed of between nine and ten knots.

In winding the wire on the reel a heavy grease had been used by the manufacturers to prevent rusting of the wire. As the wire is unwound by the flyer, this grease is thrown badly in all directions and after our first test of the apparatus the deck, bul-

warks, deckhouse sides, and awnings were covered with this grease. When it becomes necessary to refill the reel it is believed that powder can be used instead of grease and this feature will be eliminated.

It will be noted in the manufacturer's notes quoted previously that in running the wire a strain of about 38 pounds, as shown on the dynamometer scale, should be used. All our experience has been in depths of from 10 to 25 fathoms and in those depths we have found that a strain of about 36 pounds is the best. To obtain a greater strain than that requires the brake bands to be set up against the brake wheel so tightly that the wheels soon run too hot.

We found it necessary to install new springs on the brake bands, to allow the bands to be set up sufficiently.

CAUTION. — The wire splices on our original are very poorly made and are liable to jam in the lead rollers when using the gear. If this occurs the wire will part, as happened once on the *Oceanographer*, and the flyer might be bent. Refills should be made with wire spliced according to standard Coast Survey methods or preferably with one continuous length.

CIRCUMFERENCE OF MEASURING WHEEL.

The final and careful measurement gave a circumference of 1.86035 meters, which distance is used on all our work with the gear.

ADDITIONAL USES OF GEAR.

The gear was also used in connection with tests for the velocity of sound through sea water. The station ships were at buoys "George" and "Hypo", about 23 miles apart. The *Oceanographer* steamed along the line between the two buoys, kept course by the direction finder, and bombed at intervals of 1000 revolutions of the measuring wheel. R. A. R. distances from each ship were recorded at each bomb. It is believed this will give excellent information regarding the velocity.

Another use was in connection with the location of buoys for the control of an isolated shoal. One buoy was located by R. A. R., the other buoys necessary for the control were located by taut wire distances and azimuths from it.

EVAPORATED METAL MIRRORS.

(Extract from *Nature* - London, 1st September 1934, page 329).

In a letter published in the *Physical Review* of 15th July 1934, R. C. WILLIAMS has described the advantages of making mirrors by evaporating on to glass first a thin film of chromium and then a layer of aluminium. The film is at first fairly soft, but it is hardened by washing in water or alcohol and may then be rubbed hard with cotton cloth without appreciable change. Even rubbing with steel wool affects the film only slightly. The reflectivity of the films is similar to that of pure aluminium. The aluminium may be dissolved off without affecting the chromium, and the author says he has found a method of removing the chromium layer if required.

MICROMETER HYDROGRAPHIC OR SURVEY SEXTANT

The following is the description of a micrometer hydrographic or survey sextant designed and constructed by Messrs. H. HUGHES & Son, Ltd. (1), contractors to the Hydrographic Department of the British Admiralty.

This Sextant (see Fig.) has been specially designed for survey work to give the greatest possible ease and rapidity of observation. By the adoption of the micrometer

(1) Messrs. H. Hughes & Son, Ltd., 59, Fenchurch Street, London, E. C. 3.