(No Model.) 2 Sheets—Sheet 1.

# D. B. HUTTON.

## INSTRUMENT FOR ASCERTAINING THE PITCH OF SCREW PROPELLERS.

No. 284,427. Patented Sept. 4, 1883.

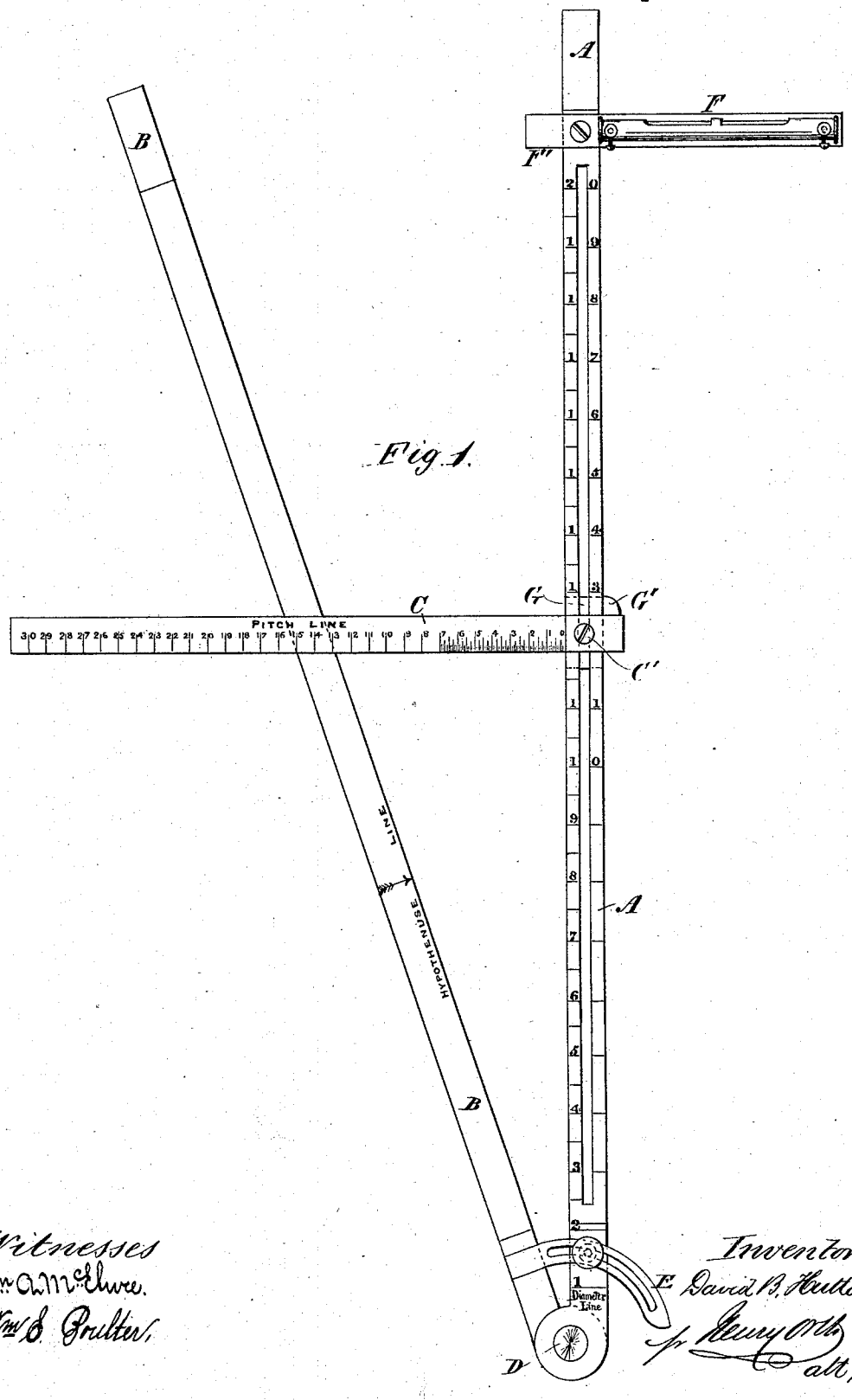



Fig. 1.

Witnesses
Wm. A. McElwee.
Wm. B. Poulter.

Inventor
David B. Hutton
by Henry Orth
Atty

N. PETERS. Photo-Lithographer, Washington, D. C.

(No Model.) 2 Sheets—Sheet 2.

# D. B. HUTTON.

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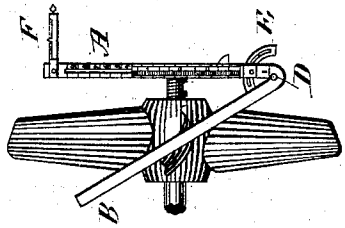



Fig 3

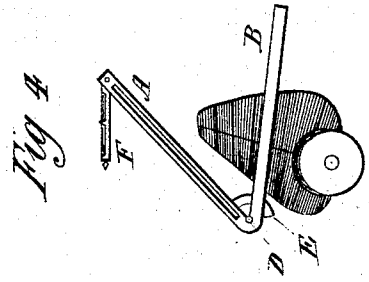



Fig 4

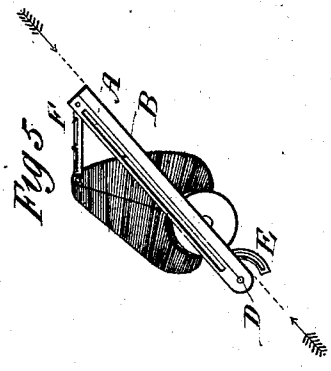



Fig 5

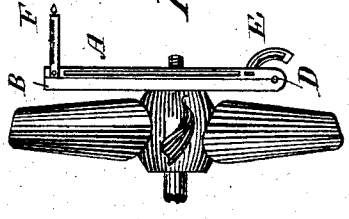



Fig 2

Witnesses
W. Burris
William A. Baker

Inventor
David B. Hutton
per Henry Orth
his attys

N. PETERS. Photo-Lithographer. Washington. D. C.

# UNITED STATES PATENT OFFICE.

DAVID BROWN HUTTON, OF LONDON, ENGLAND.

## INSTRUMENT FOR ASCERTAINING THE PITCH OF SCREW-PROPELLERS.

SPECIFICATION forming part of Letters Patent No. 284,427, dated September 4, 1883.

Application filed July 5, 1882. (No model.) Patented in England December 16, 1881, No. 5,511, and in France June 15, 1882, No. 137,428.

*To all whom it may concern:*

Be it known that I, DAVID BROWN HUTTON, a subject of the Queen of England, residing at London, England, have invented new and useful Improvements in Instruments for Ascertaining the Pitch of Screw-Propellers, (for which I have obtained Letters Patent in Great Britain, dated December 16, 1881, No. 5,511, and in France, dated June 15, 1882, No. 137,428,) of which the following is a specification.

Great difficulty is at present experienced in ascertaining the true pitch of propellers, and clumsy and inefficient appliances are generally employed for the purpose. Now, by my instrument the pitch of propeller-blades may be ascertained by forming a right-angled triangle at any required diameter by means of the said instrument the construction whereof will be best understood by reference to the accompanying drawings, in Figure 1 of which the entire instrument is represented, the other figures, from 2 to 5, representing it as applied in various positions in actual use, on a reduced scale.

A is the diameter-line leg, B the hypotenuse-line leg, and C the pitch-line arm. A and B are jointed by a strong and carefully-fitted joint at D, and a wing and thumb-screw, E, is provided for fixing them at the required angle.

F is a spirit-level capable of being turned upon a stiff joint and pin F′, for adjustment and convenience of stowage. Instead of the spirit-level, a plummet or equivalent can of course be used, if preferred, as either of them will give a datum from which to work.

The arm C is jointed at C′ to a slide or sleeve, G, so that it can be moved along the leg A as required, or folded up out of the way. A stop, G′, upon the sleeve or arm prevents it from passing a right angle when fully opened out. The leg A is shown with a long slot in it, but could be made solid, if preferred. The scale should be set off by machinery to insure great accuracy, and the legs should be truly parallel. The spaces upon the leg A are proportioned to circumferences of circles whose diameters are indicated by the figures marked at such spaces, while the spaces upon arm C are proportioned to the diameters of the same circles, so that the graduations on the arms C and A are in the ratio of the diameter and circumference of a circle. This will be readily understood when it is remembered that the base of the triangle (the arm C) represents a line upon the circumference of a circle of the diameter at which the pitch is being taken, and the leg A is therefore really graduated to circumferences, although for convenience in reading off they are called "diameters." The leg can be graduated to any desired extent. In the drawings it is shown graduated only to twenty feet; but this could be increased by increasing the size of the instrument.

The leg B is not graduated at all. It serves to form the hypotenuse of the triangle, and is placed in contact with the propeller-blade when taking the pitch, &c. The arm C, when opened out, forms the base of the triangle and represents the pitch-line of the propeller, and is graduated to the diameters of the circles whose circumferences are marked upon leg A.

I will now describe the operation of the instrument, and would here state that for the sake of clearness I have omitted in Figures 3 and 5 of the drawings to show the pitch-arm C.

To ascertain the pitch of a propeller, the legs A and B are closed up and placed against the end of the propeller-boss and the level adjusted perfectly horizontal, as in Fig. 2. A line is now marked across the propeller-blade at the diameter at which the pitch is to be taken. The instrument is now laid upon the propeller-blade with the leg B on the line marked thereon, and is held there while leg A is opened out until the level F, as adjusted, becomes again perfectly horizontal, when the thumb-screw is tightened up and the legs fixed at that angle. This is shown in Fig. 3. The arm C is now opened out and run up until it reaches the same diameter upon A as that at which the pitch is being taken and the operation is completed, the instrument now assuming the appearance shown in Fig. 1. According to the position in the drawings, the pitch has been taken at a diameter of twelve feet, (the position occupied by C upon leg A,) and the pitch is just under thirteen feet—say twelve

feet nine inches—as shown by the point where the inner edge of B (hypotenuse line) crosses arm C.

The instrument may also be used for adjusting and marking center lines on spare blades when the required pitch to be given is known, but not the proper angle or center line at which the blade must be attached to the boss. The method of applying it for this purpose is shown in Figs. 4 and 5. The diameter at which the blade is to have a certain pitch being marked upon the blade, the instrument is set by running the pitch-arm C up to the required diameter upon leg A—say, as before, to twelve feet—and opening out the legs until the hypotenuse-line crosses C at the required pitch again—say, as before, to twelve feet nine inches—and the thumb-screw E is tightened up. The instrument, being now adjusted, is applied to the blade, as in Fig. 4, by laying the hypotenuse leg B upon or along the pitch-line marked on the blade, and the level is adjusted until it is perfectly horizontal. The required datum having now been obtained by the adjustment of the level, the thumb-screw may be slackened and the legs closed up for convenience and the instrument laid across the flange or boss of the blade, so that the level will again be perfectly horizontal, as shown in Fig. 5, and a line is drawn across the boss of the blade, so as to bisect it. From the boss of the spare blade the instrument is now transferred to the face of the propeller-boss to which the spare blade is to be attached, and after the instrument has been adjusted until the level is perfectly horizontal a line is drawn across the propeller-boss to bisect it, precisely in the manner as above described, and as shown in Fig. 5. If the spare blade be now bolted up so that the lines upon the face of the propeller-boss and upon the boss of the spare blade coincide, the blade will be set at the required pitch.

The instrument is also very useful in a variety of ways, particularly at sea, as a straight-edge, or, with loose ends to slip on it, forms a pair of trammels or compasses. Various materials may be employed in its construction; but steel with brass fittings are about the most useful.

What I claim, and desire to secure by Letters Patent of the United States, is—

1. An instrument for ascertaining the pitch of propeller-blades, composed of leg A and pitch-arm C, graduated as described, and a leg, B, connected together and arranged to form the three sides of a right-angled triangle, inverted or otherwise, in combination with a spirit-level or its equivalent connected therewith, substantially as and for the purposes specified.

2. In an instrument for ascertaining the pitch of propeller-blades, the combination, with the leg B and the leg A, graduated as described, of the pitch-arm C, graduated as described, pivoted and adapted to slide along said leg A, substantially as and for the purposes specified.

3. The arm C, sleeve C′, and stop G′, in combination with the leg A, slotted longitudinally, substantially as and for the purposes set forth.

4. The combination of the leg A, graduated as described, slotted longitudinally, the pitch-arm C, graduated as described, pivoted to and adapted to slide along said leg A, a spirit-level, and a leg, B, pivoted to opposite ends of leg A, all constructed and arranged for operation substantially as and for the purposes specified.

DAVID BROWN HUTTON.

Witnesses:
W. P. THOMPSON,
JOHN HAYES.