

Nov. 30, 1926.

1,609,233

H. WHIDBOURNE ET AL

STROBOSCOPIC APPARATUS

Filed April 19, 1926

4 Sheets-Sheet 1

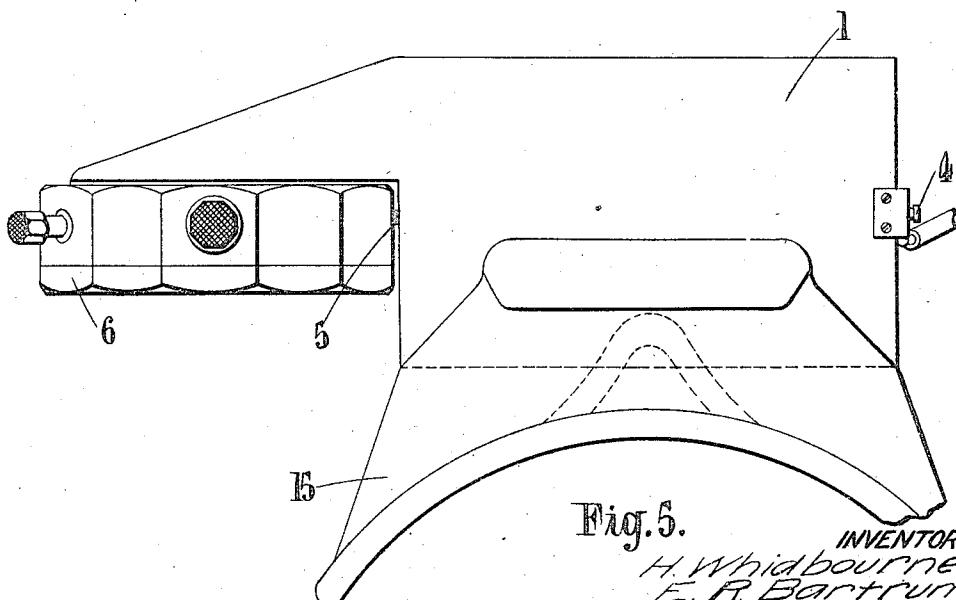
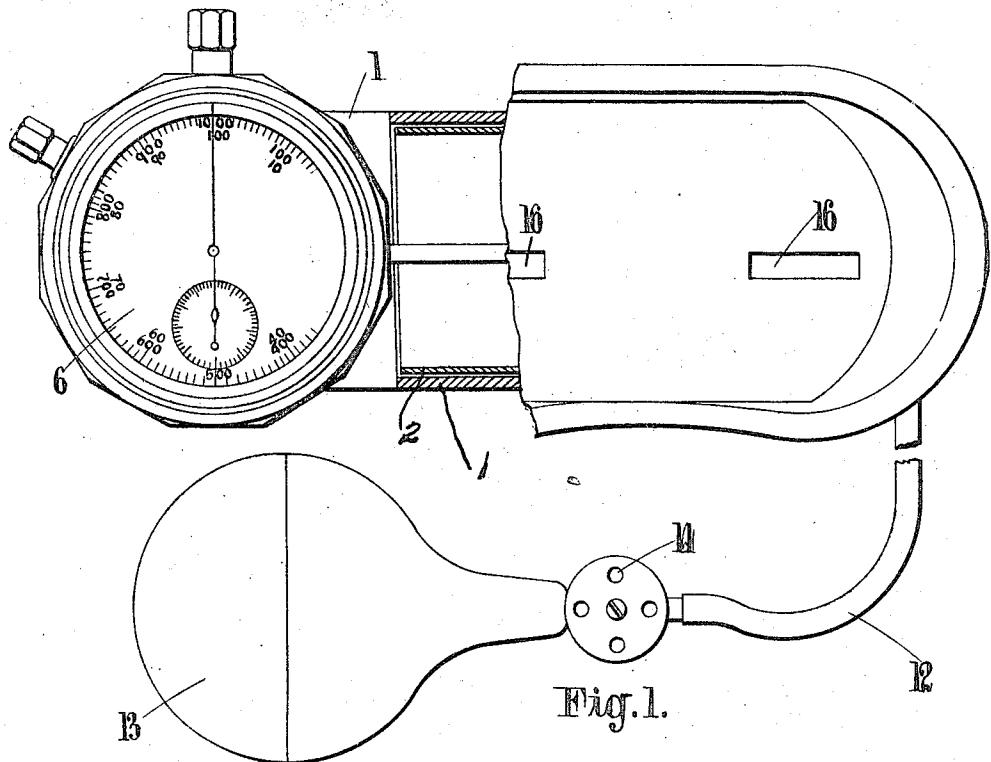


Fig. 5.

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Fig. 2.

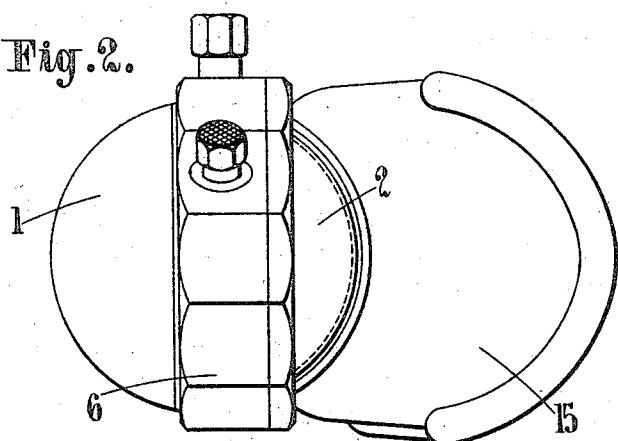


Fig. 6.

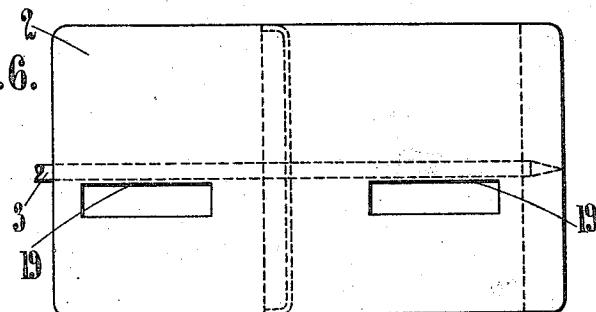
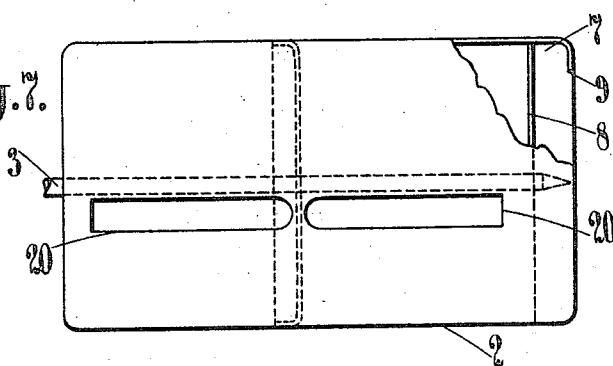


Fig. 7.



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4 Sheets-Sheet 3

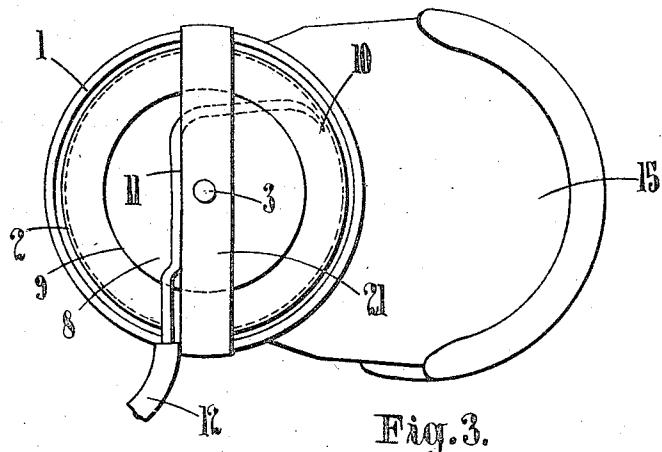


Fig. 3.

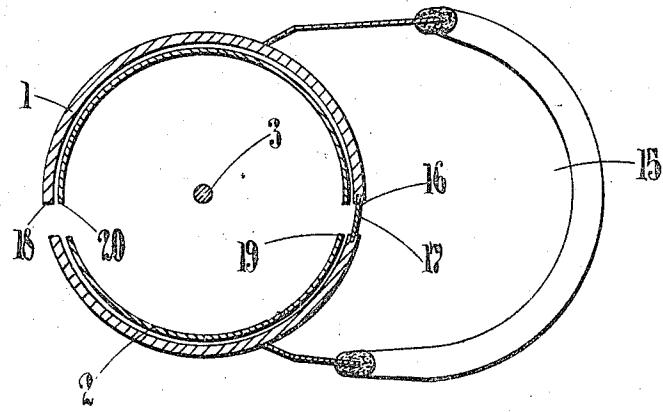


Fig. 4.

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4 Sheets-Sheet 4

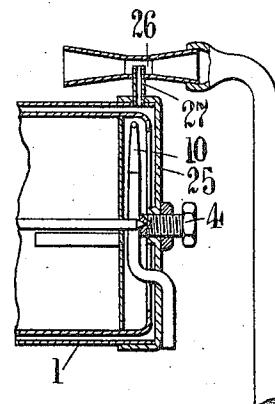
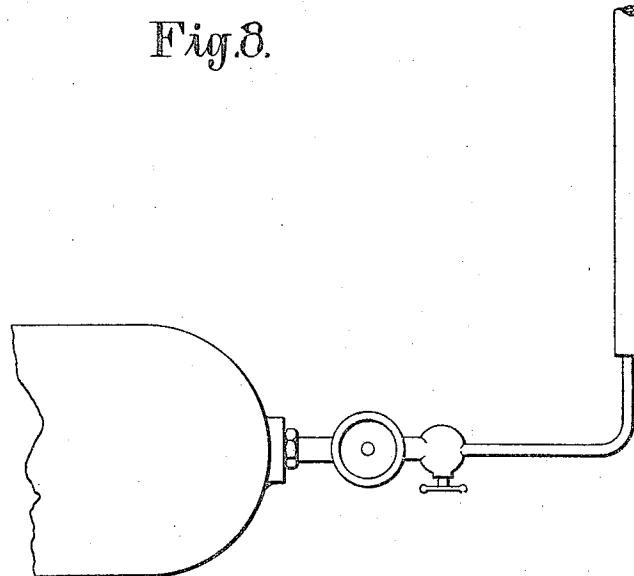


Fig. 8.



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UNITED STATES PATENT OFFICE.

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STROBOSCOPIC APPARATUS.

Application filed April 19, 1926, Serial No. 103,085, and in Great Britain November 5, 1924.

This invention relates to stroboscopic apparatus and has for an object to provide an improved apparatus which is simple and cheap to manufacture and easy to control.

5 With this end in view and such others as may hereinafter appear or are incidental thereto the invention in its broadest aspect may be said to comprise a stroboscopic apparatus having a rotatably mounted shutter, 10 one or more viewing apertures therein, a nozzle or nozzles and means for causing a jet or jets of fluid, for example air, to issue therefrom, which jet or jets are arranged to impinge obliquely upon the shutter or a part 15 secured thereto so as to cause the shutter to rotate. The jet or jets may be caused to impinge upon an edge or edges of said aperture or apertures.

In a modification of the invention, the 20 shutter may be driven by being enclosed in a casing to which air is admitted only through an orifice or nozzle directed on to the shutter, and the air jet may be produced by a suction device applied to the casing 25 and operated by hand or otherwise so that withdrawal of air from the casing causes the shutter to rotate.

The said means for supplying the jet or 30 jets of air may comprise a resilient or india-rubber bulb, such as is used for a motor horn, which is connected through a tube to the said nozzle or nozzles and may be provided with a non-return air inlet valve. The said shutter may be made in the form of a cylinder 35 which is mounted to rotate about its axis or in the form of a disc which is mounted to rotate about an axis passing through its centre.

Where a number of apertures are employed they may be disposed at equal intervals around a circumference upon the shutter. 40

Means may also be provided for equalizing the pressure of the fluid supply.

The shutter may be mounted in a casing, 45 which is provided, on each side of the shutter, with an opening or openings disposed opposite the path of the apertures. One or both of the said apertures may be provided with an eye piece or cowl.

The invention is illustrated, by way of ex-

ample, in the accompanying drawings, in which:—

Figure 1 is a front elevation of a stroboscopic revolution indicator. 55

Figures 2 and 3 are end elevations looking respectively from the left and from the right of Fig. 1.

Figure 4 is a sectional elevation of Fig. 1. 60

Figure 5 is a plan of Fig. 1.

Figures 6 and 7 are detail views looking respectively from the back and from the front of Fig. 1. Fig. 8 illustrates a modification.

As shown, the apparatus comprises a casing 1 within which is rotatably mounted a light hollow drum 2. The drum is mounted fast on a spindle 3, which at one end is supported in a pivot bearing 4 and at the other end is supported in an anti-friction bearing 70 in a casing 6 of a speed indicating instrument. 65

The drum is driven by the frictional impact of a column of air directed against the internal periphery of an annular track 7 at one end of the drum. The annular track is closed at one end by a partition 8 and is open at the other end as at 9. The air is supplied to the annular track by a jet 10, which is arranged inside the track and is 75 connected to a pipe 11 which passes through the open end of the track and is connected to a flexible pipe 12, which is furnished with a hand operated rubber bulb 13. The bulb may be fitted with a non-return air inlet valve 14, so that alternate compression and 80 expansion of the bulb supplies air to the jet. 85

Alternatively rotation of the drum may be caused by the application of a suction to the casing 1, closed by cover 25, the only point of air admission being the jet 10. This suction may be created by any suitable means. By way of illustration we have selected for this purpose an old and well known form of 90 ejector as shown at 26 in Fig. 8. 95

The casing may be provided with a cowl 15, which may be shaped to fit the observer's face to cover the eyes. On the near side opposite each eye position, the casing is formed with a viewing slot 16 which may be 100 fitted with a window 17 to keep draught from the observer's eyes and on the far side

the casing is formed with viewing slots 18. The drum is likewise formed with two pairs of bifocal viewing slots 19, 20, one pair on each side. The viewing slots are preferably placed in the line of a chord just below the horizontal plane containing the axis of revolution so that vision is obtained only once per revolution of the drum. This arrangement ensures a maximum speed of cut off for a given depth of slot, measured circumferentially, thereby given sharp image definition whilst admitting maximum illumination. For use with a pressure system the casing may be open at the ends to allow exhaust air to escape in which case cross bars 21 are provided to carry the pivot bearings 4. Alternately for outdoor use the ends may be entirely closed as at 25, Figure 8, and transparent coverings provided for the viewing slots in which case convenient openings may be provided as at 27 for disposal of exhaust air.

For use with a suction system an entirely closed casing of this nature is necessary. The casing is closed at the end near the revolution indicator, but is open to provide an air escape and accommodation for the air tube 11 at the other end. A cross bar 21 is provided at the end of the casing lastly referred to for carrying the pivot bearing 4.

It will be understood that the addition of the indicating attachment is not essential for purely stroboscopic observation, but is a modification which enables speeds to be checked where the nature of the object or other considerations do not permit of a correct reading with an ordinary speed checking instrument.

The effective speed range of the apparatus as described and illustrated with one view per revolution is of the order of from 3000 R. P. M. down to 50 R. P. M. and the control at any speed between these limits is sensitive, it only being necessary to generate quite small air puffs to keep the speed constant or to make slight changes of speed. The maximum speed is proportionally increased by the provision of additional slots around the drum as aforesaid. The indicator then may be geared, or its readings may be multiplied by the number of views per revolution.

It will be seen that the instrument is very convenient to handle only weighing a few ounces. Other advantages are that it is convenient to use and enables a clear image to be obtained.

The apparatus is particularly suitable, by way of example, for testing engine valve gear running, gun gear running, aircraft propeller running, engine exhaust gases and the like.

What we claim and desire to secure by Letters Patent of the United States is:—

65 1. A stroboscope including a rotatably

mounted shutter having a continuously unbroken portion and, provided with viewing apertures, and means for directing a jet of air obliquely against said continuously unbroken portion of said shutter to cause said shutter to rotate.

2. A stroboscope including a rotatably mounted drum having a continuously unbroken cylindrical surface and provided with viewing apertures, a nozzle arranged with its axis oblique to said drum for directing a jet of air obliquely against said unbroken cylindrical surface of said drum to cause said drum to rotate.

3. A stroboscope including a rotatably mounted drum provided with viewing apertures, said drum having an annular track, a nozzle arranged in proximity and obliquely to said track for directing a jet of air against said track to cause the drum to rotate.

4. A stroboscope including a rotatably mounted drum provided with viewing apertures, an annular track in said drum, a nozzle arranged in proximity and obliquely to said track for directing a jet of fluid obliquely against said track to cause the drum to rotate.

5. A stroboscope including a casing provided with viewing slots, a drum rotatably mounted in the casing, said drum being provided with viewing apertures, an annular track in said drum, the viewing slots in said casing when in register with the viewing apertures in the drum being situated on a chord adjacent to the axis of revolution of the drum, and a nozzle arranged in proximity and obliquely to said drum for directing a jet of fluid obliquely against the track to cause said drum to rotate.

6. A stroboscope including a casing, said casing being provided with viewing slots in the periphery thereof, a drum rotatably mounted in the casing provided with peripheral viewing apertures, an annular track in said drum, a nozzle arranged in proximity and obliquely to said track for directing a jet of fluid against said track to cause said drum to rotate.

7. A stroboscope including a casing provided with peripheral viewing slots, transparent coverings for some of said slots, a drum rotatably mounted in the casing provided with peripheral viewing apertures, an annular track in said drum, a nozzle arranged in proximity and obliquely to said track, and means for directing a jet of fluid obliquely against said track to cause the drum to rotate.

8. A stroboscope including a casing provided with viewing slots, a drum rotatably mounted in the casing, an annular track in said drum provided with viewing apertures, a nozzle arranged in proximity and obliquely to said track for directing a jet of fluid

obliquely against said track to cause said drum to rotate, and a cowl on said casing.

and means for producing a sub-atmospheric pressure in said chamber for inducing the 10 jet from said nozzle.

9. A stroboscope including a rotatably mounted shutter provided with viewing 5 apertures, a casing forming a chamber around said shutter, a nozzle within said casing arranged to direct a jet of fluid against said shutter for causing it to rotate,

In testimony whereof we have signed our names to this specification.

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