

No. 686,935.

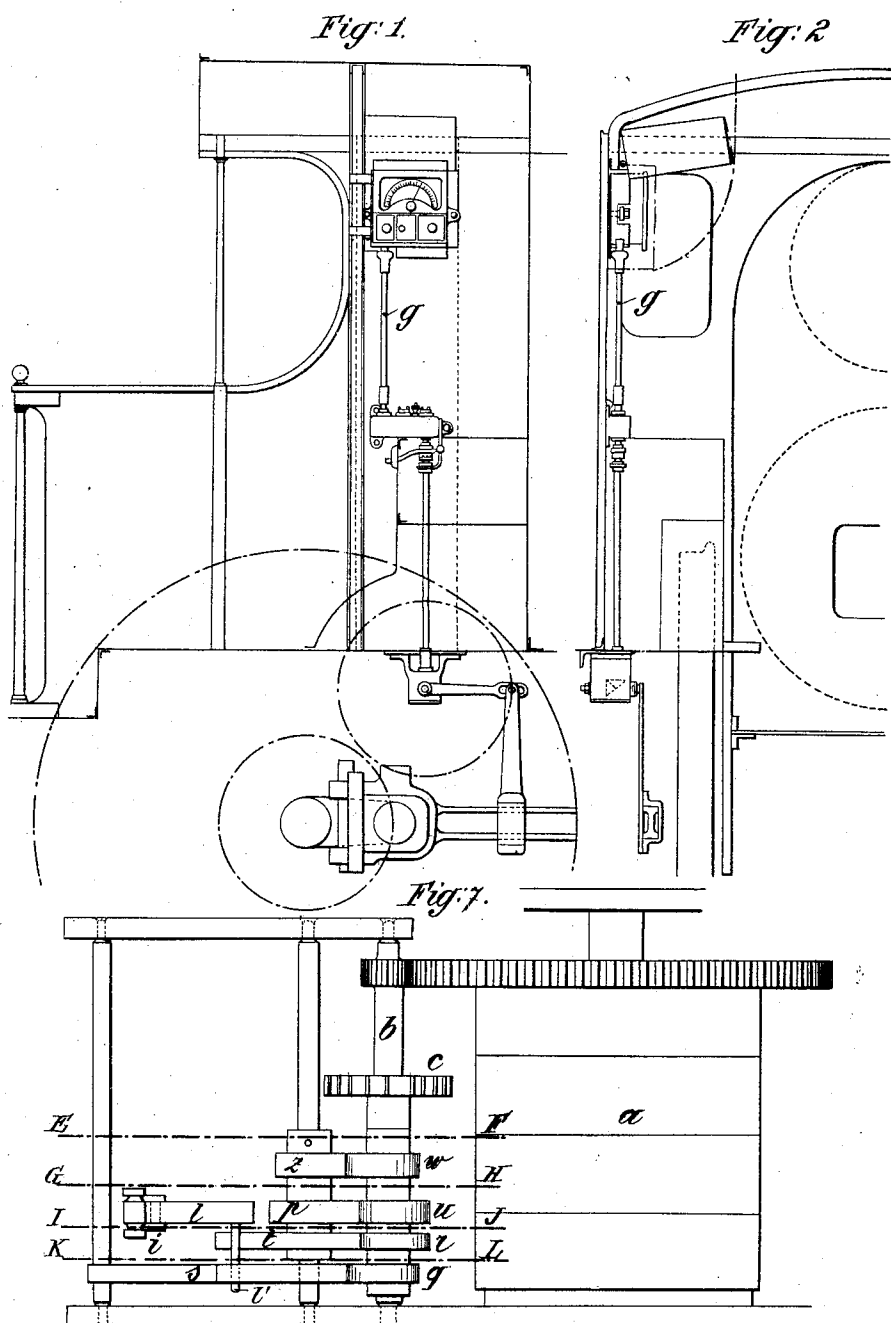
Patented Nov. 19, 1901.

N. C. E. FLAMAN.
APPARATUS FOR INDICATING AND RECORDING SPEED.

(Application filed July 27, 1900.)

(No Model.)

4 Sheets—Sheet 1.



WITNESSES

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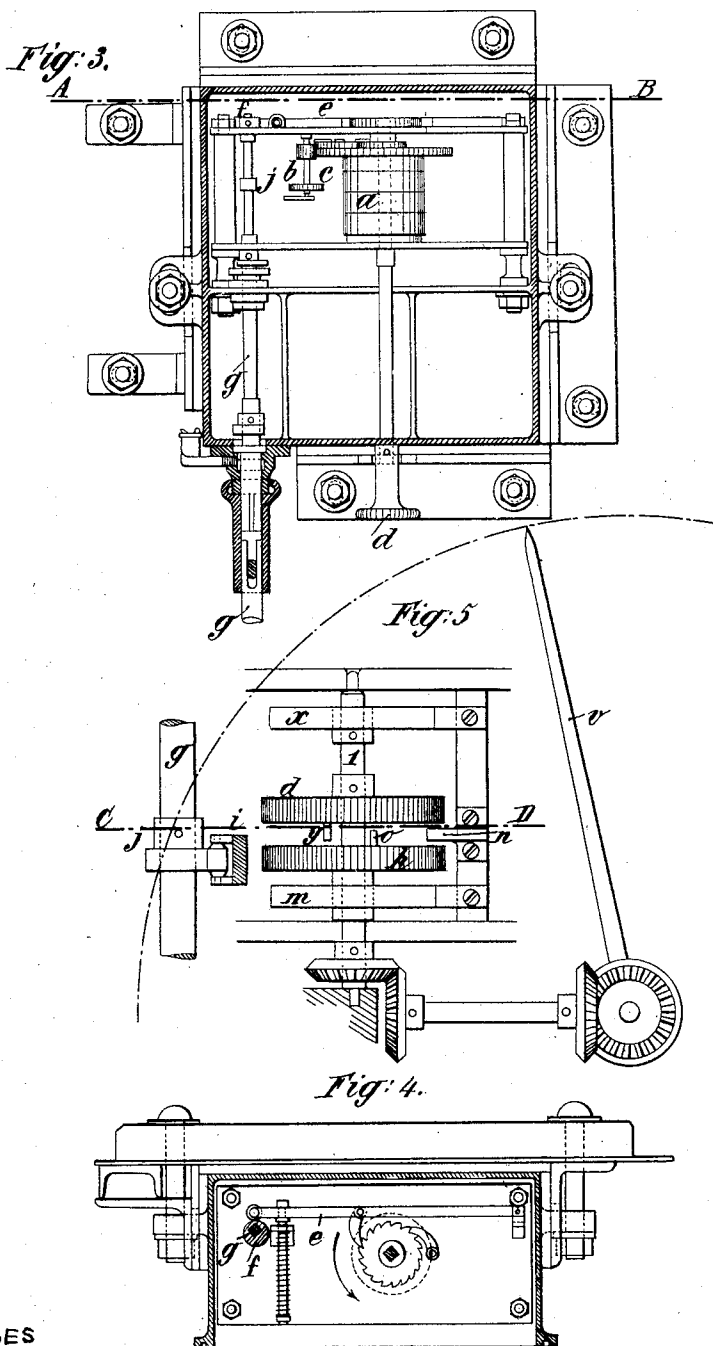
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4 Sheets—Sheet 2.



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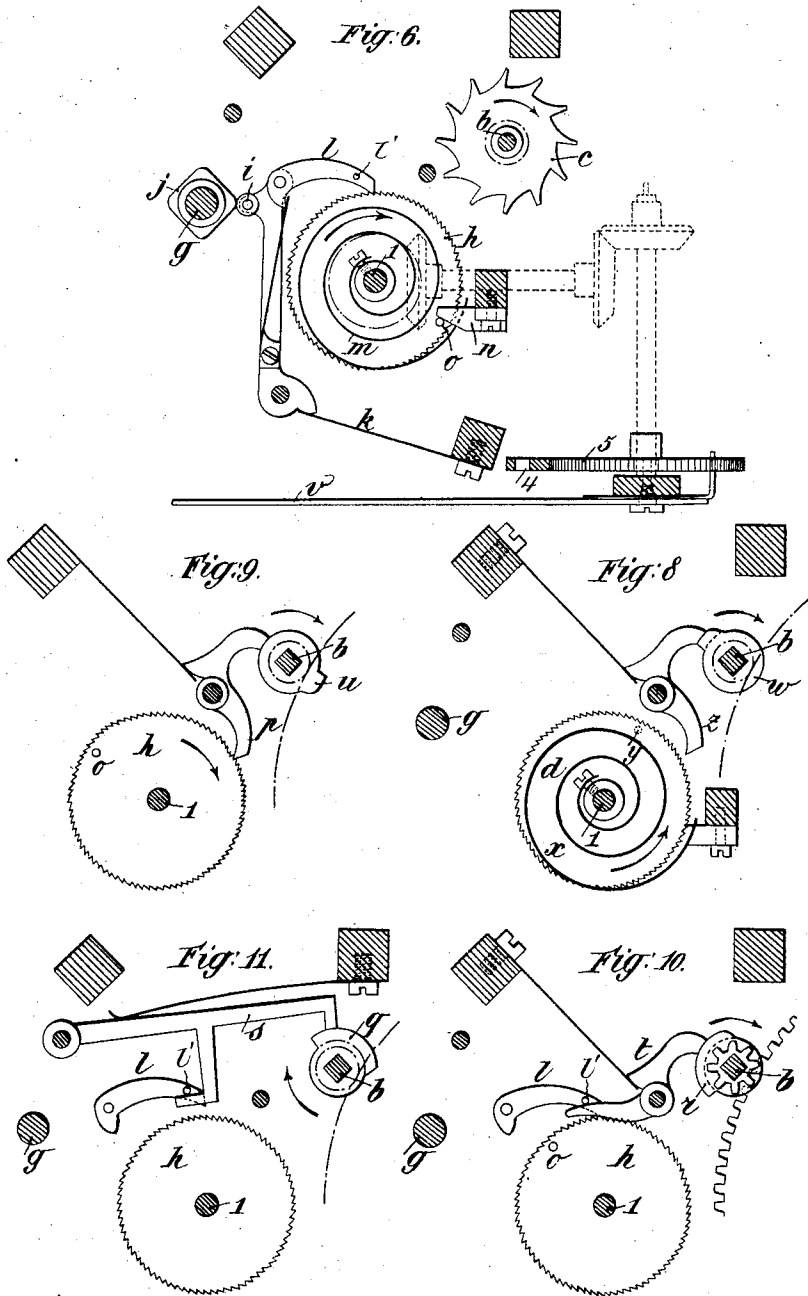
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4 Sheets—Sheet 3.



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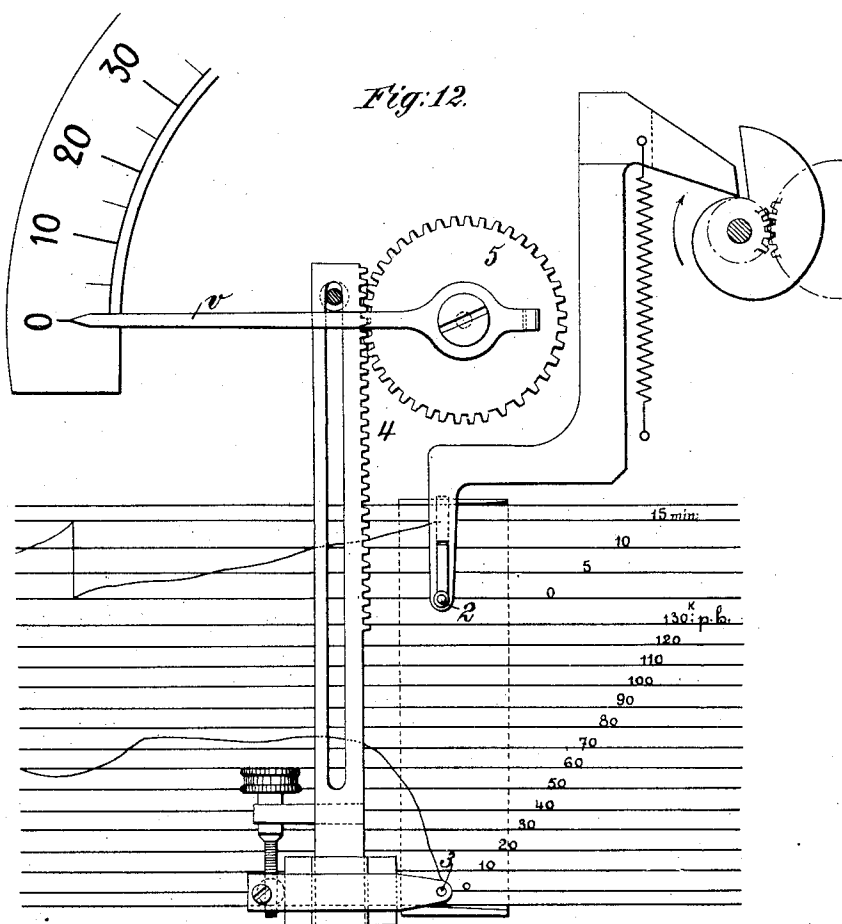
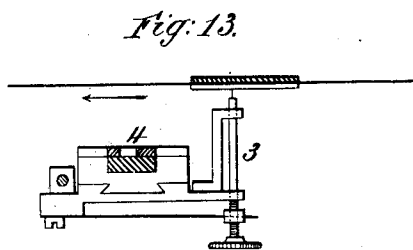
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(Application filed July 27, 1900.)

(No Model.)

4 Sheets—Sheet 4.



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UNITED STATES PATENT OFFICE.

NICOLAS CHARLES EUGÈNE FLAMAN, OF PARIS, FRANCE.

APPARATUS FOR INDICATING AND RECORDING SPEED.

SPECIFICATION forming part of Letters Patent No. 686,935, dated November 19, 1901.

Application filed July 27, 1900. Serial No. 25,031. (No model.)

To all whom it may concern:

Be it known that I, NICOLAS CHARLES EUGÈNE FLAMAN, a citizen of the Republic of France, and a resident of Paris, in the Republic of France, have invented a certain new and useful Apparatus for Indicating and Recording Speed, of which the following is a specification.

This invention relates to apparatus for indicating and registering speed, and is particularly applicable to locomotives; and it has for its object to indicate on a dial the speed of the machine at any instant and to register on a band of paper this speed for given times.

In the accompanying drawings, Figures 1 and 2 are respectively a side elevation and an end view of so much of a locomotive as is necessary to illustrate the application of my invention thereto. Fig. 3 is a sectional side elevation with some parts removed for the sake of simplicity. Fig. 4 is a sectional plan showing the winding means. Fig. 5 is a side elevation with parts broken away, showing the means for actuating the indicator. Fig. 6 is a sectional plan of Fig. 5 on the line C D. Fig. 7 is a view showing the cams and camshafts. Fig. 8 is a section on the line E F, Fig. 7. Fig. 9 is a section on the line G H, Fig. 7. Fig. 10 is a section on the line I J, Fig. 7. Fig. 11 is a section on the line K L, Fig. 7. Fig. 12 is a side elevation of the recording apparatus, and Fig. 13 is a plan of a detail thereof.

The apparatus consists of a graduated dial on which a pointer indicates substantially the rate of the speed at a given time and a means for graphically registering this indication. The length of time for which the speed is measured is given by a clockwork-movement, of which the mainspring *a* controls by gear a shaft *b*, carrying an ordinary escapement-wheel *c*. The winding of this clockwork can be done by hand by operating the stud *d* or automatically by a pawl-lever *e*, Figs. 3 and 4, acting on a ratchet-wheel and put in operation by a small eccentric *f*, fast on the driving-shaft *g*. The measuring movement is taken by some suitable moving portion of the machine. For example, in the case of a locomotive it can be taken on the crank, as shown in Fig. 1, by any system of connecting gears

and rods to operate the shaft *g*, as will be obvious to one skilled in the art. We have then a constant and unvariable motion which is given by the clock measuring the time and a variable speed motion which is the rotation of the shaft *g*. These two elements are so connected that they serve to measure the speed as follows: The shaft *g* carries a polygonal cam *j*, acting on a lever *i*, provided with a pawl *l*, taking into a ratchet *h*, loose on a shaft 1. This pawl-lever has a spring *k*, which brings it into contact with the cam *j*. The ratchet *h* carries a pin *o*, which, abutting against a fixed piece *n*, limits the rotation of this wheel. A spiral spring *m* tends to bring back again the wheel *h* to the starting-point. On the shaft 1 is wedged a second ratchet-wheel *d*, having a spiral spring *x*. The shaft 1 is connected by bevel-gear to a shaft 6, which through a bevel-gear 7 controls a pointer *v*, moving over a dial graduated in kilometers to the hour. The spiral spring *x* tends to bring the wheel *d*, also the shaft 1, and the finger *v* toward the position which corresponds to zero on the dial. The wheel *d* carries a pin *y*, which is adapted to abut upon the pin *o* of the wheel *h*. The ratchet *h* is provided with a pawl *p* to prevent its backward movement except at special times, while the ratchet *d* has a similar pawl *z*, each of these pawls being actuated by cams *u w*, fast on the camshaft *b*. On the shaft *b* there are also mounted two other cams *q* and *r*. The first controls a lever *s* to act on a pin *l'*, fixed on the pawl *l*, for the purpose of permitting the pawl to come into contact with its ratchet *h*. The second acts on a lever *t* to disengage the pawl *l* from the ratchet-wheel *h* by acting on the said pin *l'*, which is sufficiently long for this purpose.

The registering or recording mechanism comprises two inscribing-styles placed before a sheet of paper operated by the movement of the vehicle in such a manner as to unwind proportionally to the space traversed. This sheet bears two diagrams, one indicating the speed in kilometers to the hour, the other indicating the division of a fraction of the determined time—for example, fifteen minutes. One of these styles 3 operates for the inscription of the speed. It is integral with a rack 4, taking into pinion 5, fast on the shaft of

the finger *v*. The other style 2 effects on a portion of the band of paper the inscription of time. It is integral with the lever 9, controlled by a cam connected with the clock-work-movement, and at definite intervals it traverses the portion of the band on which has been inscribed the time and returns rapidly to its normal position when the width has been traversed.

10 Operation: The clock measuring the time gives to the shaft *b* and its cams *q r u v* a regular movement, and these operate, therefore, at regular intervals on their levers and respective pawls *s t p z*. On the other hand,

15 the shaft *g*, revolving in proportion to the speed to be measured, acts by its cam *j* on the pawl *l*, operating the ratchet *h*; but this pawl *l* cannot operate on the ratchet during the equal and regular periods determined by

20 the clock, for it is dependent on the levers *s* and *t*, actuated periodically by the cams *q* and *r* of the shaft *b*. At the beginning of the measuring period the lever *s* permits the pawl *l* to fall on the ratchet *h*, and at the

25 end of this period the lever *s* disengages it. The position of the cams *q* and *r* on the arbor *b* is determined to this end. The duration of the measuring period can be any desired; but it is preferable that it be as short as possible. In practice I have adopted the

30 fifth of a second. During this period the pawl *l*, controlled by its cam *j*, acts on the ratchet *h*, which turns more or less according to the speed of the shaft *g*, carrying the cam *j*. This degree of rotation represents the value of the speed in the unit of time under consideration. The ratchet *h* is maintained by the retaining-pawl *q* in position where it has been brought by the pawl *l*,

40 which when the measuring period is finished is raised by the lever *t*. The pawl *p* is then raised, liberating the ratchet *h*, which is brought to its starting-point by the spring *m*. During this time the ratchet *d* has been maintained immovable by its pawl *z*. As the

45 measuring period comes to an end, but before the retaining-pawl *p* is freed, the pawl *z* liberates the ratchet-wheel *d*, which is brought back by its spring to cause its pin *y* to abut

50 upon the pin *o* of the ratchet *h*. Directly after this the pawl *z* again secures the ratchet *d*. This then has taken a position corresponding to that which the ratchet *h* had assumed in the chosen unit of time just passed. As

55 soon as the ratchet *d* is again secured the pawl *p* liberates the ratchet *h*, loose on its shaft, which by its spring *m* returns to its starting-point, the pawl *l* having been raised. This pawl *l* is then returned to working position to act on the ratchet *h* during a new period of measurement, during which the ratchet

60 *d* will maintain its position and indicate the speed during the past measuring period and will maintain it until a second period has

65 been completed, and so on. The finger *v*

takes, therefore, a position representative of the speed corresponding to that of the ratchet *d*, and this position is changed at each fifth of a second by following exactly the variations of the ratchet *h*. It is obvious that if the speed be greater than the preceding period the pins of the wheels will abut, so that wheel *d* will be moved forward against its pawl *z* by the wheel *h*. The band of paper is operated by a suitable mechanism connected with the movement of the vehicle and is unwound proportionally to the distance traversed. It carries two graduations, one in kilometers to the hour and the other representing a predetermined period of time—fifteen minutes, for example. On this the style 2, controlled periodically by the cam 8, inscribes an outline, which style at regular intervals of time returns rapidly to the starting-point. On the kilometric graduation the style 3, which is connected to the finger *v*, inscribes a continuous outline, which represents graphically the speed.

I claim as my invention—

1. The herein-described mechanism for measuring and recording the speed of vehicles, comprising a shaft *g*, a cam-shaft *b* and a ratchet-wheel shaft 1, a ratchet *d* fast thereon and a ratchet-wheel *h* loose thereon, a pin on each wheel and springs to return them to normal position, an operating-pawl *l*, and holding-pawls *p* and *z*, cams on the shaft *b* to operate the holding-pawls and a cam on the shaft *g* to operate the pawl *l*, cam-and-lever means to regulate the action of the pawl *l* on its ratchet-wheel, said shaft *g* operated by the movement of the vehicle and shaft *b* by clock-work, all as and for the purpose described.

2. The herein-described mechanism for measuring and recording the speed of vehicles comprising a shaft *g*, a cam-shaft *b* and a ratchet-wheel shaft 1, a ratchet *d* fast thereon and a ratchet-wheel *h* loose thereon, a pin on each wheel and springs to return them to normal position, an operating-pawl *l*, and holding-pawls *p* and *z*, cams on the shaft *b* to operate the holding-pawls and a cam on the shaft *g* to operate the pawl *l*, cam-and-lever means to regulate the action of the pawl *l* on its ratchet-wheel, said shaft *g* operated by the movement of the vehicle and shaft *b* by clockwork, a pointer mechanism operated by the ratchet *d*, a strip of paper operated by the movement of the vehicle, a stylus to record thereon operated by the pointer-shaft and a second stylus operated by the clock-work, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

NICOLAS CHARLES EUGÈNE FLAMAN.

Witnesses:

GUSTAVE DUMONT,
EDWARD P. MACLEAN.