

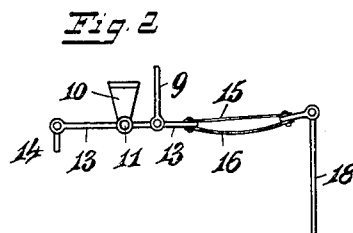
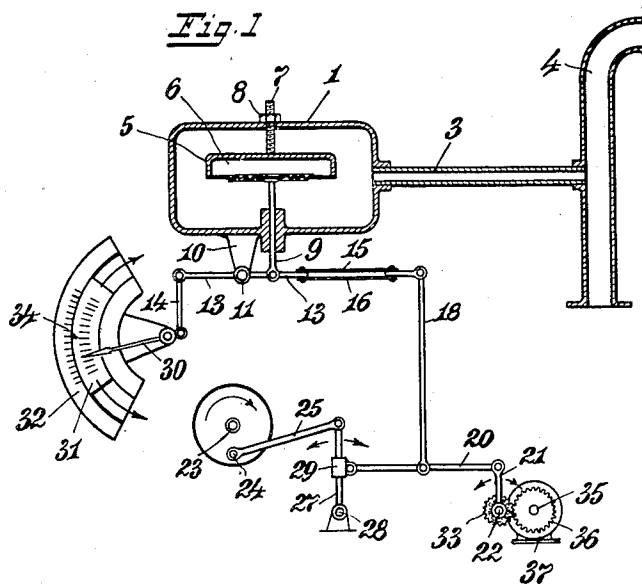
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DEVICE FOR CONTINUOUSLY REGISTERING THE REVOLUTIONS OF AN INTERNAL
COMBUSTION ENGINE IN CONSIDERATION OF THE ACTUAL LOAD

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DEVICE FOR CONTINUOUSLY REGISTER-
ING THE REVOLUTIONS OF AN INTER-
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ERATION OF THE ACTUAL LOAD

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It is of the utmost importance for the economi-
cal working of a combustion engine to have means
of determining, when the total stress on the en-
gine has reached a point where an overhauling of
the engine seems advisable.

The present invention has for its object to pro-
vide a very simple device to continuously register
and indicate the total load taken up by the en-
gine during its entire running period.

A further object of my invention is to provide
a registering device, which is driven from the
crank shaft of the engine by means of an adjust-
able gear and comprises means to vary the trans-
mission ratio of said gear in dependence upon the
pressure conditions in the intake pipe of the en-
gine. As well known, the pressure condition in
the intake pipe is directly proportional to the
load and the engine.

Still another object of my invention is to pro-
vide a device of this character for indicating con-
tinuously the actual pressure prevailing in the
intake pipe.

Further details are shown in the accompanying
drawing, which illustratively exemplifies one em-
bodiment of my invention.

Fig. 1 is a diagrammatic view of the entire
arrangement, according to the invention, and

Fig. 2 shows a special part of the gear in active
position.

In the drawing 23 denotes a rotary shaft driven
by the engine and driving in turn by means of an
eccentric 24 and a transverse arm 25, a rocking
lever 27 pivoted at 28. A sliding collar 29 is ar-
ranged on the rocking lever 27 and is pivotally
connected to the connecting bar 20, the other end
of which is pivotally attached to the swinging arm
21. The swinging arm 21 is fixed to a shaft 22,
which is coupled by means of an intermittent
movement to the registering device 33, 35, 36, 37.
The transmission ratio between the pinions 33
and 36 is such, that a predetermined number of
rotations of the shaft 23 at a middle position of
the sliding collar 29 corresponds to one unit on
the indicator wheel 37.

A pressure chamber 1 is connected to the intake
pipe 4 of the engine by means of a short pipe 3
which enters short of the inlet openings to the
cylinders. In this way all the usual operative
features of the engine cooperate in defining the
pressure in the pressure chamber 4, which pres-
sure always corresponds exactly to the actual load
on the engine.

A pressure box 5 is supported in the pressure
chamber 4 on a screw bolt 7, which depends from
the upper wall of the pressure box and projects

upwardly through an opening in the pressure
chamber to receive a nut 8, which is screwed over
the bolt and against the chamber to fix it in the
desired position. By adjustment of the nut 8,
the position of the pressure box 5 can be changed,
in order to accommodate the device to different
types of engines. The bottom of the pressure box
5 constitutes a diaphragm 6 carrying a spindle 9
projecting downwardly through a bearing in the
bottom of the pressure chamber 1.

A hanger or bracket 10 depends from the bot-
tom of the chamber 1 and comprises a bearing 11
in which a two armed lever 13 is pivotally mount-
ed. One arm of the lever 13 is connected ad-
jacent its pivot point to the lower end of the
spindle 9, while the extreme end of said arm is
pivotally connected to the upper end of a link
18, the lower end thereof being pivotally connect-
ed to the mid portion of an arm 20.

The portion of the lever 13 beyond the spindle
9, comprises a temperature sensitive member in
form of a bimetal bar 15, 16 to transmit the ef-
fect of changes in temperature to the connecting
rod 18 and the gear 29, 20, 21, 22.

The opposite end of the lever 13 carries a link
14 connected to a pointer 30 which moves over an
arcuate scale 31, the latter being arranged to
slide in a second fixed arcuate scale 32. The
slidable scale 31 is provided with graduations
which enable readings to be taken of the actual
pressure in the pressure chamber 1. The zero
point 34 is arranged in the centre of the scale 31
which must be adjusted under the indicator 30
before the engine is started. When the machine
is not running, the indicator 30 indicates the pre-
vailing atmospheric pressure in the intake pipe.
The outer fixed scale 32 carries a barometric
graduation so that the barometric pressure can be
read upon this scale, when the engine is at rest.

The registering mechanism which may be cali-
brated in any suitable units, as, for instance, in
horsepower-hours, operates as follows: Shaft 23
drives through crank 24, the arms 25 and 27,
sliding collar 29, bar 20, and arm 21 to cause the
shaft 22 to rotate intermittently in one direction,
whereby the rotations of shaft 23 are registered
on the counting wheel 37. The degree of the
angular turns performed by shaft 22 on the in-
dividual rotations of shaft 23, depends upon the
position of the sliding collar 29, on the lever 27.
The sliding collar 29 is shifted upwardly and
downwardly by the movement of the spindle 9 ac-
cording to the pressure conditions in the intake
pipe 4.

When the load on the engine is small, the pres-

sure falls in the intake pipe 4 and in the pressure chamber 1. The diaphragm 6 is projected outwardly by the pressure in the pressure box 5, and the needle 9, the right arm of lever 13, rod 18, bar 20 and collar 29 are lowered. When the sliding collar 29 approaches the pivot point 28 of lever 27, the movements of the gear parts 29, 20, 21 and the angular turn of shaft 22 per rotation of shaft 23 are reduced. When the load on the engine increases, the collar moves and just the opposite happens. The diaphragm returns to its normal position and the spindle 9, the right arm of lever 13, rod 18 and bar 20 lifts the collar 29 on the lever 27. The distance between the collar 29 and the pivot point 28 and the angular turn of shaft 22 per rotation of shaft 23 are accordingly increased. Thus the registration of the shaft rotations is corrected in dependence upon the pressure conditions in the intake pipe.

Fig. 2 illustrates the working of the bimetallic bar 15, 16 arranged in the right arm of lever 13, e. g., upon a fall of temperature. The upper bar 15 contacts more than the lower bar 16, the rod 18 is raised and the angular turn of shaft 22 per rotation of shaft 23 is increased, because one and the same pressure at a lower temperature corresponds to a higher load than at a higher temperature. It is sufficient if the temperature sensitive organ is arranged in the neighborhood of the intake pipe, because the temperature of the gas in the intake pipe is practically identical with that of the atmosphere in the neighborhood of the intake pipe.

What I claim is:

1. A registering device for indicating the total load taken up by a combustion engine during its running period, comprising a register, an adjustable gear driven by the crank shaft of the engine and adapted to drive said register, a pressure chamber connected to and subject to the pressure in the intake pipe, a pressure box adjustably arranged in said chamber, a diaphragm forming the bottom of said pressure box, a spindle fixed to said diaphragm and projecting downwardly through the bottom of the pressure chamber, and a lever system connecting said spindle to said adjustable gear whereby the transmission ratio of the latter is varied in dependence upon the pressure conditions in the intake pipe.

2. A device, as claimed in claim 1, comprising further a bimetal bar arranged in the neighborhood of the intake pipe and constituting part of said lever system, so as to change the transmission ratio of the adjustable gear also in dependence upon the temperature conditions in the neighborhood of the intake pipe.

3. A registering device for indicating the total load taken upon by a combustion engine during its running period, said device comprising a register, a crank arm driven by the crank shaft of the engine, a swinging lever actuated by said crank arm, a slidable collar adjustable on said lever, a swinging arm intermittently actuating said register, a bar connecting said sliding collar with said swinging arm, a pressure chamber connected to and subject to the pressure in the intake pipe of the engine, a pressure box within such pressure chamber a diaphragm forming the bottom of said pressure box, a spindle fixed to said diaphragm and projecting downwardly through the bottom of said pressure chamber, a double armed lever pivotally arranged below said pressure chamber, one arm of said lever being pivotally connected to said bar and said spindle and including a bimetal bar, an adjustable scale, and a pointer moving over said scale, said pointer being driven by the second arm of said two-armed lever.

4. A registering device for indicating the total load taken up by a combustion engine during its running period, comprising a register, an adjustable gear including a crank arm driven by the crank shaft of the engine, a swinging lever actuated by said crank arm, a slidable collar adjustable on said lever, a swinging arm actuating said register and a bar connecting the free end of said swinging arm with said collar, and means to vary the position of said sliding collar on said lever and thus the transmission ratio of said gear in dependence upon the pressure conditions in the intake pipe of the engine.

5. A device as claimed in claim 4, in which said means for varying the transmission ratio of the gear in dependence upon the pressure conditions in the intake pipe of the engine comprises a pressure chamber connected to and subject to the pressure in the intake pipe, a pressure box adjustably arranged in said chamber, a diaphragm forming the bottom of said pressure box, a spindle fixed to said diaphragm and projecting downwardly through the bottom of said pressure chamber and a lever system connecting said spindle to said sliding collar.

6. A device as claimed in claim 4, comprising as a further element included in the means for varying the transmission ratio of the gear a bimetal bar arranged in the neighborhood of the intake pipe and connected with said adjustable gear, so as to change the transmission ratio of the latter also in dependence upon the temperature conditions in the neighborhood of the intake pipe.

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