

(No Model.)

3 Sheets—Sheet 1.

F. HART.
PRESSURE GAGE.

No. 564,957.

Patented July 28, 1896.

Fig. 2.

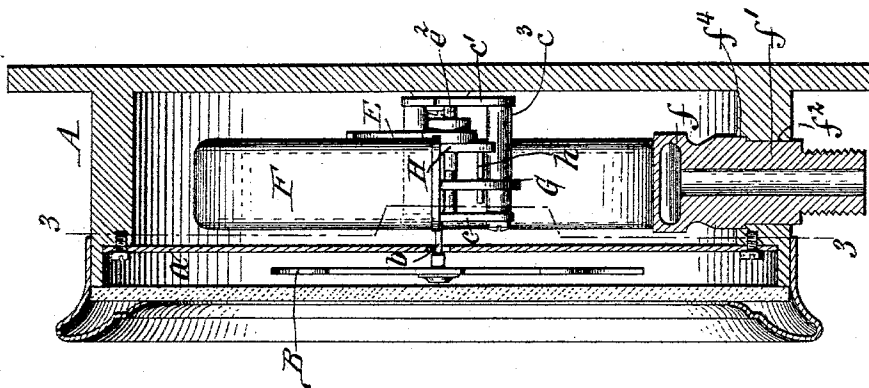
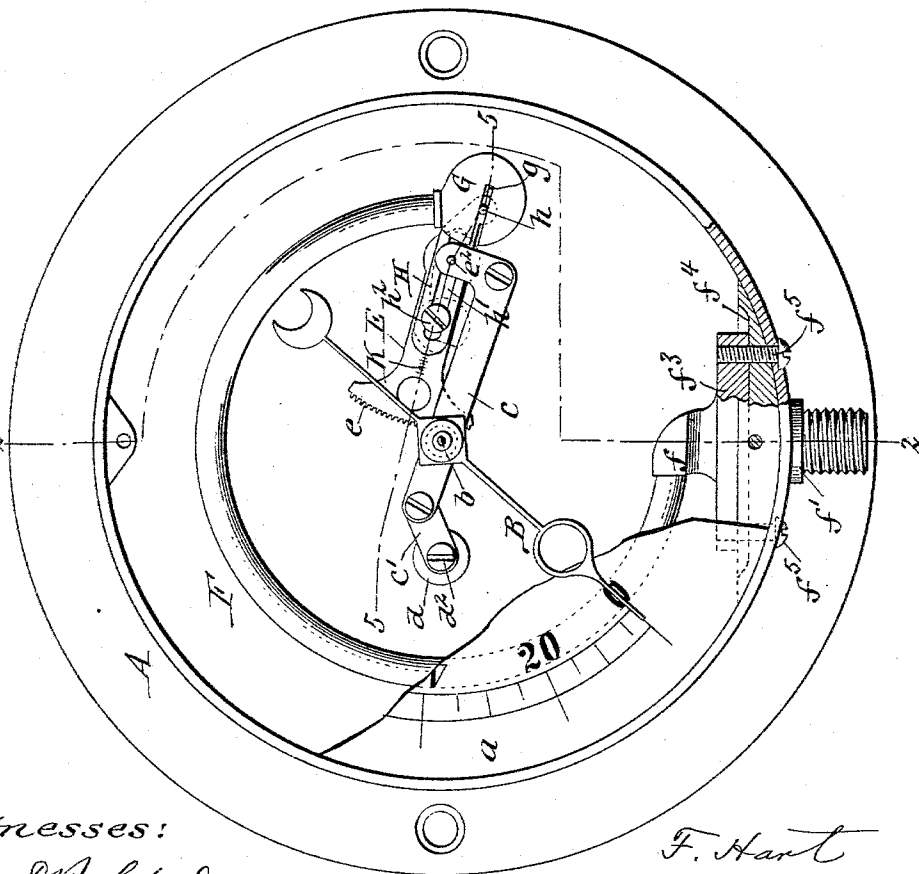


Fig. 1.



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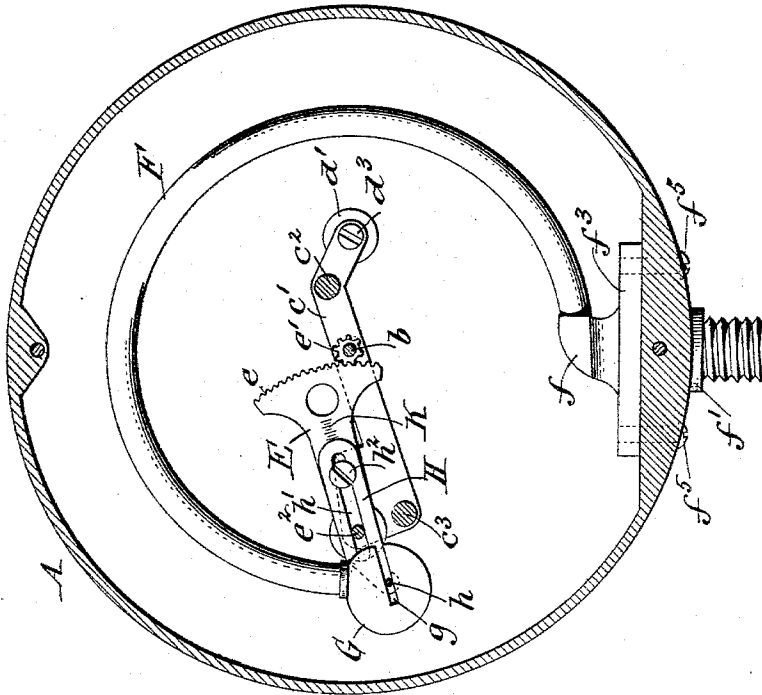
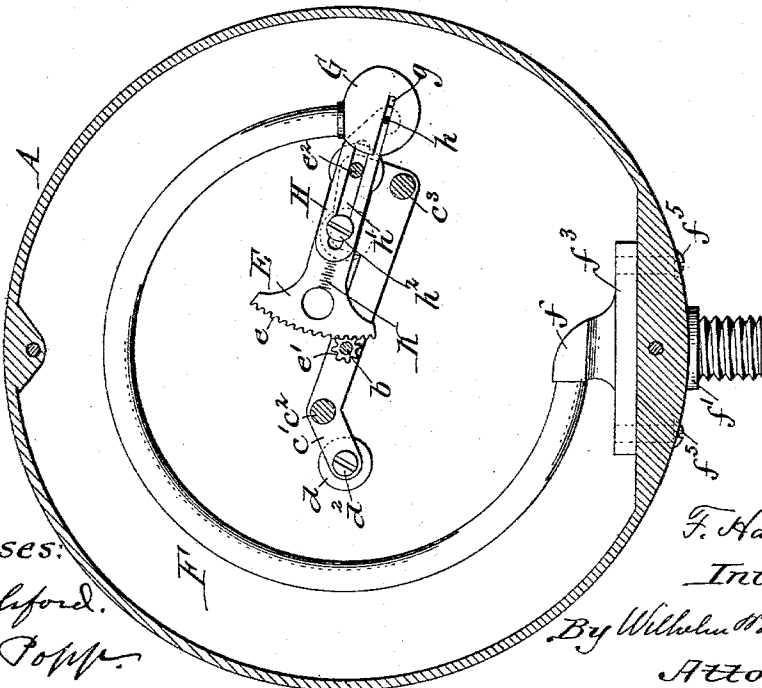


Fig. 3.



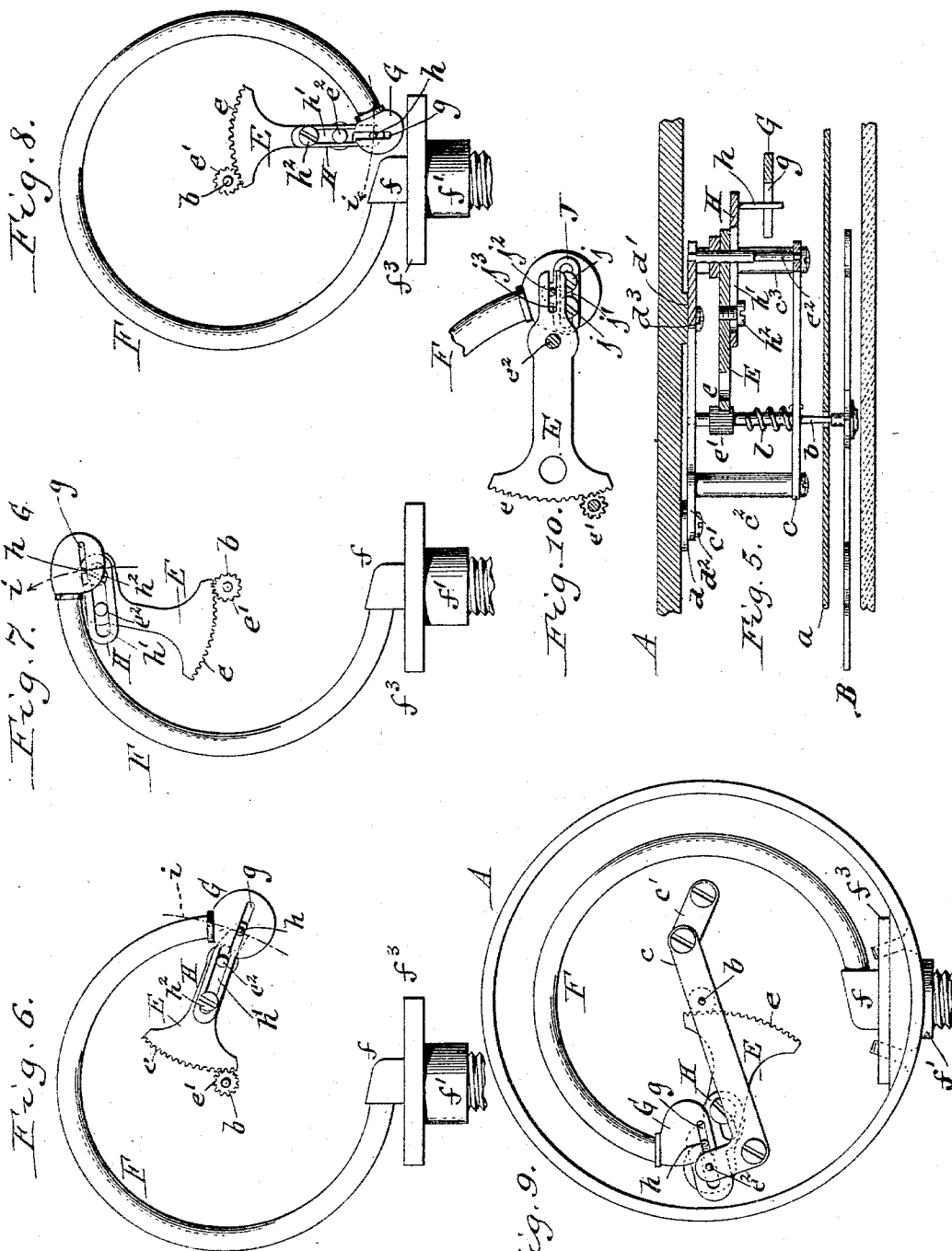
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Fig. 9.
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UNITED STATES PATENT OFFICE.

FREDERICK HART, OF POUGHKEEPSIE, NEW YORK, ASSIGNOR TO ELLEN MARIA HART, OF SAME PLACE.

PRESSURE-GAGE.

SPECIFICATION forming part of Letters Patent No. 564,957, dated July 28, 1896.

Application filed March 24, 1896. Serial No. 584,619. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK HART, a subject of the Queen of Great Britain, residing at Poughkeepsie, in the county of Dutchess and State of New York, have invented new and useful Improvements in Gages, of which the following is a specification.

This invention relates to that class of gages which are commonly known as "Bourdon gages," and in which the movement for shifting the hand or pointer is produced by a hollow crescent-shaped spring, which is expanded by forcing the fluid into the same or contracted by exhausting the fluid therefrom.

The objects of my invention are the production of a gage of this character in which the same parts can be assembled in two different ways to form either a pressure or a vacuum gage; also to simplify the construction of the parts; also to enable the parts to be easily and readily adjusted and to prevent binding, so that the parts will work freely.

In the accompanying drawings, consisting of three sheets, Figure 1 is a front elevation of a pressure-gage provided with my improvements, the greater portion of the dial being broken away. Fig. 2 is a vertical transverse section in line 2 2, Fig. 1. Fig. 3 is a vertical diametrical section in line 3 3, Fig. 2. Fig. 4 is a similar view showing the operating parts reversed for producing a vacuum-gage. Fig. 5 is a fragmentary horizontal section in line 5 5, Fig. 1. Figs. 6, 7, and 8 are fragmentary views showing different forms of gage-springs and the relative position of the mechanism whereby the movement of the spring is transmitted to the hand or pointer which traverses the dial. Fig. 9 is a fragmentary front elevation showing a slightly-different arrangement of the parts for producing a pressure-gage embodying my invention. Fig. 10 is a fragmentary view showing a modification of the means for connecting the gage-spring and sector.

Like letters of reference refer to like parts in the several figures.

In Figs. 1, 2, 3, 4, and 5, which show my improvements applied to a pressure-gage, A represents the usual cylindrical case of the

gage provided on its front side with a circular dial *a*.

B is the hand or pointer, which traverses the graduations of the dial and which is mounted on the front end of a spindle *b*, arranged centrally in the case. This spindle projects with its outer end through a central opening in the dial and is journaled with its inner portion in the front and rear angular bars *c c'*. These bars are connected by transverse posts *c² c³*, forming together a frame in which the movement or transmitting mechanism of the gage is mounted. The rear bar of this frame is secured to seats *d d'* on the inner side of the back of the case by screws *d² d³*.

E represents the sector arranged on the right-hand side of the pointer-spindle and provided on its inner end with a gear-segment *e*, which meshes with a pinion *e'* on the spindle. This sector is mounted with its outer end on a staff *e²*, which is journaled in the front and rear bars of the frame parallel with the spindle *b*.

F represents the hollow gage-spring of crescent form, which is expanded by an internal pressure applied to the same and whereby the sector is oscillated for shifting the pointer on the dial. This spring is arranged in the case with its free end on the right-hand side. The lower fixed or inlet end of the spring is secured to a socket *f*, which is provided on its under side with an inlet-nipple *f'*. The latter projects downwardly through an opening *f²*, formed centrally in the lower portion of the case.

f³ is a horizontal fastening plate or flange formed on the socket and fitting snugly into a transverse groove *f⁴*, which is formed in the straight upper face of the lower portion of the case. The socket is held in place by screws *f⁵*, passing through the fastening plate or flange of the socket into the case.

G represents a bearing-head secured to the free or movable end of the gage-spring and provided with a slot *g*.

H represents a slide whereby the gage-spring is adjustably connected with the sector. This slide is provided at its outer end with a pin *h*, arranged parallel with the staff of the sector and engaging in the slot in the

spring-head. The inner portion of the slide is provided with a slot h' , through which the sector-staff passes, and is secured to the sector by an adjusting-screw h^2 , arranged in the slot of the slide. Upon admitting a liquid or gas under pressure into the gage-spring the latter expands and its free end moves away from its fixed end, which movement is transmitted by the slide and sector to the pointer. By adjusting the slide lengthwise on the sector its pin may be shifted in the slot of the spring-head for producing the proper relative movement of the gage-spring and pointer. This pin-and-slot connection between the slide and the gage-spring permits the position of the free end of the spring to vary considerably without affecting the slide, that is to say, the slotted head at the free end of the spring can stand nearer to or farther from the front of the case without binding on the slide, and it can also stand at a slight angle to the plane of the sector without binding. Furthermore, this connection permits the gage-spring or the movement to be removed from the case without one disturbing the other.

The slot in the head of the spring is preferably arranged parallel with the path of the sector-slide when the gage is at that point at which it is desirable that the pointer shall not move when the slide is adjusted in or out. Usually this point is the zero-point at one end of the graduation of the scale, but it may be in the middle of the graduation where the zero-point is located in a compound pressure and vacuum gage. This arrangement of the slots in the slide and spring-head permits of adjusting the connection between the spring and sector for producing the proper throw of the pointer without disturbing the initial position of the spring and pointer. This arrangement of the slot in the spring-head also reduces the lengthwise movement of the slide-pin in the slot of the spring-head to a minimum as the latter shifts its position in moving with the spring, thereby avoiding undue wear of these parts, and it also produces a practically uniform movement of the sector and pointer, thereby permitting of substantially uniform graduations on the dial. In Figs. 6, 7, and 8 this pin-and-slot connection between the sector and spring is shown applied to different forms of springs. Fig. 6 shows a spring which forms about three-fourths of a circle, like that shown in Figs. 1 and 3, and the sector is arranged on the right-hand side of the pointer-spindle. Fig. 7 shows a spring forming about one-half of a circle and the sector arranged above the pointer-spindle. Fig. 8 shows a spring forming nearly a complete circle and the sector arranged below the pointer-spindle.

If desired, a slide J may be adjustably secured to the spring-head by screws j , passing through a slot j' in the slide and provided with a pin j^2 , which engages with a slot j^3 in the sector, as shown in Fig. 10, this construc-

tion being merely a reversal of that shown in the first-described construction.

In the several constructions of gages heretofore described the gage-spring is connected with the sector outside of the sector-staff. If desired, the spring may be connected with the sector between the pointer-spindle and sector-staff, which necessitates reversing the movement and spring, as shown in Fig. 9, in order to move the pointer in the proper direction if the gage is put up for indicating pressure. In most gages of this type as heretofore constructed the slide on the sector was connected with the gage-spring by a link. This construction is objectionable in several respects. For instance, the relative movement of the spring and sector having such a connection is not uniform and requires an irregularly-graduated scale. It is impossible to retain the pointer at zero or any other fixed point while shifting the slide for adjusting the connection between the sector and spring, and when this adjustment is considerable a shorter or longer link has to be substituted in order to permit the parts to remain in their proper positions. If the head of the spring and the sector-slide are not perfectly in line, the link must be bent for adjusting it to these parts.

K represents graduations, which are arranged in a radial row on the sector and which enable the slide to be readily adjusted on the sector for securing the proper throw of the pointer.

When it is desired to construct a vacuum-gage from the same parts which constitute a pressure-gage, as shown in Fig. 3, these parts are reversed, so that the open portion of the spring and the movement are on the left-hand side of the case, as shown in Fig. 4, thereby bringing the parts in the proper position for moving the pointer in the same direction when the spring is contracted by exhaustion as when the spring is expanded by pressure in a pressure-gage. In order to permit of this reversal without requiring any change in the number or formation of the parts, the screws whereby the movement-frame and the socket are fastened to the case are arranged symmetrically. For instance, the socket-fastening screws may be arranged equidistant on opposite sides of the central inlet-nipple, while the frame-screws may be arranged equidistant on diametrically opposite sides of the pointer-spindle and on a line arranged at right angles to a line drawn centrally through the nipple of the socket and the pointer-spindle, as shown in Figs. 1, 3, 4, and 9.

The slot in which the pin engages moves the pin positively in either direction, but as an equivalent of one side of the slot a return-spring l , Fig. 5, may be connected with the pointer-spindle in a well-known manner, in which case one side or face of the slot may be omitted.

The lower face and the sides of the fastening-plate of the socket, the groove in the case

which receives this plate, and the seats on the back of the case against which the movement-frame is fastened are milled perfectly true, so that when these parts are fastened they
5 are in their proper relative position and require no further adjustment.

I claim as my invention—

1. In a gage, the combination with the gage-spring and the sector, of a head secured to
10 the spring and provided with a slot, and a slide mounted on the sector and provided with a pin engaging with said slot, substantially as set forth.

2. In a gage, the combination with the sec-
15 tor and the gage-spring provided at its mov-

able free end with a slotted head, of a slotted slide arranged on the sector and provided with a pin engaging with the slot in said head, and a fastening-screw arranged in the slot of the slide and securing the slide to the sector, 20 the slots in said head and slide being arranged in line or parallel to one another and substantially at right angles to the path of the head, substantially as set forth.

Witness my hand this 10th day of March, 25 1896.

FREDERICK HART.

Witnesses:

E. M. MEEKS,
CLARENCE SAGUE.