ANEMOMETERS (AND AIRMETERS)

by **Tony Moon**
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Mine ventilation is of critical importance to the mining engineer. One measurement that is monitored on a routine basis is the quantity of air flowing at various locations within the mine. Anemometers and airmeters are the small, portable instruments that the engineer or fireboss would use to measure the air flow. Not all anemometers were used in mines, however, as they were used wherever ventilation was important such as in tunnels, sewers, and even large buildings.

Figure 1 shows three anemometers that are typical of those used in mines. This style of anemometer is known as a Biram anemometer and the most popular sizes were 3 inch, 4 inch, and 6 inch diameter. The instrument consists of a number of small vanes which are made up into a fan wheel which is fixed onto a central shaft which in turn drives a series of recording indicators through gears. All of those shown in Figure 1 have one large indicator dial and one smaller dial, but instruments with up to five smaller dials can be found. Most instruments that the author has examined are calibrated in feet and are set up such that 100 revolutions of the fan wheel is one revolution on the large indicator with smaller indicators in hundreds, thousands, hundred thousands, and millions of feet. Most instruments have a small lever or clutch which allows the recording indicators to be thrown in and out of gear with the fan wheel by the user. Some recent models even have a zero setting lever to reset all the indicators.

Figure 2 shows two anemometers, one of which is the style normally described in catalogs as an airmeter. The three pages reproduced from the 1909 Keuffel and Esser catalog show both types of anemometers and airmeters described previously. Also shown is a small 2 inch diameter pocket watch style anemometer and a self timing anemometer complete with stop watch. Anemometers with hourglass sand timers were also available as were models which read the air velocity directly (feet per minute instead of feet).

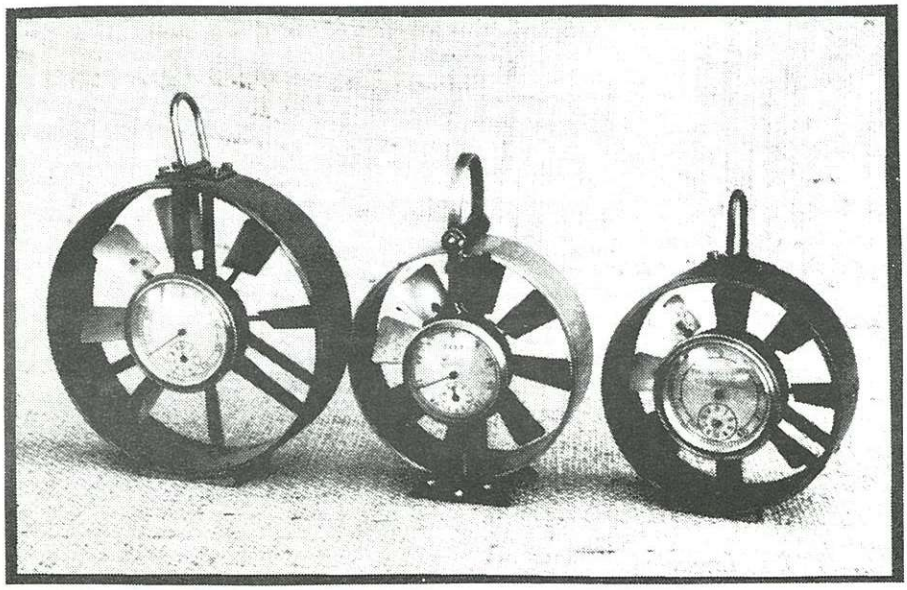


Figure 1. Left to right: 4 inch diameter anemometer by "The Everhart Brass Works, Scranton, PA," and two 3 inch units, one unmarked and the other by "The M. Cole Co., Columbus, O." This style of anemometer is known as a Biram anemometer and also came in a 6 inch diameter size. All of those anemometers have one large indicator dial and one smaller dial, but instruments with up to five smaller dials can be found. All from the author's collection)

To make a measurement with an anemometer, the instrument is held in the air current with the fan wheel at right angles to the air flow direction. The instrument is usually held a arms length or on an extension rod and is moved slowly over the area of the tunnel opening. The fan wheel is allowed to turn and the initial reading is taken with the clutch disengaged. The clutch is then engaged and the test period is started. At the end of a fixed period of time, usually one minute, the clutch is disengaged and the indicators are read. Several readings are generally taken and averaged. The average reading is then divided by the average test period to give the velocity in feet per minute. The volume of air (cubic feet per minute) moving can be calculated knowing the cross-sectional area of the tunnel.

Anemometers were made by several manufacturers, some of which are as follows;

-Davis & Son, London and Derby

-John Davis & Son (Derby Ltd)

-Davis Instrument Manufacturing Co., Baltimore (still being sold in the 1950's by Mine Safety Appliances)

-Keuffel and Esser Co., New York

-Negretti and Zambra, London

-Short and Mason Ltd, London (sold by Mine and Smelter Supply)

-Taylor, Rochester, NY (still being sold in the late 1950's by Mine Safety Appliances)

Most anemometers have a brass frame with a blackened, polished, or varnish finish, and lightweight aluminum vanes. However, aluminum frames are also known. Modern anemometers have a painted finish with black, grey, and green being popular.

In the next issue of the *MAC*--hygrometers and barometers--the other instruments of the ventilation engineer.

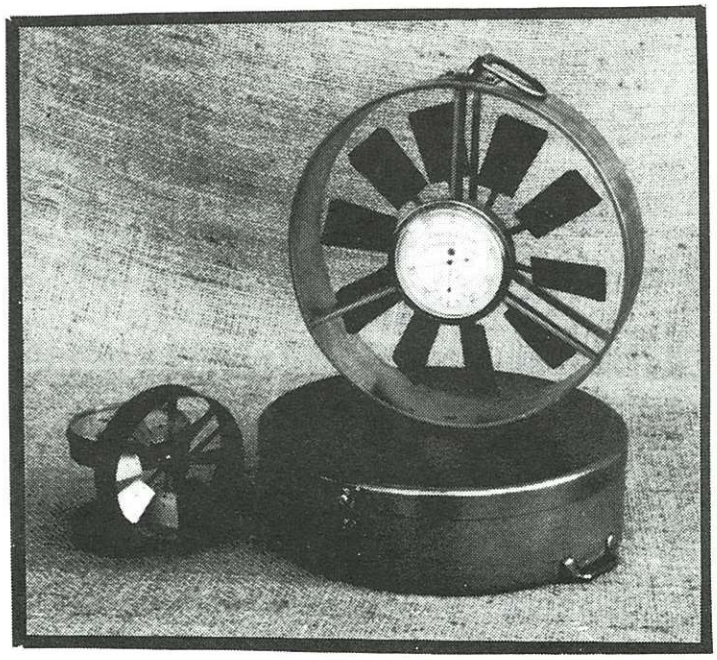
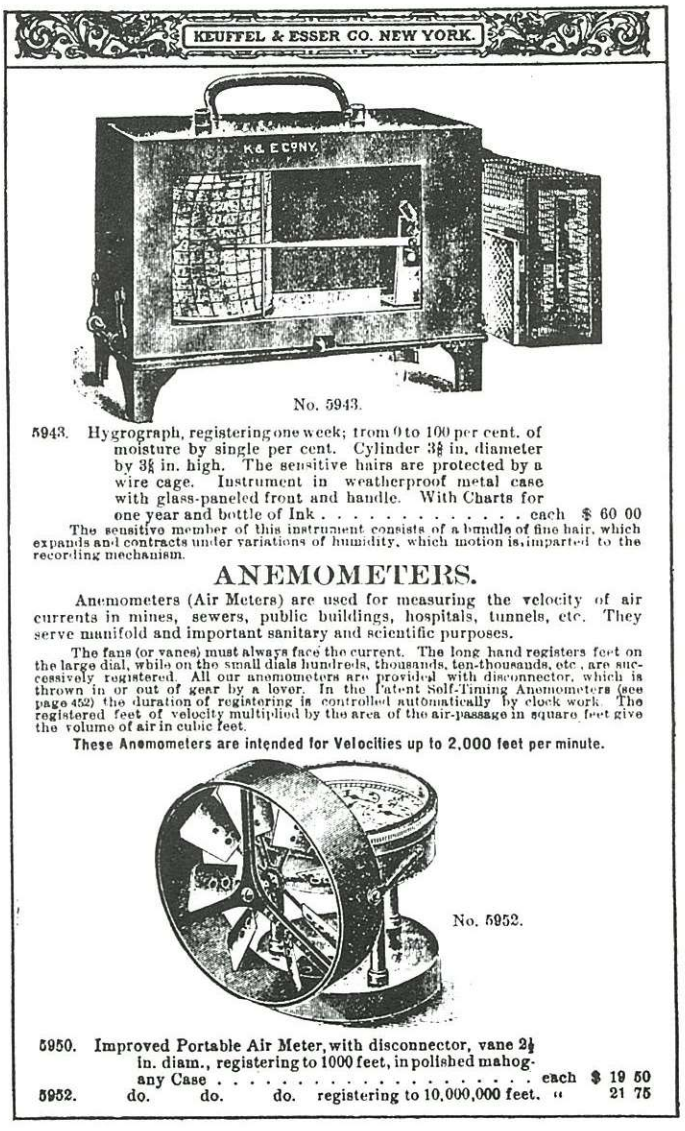


Figure 2. Small 2 $^{1}/_{2}$ inch diameter airmeter by "Davis & Son, Derby" and a 6 inch diameter anemometer with aluminum carrying case by "Davis & Son, London & Derby." (From the author's collection)

Figure 3. Three pages from a 1909 Keuffel and Esser catalog showing both types of anemometers and airmeters that are described in the text.



KEUFFEL & ESSER CO. NEW YORK.

No. 5943.

5943. Hygrograph, registering one week; from 0 to 100 per cent. of moisture by single per cent. Cylinder 3⅛ in. diameter by 3⅛ in. high. The sensitive hairs are protected by a wire cage. Instrument in weatherproof metal case with glass-paneled front and handle. With Charts for one year and bottle of Ink . . . . . each $ 60 00

The sensitive member of this instrument consists of a bundle of fine hair, which expands and contracts under variations of humidity, which motion is imparted to the recording mechanism.

ANEMOMETERS.

Anemometers (Air Meters) are used for measuring the velocity of air currents in mines, sewers, public buildings, hospitals, tunnels, etc. They serve manifold and important sanitary and scientific purposes.

The fans (or vanes) must always face the current. The long hand registers feet on the large dial, while on the small dials hundreds, thousands, ten-thousands, etc., are successively registered. All our anemometers are provided with disconnector, which is thrown in or out of gear by a lever. In the Patent Self-Timing Anemometers (see page 452) the duration of registering is controlled automatically by clock work. The registered feet of velocity multiplied by the area of the air-passage in square feet give the volume of air in cubic feet.

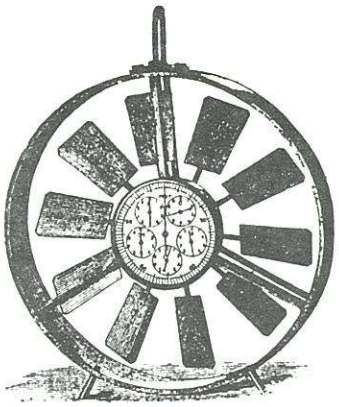
These Anemometers are intended for Velocities up to 2,000 feet per minute.

No. 5952.

5950. Improved Portable Air Meter, with disconnector, vane 2½ in. diam., registering to 1000 feet, in polished mahogany Case . . . . . each $ 19 50

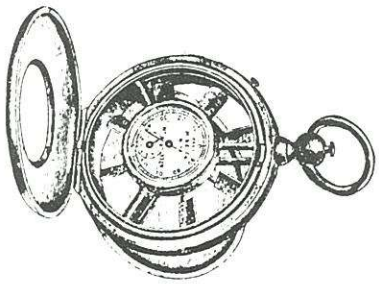
5952. do. do. do. registering to 10,000,000 feet. " 21 75

KEUFFEL & ESSER CO. NEW YORK.



No. 5965.

5953.	Biram Anemometer, 3 in. diam., reading to 1000 feet, with disconnector, in polished Mahogany Case .						each	$ 18 50
5957.	do.	4 in.	diam.,	reading to	1000	feet, do.	"	19 00
5958.	do.	4 "	"	"	100,000	" do.	"	21 00
5963.	do.	6 "	"	"	1000	" do.	"	21 00
5965.	do.	6 "	"	"	10,000,000	" do.	"	30 00



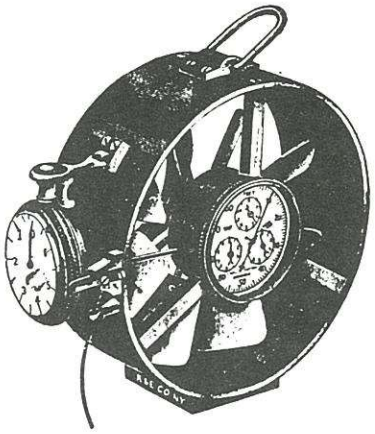
No 5968.

5968. Watch-pattern Anemometer, 2 in., registering to 1000 feet; nickel plated hunting case, with disconnector. The two covers, when open form a base for the instrument. In velvet lined morocco Case . . . . . each $ 30 00

KEUFFEL & ESSER CO. NEW YORK.

SELF-TIMING ANEMOMETERS.

(Patented.)



No. 5958 T.

5953T.	Biram Anemometer, Self-timing, 3 in. diam., reading to 1000 feet, with disconnector, in polished mahogany Case						each	$ 33 50
5957 T.	do.	4 in.	diam.,	reading to	1000	feet, do.	"	34 00
5958 T.	do.	4 "	"	"	100,000	" do.	"	36 00
5963 T.	do.	6 "	"	"	1000	" do.	"	36 00
5965 T.	do.	6 "	"	"	10.000.000	" do.	"	45 00

The self-timing anemometers are set to register by clock work, during a stated number of minutes up to six minutes (by half-minutes). After being placed in position they are started by means of a cord attached to the lever and they stop automatically when the set time has expired. They therefore register for a definite period of time, while in the old style of instruments the registering begins when the air current strikes the vanes and continues until the disconnecting lever is shifted by hand.

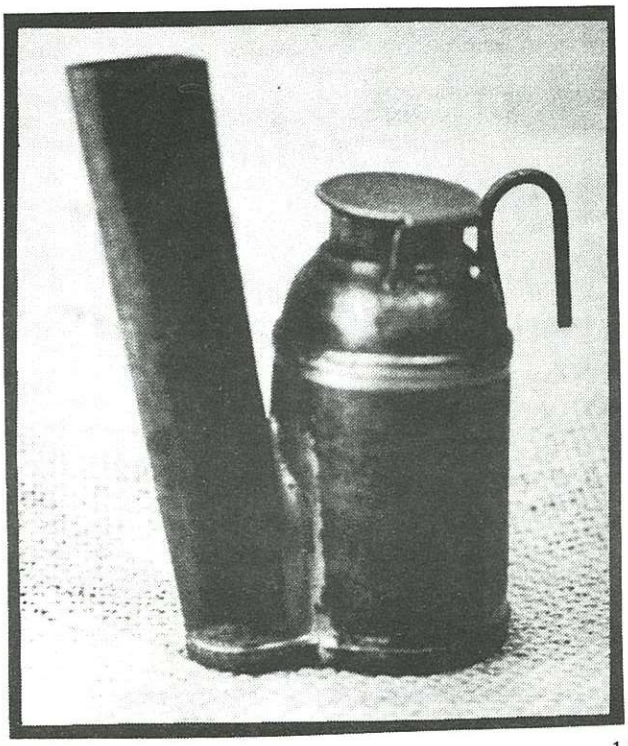
TESTING.

We have the best possible appliances for testing anemometers and furnish with each anemometer a table giving a number of comparisons. A much more complete table of this kind, covering the range of the instrument will be furnished to order. The price of such testing is according to the conditions of the test.

As we manufacture anemometers, we have the best facilities for repairing them, whether of our make or other

AN UNUSUAL OIL WICK LAMP

by **Tony Moon**
Sandy, Utah



The oil wick lamp shown in the accompanying illustration has one of the most unusual spout arrangements that the author has seen. The spout is almost vertical and essentially comes out of the side of the oil vessel. The lamp is tin and is 3 inches high at the lid and 3 $^{3}/_{4}$ inches high to the top of the spout. The only marking is "PAT. APRIL 16. 95" on the side. This is a valid patent date but the author has been unable to locate any patent relating to miner's lamps on this date. If any reader can help, it would be appreciated.