March 12, 1957 B. A. SHOOR 2,784,591

CYCLE ERGOMETER

Filed July 25, 1955

Fig. 1

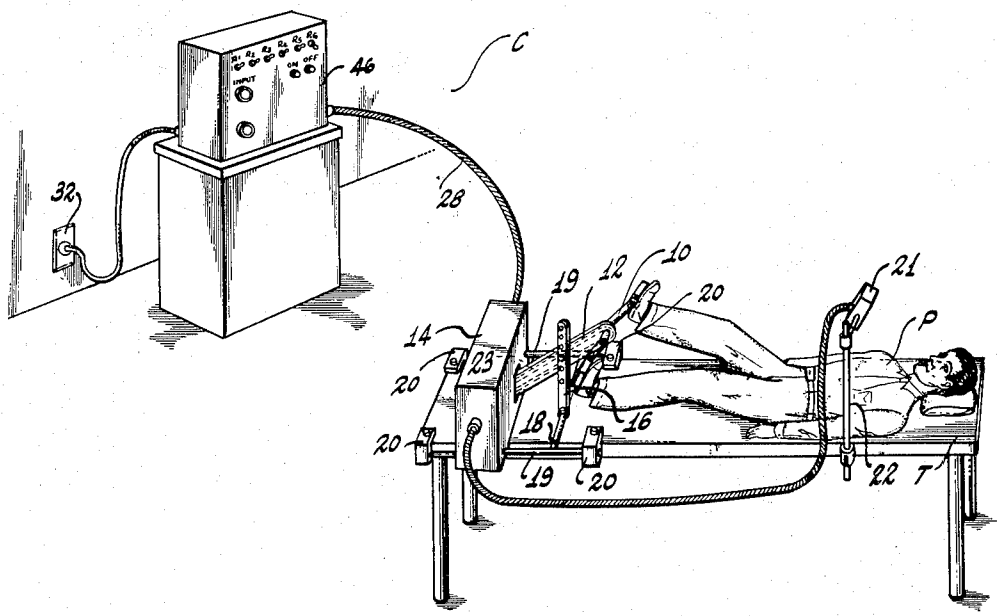
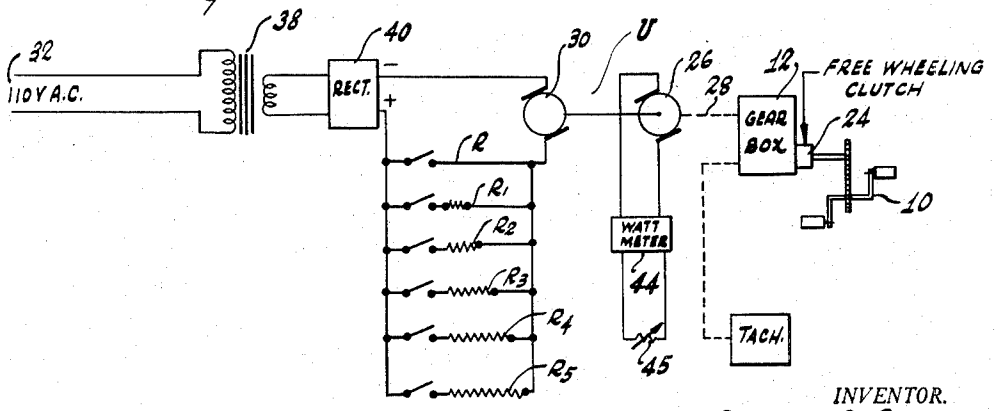


Fig. 2



INVENTOR.
BERNARD A. SHOOR

BY Fulwider Mattingly & Hunter
Attorneys

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CYCLE ERGOMETER

Bernard A. Shoor, Los Angeles, Calif.

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6 Claims. (Cl. 73—379)

The present invention relates generally to the field of medicine and more particularly to a novel cycle ergometer.

In the medical treatment of certain disorders it is essential to have an accurate indication of the exact amount of work a patient can perform over a certain period of time. It has been heretofore proposed to measure such work output by means of various types of cycle ergometers. Generally, these devices utilize the principles of a prony brake and they have not provided sufficiently accurate results.

It is a major object of the present invention to provide a new and improved form of cycle ergometer.

Another object is to provide a cycle ergometer which affords extremely accurate results over a wide range of operating conditions.

Yet another object is to provide a cycle ergometer which is simple in design and rugged of construction whereby it may afford a long and trouble-free service life.

It is a further object of the invention to provide a cycle ergometer which may be manufactured and maintained at less cost than the majority of the heretofore-proposed devices of this type offering comparable results with respect to accuracy.

A further object is to provide a device of the aforedescribed nature which utilizes common and inexpensive electrical components.

An additional object of the present invention is to provide a cycle ergometer which does not require the services of a highly trained technician for its operation.

It is yet another object of the invention to provide a cycle ergometer which may be operated with the patient disposed in either a sitting or in a prone position.

These and other objects and advantages of the present invention will become apparent from the following detailed description of a prefered embodiment thereof, when taken in conjunction with the appended drawings, wherein:

Figure 1 is a perspective view of a preferred form of cycle ergometer embodying the present invention; and

Figure 2 is an electrical circuit diagram of said cycle ergometer.

Referring to the drawings, the preferred form of cycle ergometer C embodying the present invention is adapted to measure the work output of a patient P shown lying upon a suitable table T. The cycle ergometer C includes a pair of pedals **10** which are engaged by the feet of the patient P in order that he may effect rotation thereof. The pedals **10** extend from either side of the front of a support bar **12** having its front end pivotally connected to a gear box housing **14**. The elevation of the pedals **10** may be adjusted to the needs of individual patients by means of a bracket **16**. The lower end of the bracket is pivotally affixed to a cross-bar **18** which extends between a pair of frame elements **19**. The front end of these frame elements **19** support the sides of the gear box housing **14**. Each of the frame elements **19** carry suitable clamps **20** by means of which they may be removably attached to an X-ray table T, or the like, upon which the

patient P rests during a work measuring operation. The patient P may determine the rotational speed at which he is pedaling by means of a tachometer **21** mounted upon a stand **22** that is clamped to one side of the table T. A suitable cable **23** interconnects the pedals **10** and the gear box housing **14**. Preferably, as shown in Figure 2, a free wheeling clutch **24** is incorporated in the gear box housing **14** so as to prevent inadvertent contact of a rapidly rotating pedal with the patient's feet or ankles. As also shown in Figure 2, the cycle ergometer C includes an electric motor-generator or dynamotor unit U, the generator portion **26** of which is connected to the pedals **10** through the gear box **12** and a suitable cable **28**.

The motor portion **30** of the motor-generator unit U is connected to a suitable source of electric current **32** such as an outlet for domestic alternating current. Preferably, this alternating current will pass through a step-down transformer **38** and a rectifier **40**. The amount of current flowing to the motor **30** and hence its rotational speed may be adjusted by means of several electrical resistances R, R1, R2, R3, R4 and R5. The amount of work being applied by the patient P to the generator **26** is measured as by means of a watt meter **44**. A load, such as a variable resistance **45**, is connected to the generator **26**. Conveniently the motor generator unit U, the transformer **38**, the rectifier **40**, the resistances R, the watt meter **44** and the variable resistance **45** are mounted within a housing **46**.

In the operation of the preferred form of cycle ergometer embodying the present invention, the motor **30** is caused to rotate at a desired speed by proper manipulation of the resistances. The patient P is then instructed to pedal at a rate which will cause the generator **26** to rotate at the same speed as the motor. At this time the patient will not be performing any substantial amount of work. The patient is further instructed to maintain the tachometer reading constant.

Next, the operator decreases the electric current input to the motor **30** by means of the resistances. Such decrease is effected in predetermined steps. Each time an additional resistance is introduced the rotational speed of the motor tends to decrease. The added work required to maintain the rotational speed of the motor (and hence the tachometer reading) constant must be supplied by the patient. The value of such added work may be accurately obtained by means of the watt meter **44**. The utilization of the variable resistance **45** permits the loading of the generator **26** to be readily adjusted. In this manner the work load of the generator may be varied so as to provide most accurate results when persons of different strengths are being tested.

With the aforedescribed arrangement, it is possible to carefully chart perimetric curves of the work supplied by the patient under varying load conditions at different constant velocities. Such perimetric curves may be charted with the patient disposed in a sitting position as well as in a prone position. To this end the gear box bracket **14** may be lowered relative to its supporting pedestal **16**. The patient P may then sit upon the edge of the table T and engage the pedals **10** with his feet.

While there has been shown and described hereinbefore what is presently considered to be the preferred embodiment of the present invention, it will be apparent that various modifications and changes may be made thereto without departing from the spirit of the invention or the scope of the following claims.

I claim:

1. A cycle ergometer, comprising: a coupled-together motor-generator unit; a source of electric current for operating the motor portion of said unit; electrical resistance means interposed between said source and said motor portion for controlling the speed of the latter; patient-

operable means for effecting rotation of said generator portion; and, means for measuring the output of said generator portion.

2. A cycle ergometer, comprising: a coupled-together motor-generator unit; a source of electric current for operating the motor portion of said unit; electrical resistance means interposed between said source and said motor portion for controlling the speed of the latter; patient-operable means for effecting rotation of said generator portion; a variable load connected to said generator portion; and, means for measuring the output of said generator portion.

3. A cycle ergometer, comprising: a coupled-together motor-generator unit; a source of electric current for operating the motor portion of said unit; electrical resistance means interposed between said source and said motor portion for controlling the speed of the latter; pedal means for effecting rotation of the generator portion of said unit; means for measuring the speed at which said pedal means are operated; a variable load connected to said generator portion; and, means for measuring the output of said generator portion.

4. A cycle ergometer, comprising: a coupled-together motor-generator unit; a source of electric current for operating the motor portion of said unit; electrical resistance means interposed between said source and said motor portion for controlling the speed of the latter; pedal means for effecting rotation of the generator portion of said unit; a tachometer for indicating the rotational speed at which said pedal means are operated; a variable resistance load connected to said generator portion; and, a watt meter for measuring the output of said generator portion.

5. A cycle ergometer, comprising: a coupled-together motor-generator unit; means for controlling the speed of the motor portion of said unit; pedal means for effecting rotation of the generator portion of said unit; a tachometer for indicating the rotational speed at which said pedal means are operated; a load connected to said generator portion; and, a watt meter for measuring the output of said generator portion.

6. A cycle ergometer, comprising: a coupled-together motor-generator unit; means connectible with a source of electric current for operating the motor portion of said generator, and including electrical resistances which may be utilized for controlling the speed of said motor portion; a gear box connceted to the generator portion of said unit; pedal means connected to said gear box so as to effect rotation of said generator portion; a free-wheeling clutch interposed between said pedal means and said gear box; a tachometer for indicating the rotational speed at which said pedal means are operated; a variable resistance load connected to said generator portion; and, a watt meter for measuring the output of said generator portion.

References Cited in the file of this patent

UNITED STATES PATENTS

1,498,529	Allen	June 24, 1924
1,653,921	Mullen	Dec. 27, 1927
2,202,187	Chalette	May 28, 1940
2,585,475	Lee	Feb. 12, 1952

FOREIGN PATENTS

475,603	Canada	July 31, 1951