(No Model.) 2 Sheets—Sheet 1.

N. P. BOWSHER.

SPEED INDICATOR.

No. 260,156. Patented June 27, 1882.

Fig 1.

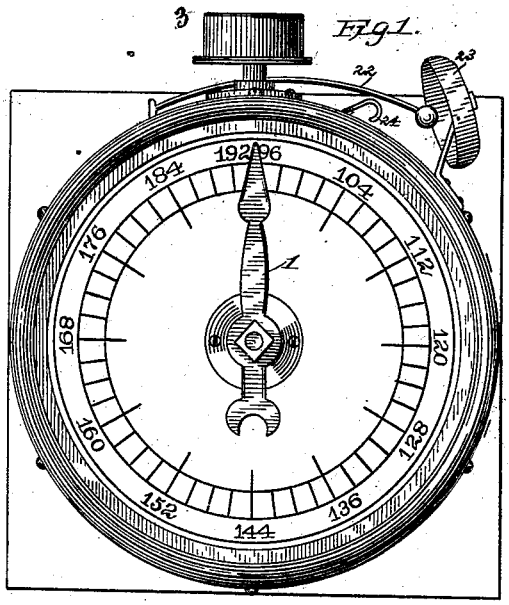
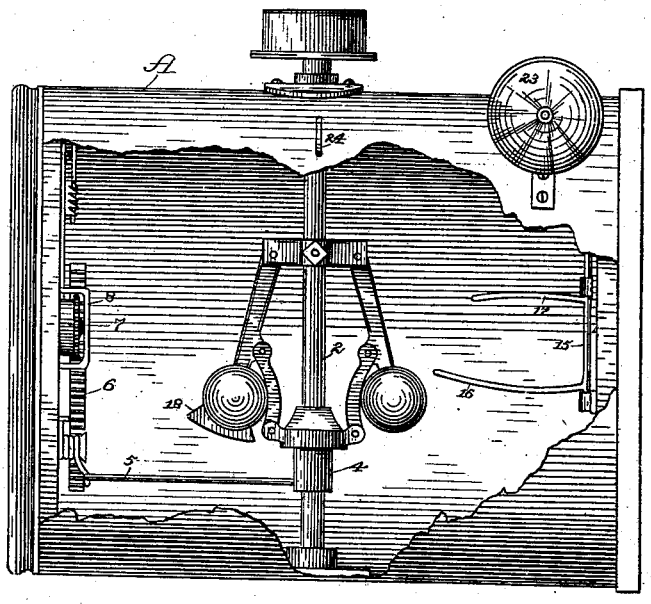


Fig 2.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

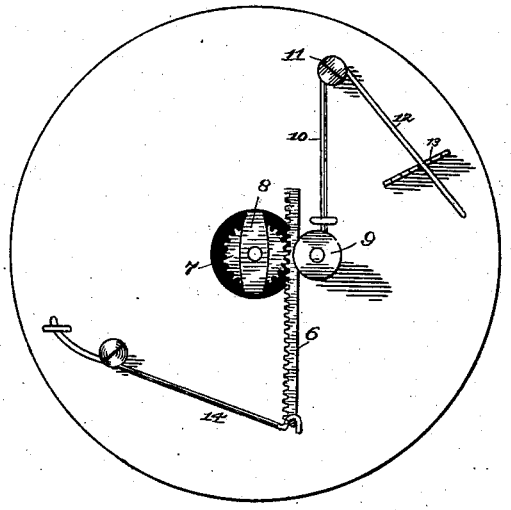
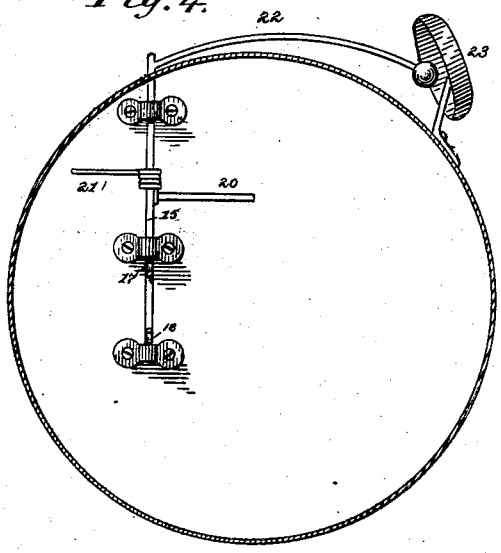


Fig. 4.



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UNITED STATES PATENT OFFICE.

NELSON P. BOWSHER, OF SOUTH BEND, INDIANA.

SPEED-INDICATOR.

SPECIFICATION forming part of Letters Patent No. 260,156, dated June 27, 1882.

Application filed January 18, 1882. (No model.)

To all whom it may concern:

Be it known that I, NELSON P. BOWSHER, of South Bend, in the county of St. Joseph and State of Indiana, have invented a new and useful Improvement in Speed-Indicators; and I do hereby declare that the following is a full, clear, and exact description of the same.

My invention is an improved dial motion-indicator and alarm combined with said motion-indicator. It is an improvement upon the apparatus shown in Letters Patent granted me by the United States on the 12th day of May, 1868, reissued on the 21st day of June, 1881.

My invention consists, first, in improved details in respect to the dial motion-indicator; and, second, in combining with a dial motion-indicator an audible alarm adapted to be sounded when any undesirable change occurs in the speed of the machinery. These improved details, together with the sounding mechanism, are described in connection with the old parts, and are particularly pointed out in the claims.

In the accompanying drawings, Figure 1 shows the face of the dial and represents a front elevation of the case. Fig. 2 shows a side elevation with the wall partly broken away to disclose the mechanism. Fig. 3 represents a transverse section, showing the end opposite the dial-face. Fig. 4 shows a transverse section representing the inner surface of the head which carries the dial-face.

In these drawings, A represents the case which contains the mechanism of the governor and the intermediate mechanism between the governor and the index-finger, as well as that which communicates motion to the hammer of the bell. It is desirable, on account of compactness and convenience in manufacture, to make this case cylindrical in form. In order to permit this I have specially arranged the parts of the governor and the connecting mechanism by means of which the governor communicates motion to the index-finger, as will be shown hereinafter. The face of the dial occupies the end of this cylindrical case, and the index-finger 1 is pivoted centrally thereon. I prefer to make the shell of tin; but any ordinary sheet metal or other thin material may be used for the purpose.

The governor-shaft 2 I place in a vertical plane running longitudinally through the center of the cylinder-case, the said shaft running in suitable bearings attached to the shell, in which bearings it revolves freely. A pulley, 3, on the outside serves for the belt-connection with the shafting. The arms and balls and sleeve 4, connected to the arms, are of ordinary construction, except in a particular hereinafter noted.

Motion is communicated from the sleeve 4 when it is raised by the spread of the balls, due to increased centrifugal force, by means of an arm, 5, connected directly to a rack-bar, 6, which bar moves near the inner surface of the front head of the cylinder and in a line parallel with the shaft. This rack-bar engages with a pinion, 7, fixed upon the shaft of the dial-finger, the rear end of which has its bearings in a small bracket, 8. A flanged pressure-roller, 9, bears against the back of the rack-bar and holds it in connection with the pinion. This pressure-roller is held to the rack-bar by means of a spring, 10, pivoted upon a pin, 11, and adjustable in tension so as to make the finger more or less sensitive, as desired, by means of an arm, 12, the end of which rests in the teeth of a rack, 13. The rack-bar is held down by means of a spring, 14, fixed to the inner face of the head, its free end being hooked over the rod which connects the sleeve 4 to the rack-bar. This spring 14, by reason of its constant downward pressure, serves to correct any wear or looseness in the fit of the sleeve 4 on the shaft, and, with its hooked end, serves as a guide to the lower end of the rack-bar, thus insuring a comparatively vertical motion of the same. The parts are so adjusted that when the rack-bar is down to its lowest limit—that is to say, the lowest limit permitted it by the sleeve 4—the index-finger will be at its starting point, which is in this instance, at 96.

It will be understood that as the sleeve 4 rises, as it must upon any increase in the speed of the shaft over a given limit, it carries up the rack-bar and turns the index-finger with its shaft in exact proportion to the rise of the said sleeve. The index-finger, moving over the figures properly placed upon the face of the dial, shows the number of revolutions per minute at any given time. The rack-bar gives a positive movement by simple mechanism, and as the parts are arranged is easily connected to the sleeve and gives the balls space to move within the cylindrical case.

I now proceed to describe the apparatus by means of which increase in speed of the shaft beyond a given limit or change in speed in either direction from a given rate will sound the alarm.

Upon the inner face of the rear head I place a small vertical shaft, 15, pivoted upon the said head and provided with arms 16 17, which project into the paths through which a wing, 18, on one of the balls may move when the balls are traveling at certain rates of speed. The arm 16 is the lower, and will be struck by the wing on the ball when the ball and its shaft are moving at a certain rate. The distance between the lower arm, 16, and the upper arm, 17, is such that the wing upon the ball may pass between without striking either. It will therefore be apparent that these arms may be so set that the balls may revolve between without striking either, while any variation, either by increase or diminution of speed will cause the wing to strike one or the other of the arms.

The arms are held in the path of the wing by means of a spring, 20, and the arm 21, the spring being on the side toward which the balls are moving, it being understood that the balls move against the sun. The wing is on one ball only, since if it were on both it would strike the arms in such quick succession as not to give the hammer sufficient time to strike a distinct blow. The shaft 15 projects through the shell, and is provided with an arm, 22, on the end of which is a hammer adapted to strike a bell, 23. The arms 16 17 are made of wire, and may be bent up or down, according to the rate of speed required. A hook, 24, is provided, by means of which the hammer-arm may be held out of connection with the bell.

It will be seen that when in use, if the balls rotate at such a speed as to cause them to come in contact with the arms 16 or 17, these arms will be forced back out of the path of the ball, and by reason of this the shaft 15 will be made to partially rotate, and that the arm 22 and the hammer will be thrown back. Now, when the balls pass beyond the reach of these arms, the spring 20, by reason of its tension, will cause the shaft 15 to suddenly move back to its original position, thus causing the hammer to strike the bell. The arm 21 serves as a stop for the shaft 15, and should be so adjusted as to cause the hammer to be slightly removed from the bell when at rest.

It will be observed that the balls are so arranged upon the vertical shaft that when spread they move about midway of the cylinder, and therefore in its widest part, and the other parts of the mechanism are arranged in relation to the cylindrical case so as to be adapted to its form. The cylindrical case, being made of sheet metal or like material, can be readily bent into form and firmly secured at one end to the head which carries the dial-face, and at the other to a head by means of which it is fixed in place.

It will also be seen that without departing from the spirit of this part of my invention I may dispense with the arms 16 and 17, and have but one arm projecting from the shaft 15, and divide the wing upon the ball; or I may use a section of a wing upon the upper side of one ball and a like section upon the lower side of the other, accomplishing the same object in each case.

A sliding door may be fitted in the side of the case, so that access may be had to the parts for oiling.

I prefer to make the heads of wood for cheapness and convenience.

The indicator should be located so as to be conspicuous from all parts of the floor. If run in connection with water-power, it should be so located as to be visible from the gate-wheel, and if in connection with millstones, so as to be seen from the lighter-screws also.

In order to avoid trembling, the bearing of the shaft to which the indicator is connected should be tight, and if the shaft is weak the indicator should be belted thereto as near as possible to the bearing.

When a driving-pulley is necessary it should be trued off after being secured to the shaft, as every vibration of the shaft or irregularity of the belt will be communicated to the index-finger.

It is obvious that the mechanism for moving the sleeve 4 or the rack-bar may be varied and other means substituted for striking the arms 16 17 without departing from the spirit of my invention.

Having thus described my invention, what I claim is—

1. The described indicator, consisting of a cylindrical case having a dial-plate and index-finger upon one head, a vertical shaft set centrally in bearings in said shell, the ball-governor and sleeve of said shaft, and intermediate connections, as described, between the sleeve and the index-finger, and the bell-sounding mechanism, adapted to be operated by the revolution of the balls to the side of the governor, the said balls being arranged upon the shaft so as to move when spread in the widest part of the case, all substantially as described.

2. In combination with the sleeve 4 of the governor, the rack-bar and the arm connecting said rack-bar to the sleeve, the spring for holding down said arm and bar, and the pinion upon the shaft of the index-finger, all substantially as described.

3. The combination of an indicator or dial-finger connected by suitable intermediate mechanism with a revolving shaft and adapted to show upon the dial-face the speed of said shaft, with a sounder adapted to be operated by centrifugally-moving arms adapted to come in contact with the sounding mechanism when exceeding certain limits of motion, substantially as described.

4. In combination with the shaft, the arms and balls, the arms 16 17, connected, as de-

scribed, to the hammer which strikes the bell, whereby any variation from a given rate is made to give an alarm, substantially as described.

5. The combination of the shaft 15, the arms 16 and 17, and the wing upon the ball, said arms being arranged to permit the ball to pass between them, whereby any variation of speed, either of increase or diminution, will cause the alarm to be sounded, substantially as described.

6. In a dial speed-indicator, the combination of a dial-plate, an index-hand, a governor connected to such index-hand by mechanism substantially as described, and a sounder or alarm operated by such governor when its speed is increased or diminished to a certain extent.

7. In combination with a dial speed-indicator, the rack-bar 6, the pinion 7, the spring 10, and the adjustable pressure-roller, and the spring or arm 12, substantially as described.

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

NELSON P. BOWSHER.

Witnesses:
JOE KAHN,
GEO. PFLEGER.