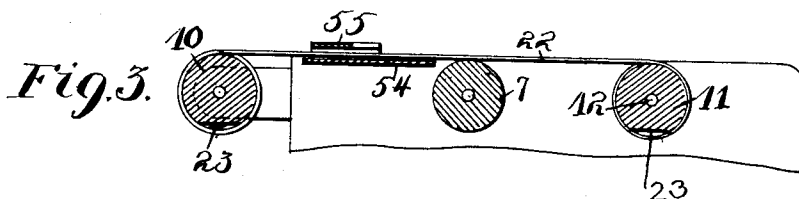
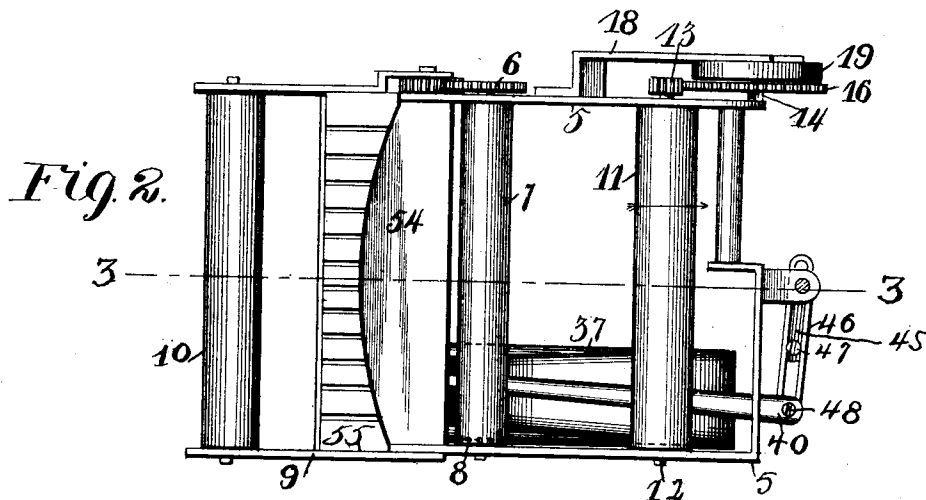
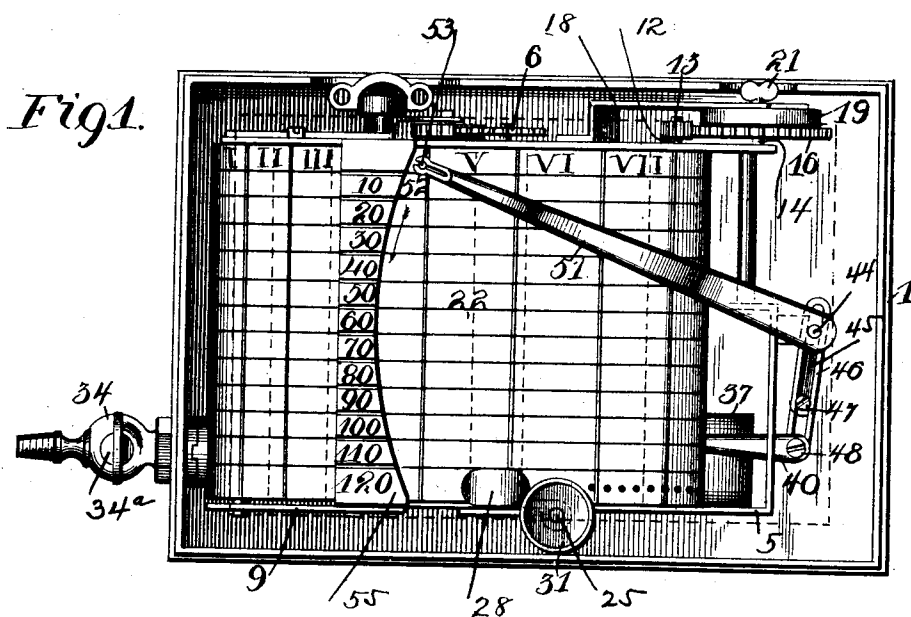


3 Sheets—Sheet 1.

PRESSURE RECORDER FOR AIR BRAKES, &c.

Patented Oct. 18, 1892.



Witnesses
W. G. Gallot.
a. a. Eicks

Inventor
W. F. DeForest.
 By *his* Attorneys *Higdon & Higdon Longan*

(No Model.)

3 Sheets—Sheet 2.

W. F. DE FOREST.

PRESSURE RECORDER FOR AIR BRAKES, &c.

No. 484,411.

Patented Oct. 18, 1892.

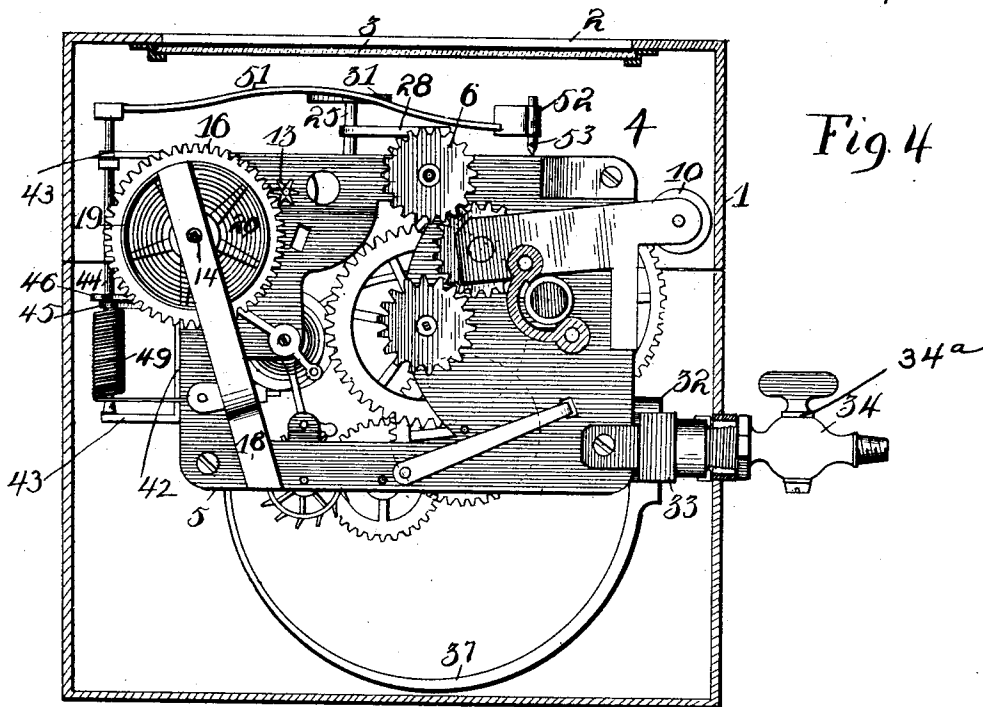
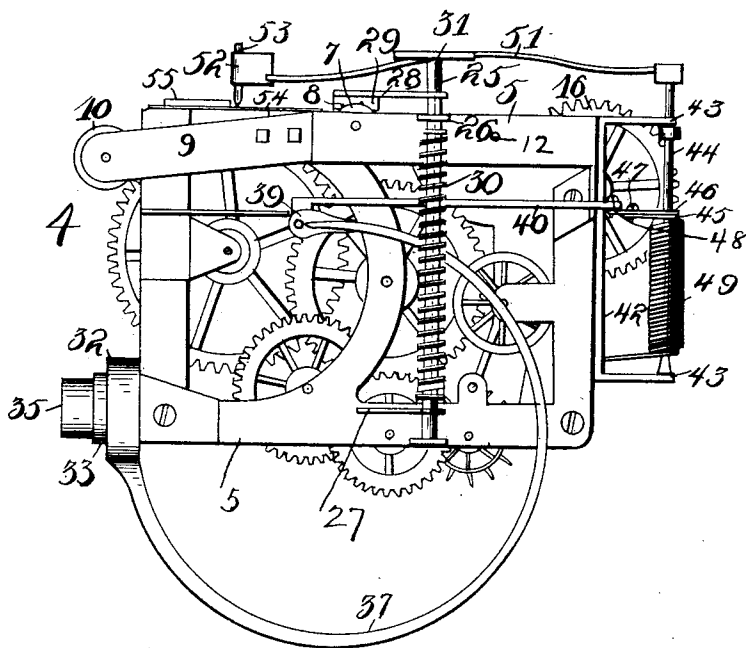


Fig. 4

Fig. 5



Witnesses
a. a. Eickes
L. P. Follert.

Inventor
W. F. De Forest
By his Attorneys Higdon & Higdon

(No Model.)

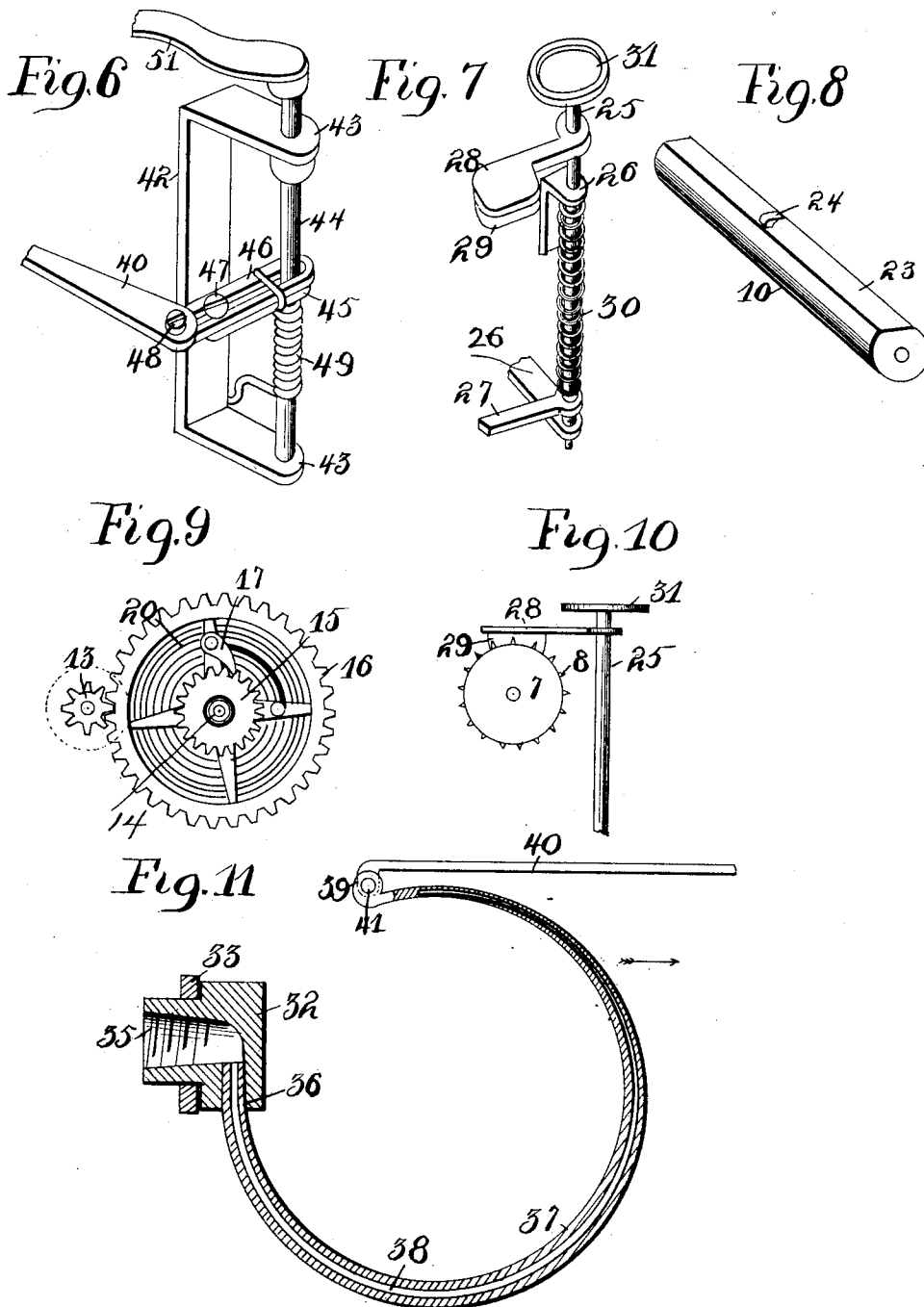
3 Sheets—Sheet 3.

W. F. DE FOREST.

PRESSURE RECORDER FOR AIR BRAKES, &c.

No. 484,411.

Patented Oct. 18, 1892.



Witnesses
A. A. Eicks
O. S. Keller.

Inventor
W. F. DeForest
By his Attorneys Higdon, Higdon & Longan

UNITED STATES PATENT OFFICE.

WYATTE F. DE FOREST, OF ST. LOUIS, MISSOURI.

PRESSURE-RECORDER FOR AIR-BRAKES, &c.

SPECIFICATION forming part of Letters Patent No. 484,411, dated October 18, 1892.

Application filed February 24, 1892. Serial No. 422,623. (No model.)

To all whom it may concern:

Be it known that I, WYATTE F. DE FOREST, of the city of St. Louis, State of Missouri, have invented certain new and useful Improvements in Pressure-Recorders, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My invention relates to improvements in pressure-recorders; and it consists in the novel arrangement and combination of parts, as will be more fully hereinafter described, and designated in the claims.

In the drawings, Figure 1 is a top plan view of my complete invention and, as shown, is located in a box constructed for its reception. Fig. 2 is a top plan view of the upper portion of my invention, showing more particularly the frame and the rollers mounted thereupon which the record-sheet employed is rolled and fed when the machine is in operation. Fig. 3 is a vertical longitudinal section of the invention, taken on line 3 3 of Fig. 1, showing the location and arrangement of the rollers and the record-sheet in position upon the same. Fig. 4 is a side elevation of my complete invention as located in a box for receiving the same, the said box being in section. Fig. 5 is also a side elevation of my invention from the opposite side of the same. Fig. 6 is a perspective view showing the mechanism for operating the pencil or marker. Fig. 7 is a perspective view of the device employed in connection with the feed-roller for holding the record-sheet against the said roller. Fig. 8 is a perspective view of one of the rollers upon which a record-sheet is wound, showing more clearly the construction of the same and the means for holding said sheet to the said roller. Fig. 9 is a side elevation of the gearing which is in connection with one of the rollers for removing all slack from the record-sheet. Fig. 10 is a detail view showing one end of the feed-roller and the device for holding the record-sheet against the said roller in connection with the same, and Fig. 11 is a vertical longitudinal section of the spring which is adapted to be actuated by the pressure of the air adapted to be passed into the same.

The invention that I am about to describe is adapted to be used more especially in con-

nection with the air supplied for setting the brakes on railway-cars, but can also be used with like results for indicating the pressure of steam, water, &c.

The object of my invention is to construct a recorder that will give the exact pressure of the air that is carried at all times upon the train, recording the amount of air so carried; also, the amount of air discharged out of the drain-pipe in setting the brakes.

By the employment of suitable clock-gearing it can be ascertained at a glance at what time of day air was applied to the brakes and the various pressures of air at various times.

The device can be constructed to run any required length of time and can be put on any car of the train, and by a glance at the record-sheet the above-stated information can quickly be ascertained.

There are many other advantages that could be claimed for its use in connection with railway-trains; but it is deemed not necessary.

Referring to the drawings, 1 represents a box or casing, the size of which depends upon the size of the machine, and is adapted to receive the device hereinafter described and protecting the same from injury, as well as from dust and other accumulations. Said box is constructed of two parts and the same united in any mechanical manner, the top of which is provided with an opening 2, and said opening closed or covered by a suitable glass 3, exposing to view the record-sheet carried by the device located in the box.

In order that the device that I am about to describe may be fully understood, I shall first describe the construction and operation of the gearing which I employ for imparting motion to the roller for feeding the record-sheet under the marker.

In order to reduce the perplexity of the device in the description thereof, it would be well to state that I employ the ordinary clock-gearing for imparting the proper rotation to the feed-roller. 4 represents the clock-gearing, which, as stated, is of the ordinary construction, having a frame 5 for supporting and forming bearings for the various movable parts composing said clockwork. 6 represents a gear-wheel, which is in connection with the gearing of the clockwork and is adapted to be rotated by the same, rotating in its turn

the feed-roller 7, which has its bearings loosely mounted in the frame of the machine and is keyed against rotation independent of said gear-wheel 6, the latter being carried by one of said bearings. 8 (see Figs. 2 and 10) represents a series of short pins, which are carried by and upon one end of the roller 7, opposite to the gear-wheel 6 and upon the peripheral surface of the same, which pins are adapted to take hold or pierce the record-sheet, and thereby feed the same when motion is imparted to the said rollers.

In practically constructing my invention it is readily observed that the record-sheet must be properly ruled in order to designate the hours properly by a certain movement or travel of the same.

To one side of the frame of the device, as better illustrated in Figs. 1, 2, and 5, is secured a spring 9, which is made of any suitable flat metal adapted for the purpose, the free end of which is adapted to press against the roller 10, making frictional contact with the same, and also forming a bearing for one end of the said roller. The opposite end of the roller 10 is mounted in the rigid frame, by which construction the record-sheet is held tight across the machine by the mechanism as hereinafter described and employed in connection with the said rollers. 11 represents a similar roller, which is loosely mounted in the opposite end of the frame, upon which the record-sheet is adapted to be wound after the same has passed under the marker. The shaft 12 for said roller projects a suitable distance beyond one side of the frame, and keyed to the same is a pinion 13, which is adapted to be rotated by the mechanism hereinafter described for imparting motion in the proper direction to the said roller 11.

14 represents a stud, which is loosely supported at one end in the frame and at the other end in the bracket 18, and is adapted to be rotated in the said supports, and keyed to the said stud is a small gear-wheel 15, as better illustrated in Fig. 9, and loosely mounted upon said stud adjacent to said gear-wheel is a large gear-wheel 16, the teeth of which mesh with the teeth formed on the pinion 13, carried by the shaft of roller 11, for imparting motion to the roller 11.

Upon the gear-wheel 16 is loosely mounted a spring-pawl 17, the engaging end of which is adapted to come in contact with the gear-wheel 15, so as to cause the wheel 16 and the gear 15 to rotate together in one direction, but permit the gear-wheel 16 to be rotated independent of the gear-wheel 15 in the other direction.

18 represents a bracket, which is secured to one side of the frame 5 and supports a suitable band or ring 19, and also forms a bearing for one end of the stud 14.

20 represents an ordinary clock-spring, one end of which is attached to the stud 14 and the opposite end attached to the band or ring 19, said spring being located within and is

incased by the said band 19, entirely protecting the same from any injury.

To one end of the stud 14 is attached a button 21, by means of which the same is turned in one direction, winding up the spring 20 in the well-known manner, after which the roller 11 is rotated in the direction as shown by the arrow in Fig. 2.

22 represents the record-sheet which I employ in carrying out my invention and which is better illustrated in Figs. 1 and 3 of the drawings. Said sheet is constructed of any suitable material; but by preference I employ paper which is more adapted to the purpose, and upon the surface thereof are ruled any number of lines—namely, longitudinal and transverse lines.

The longitudinal lines indicate the pressure by pounds, and the transverse lines the hours of the day.

The rollers 10 and 11 are each provided with cut-away portions 23, and said portions are provided with hooks 24, as better illustrated in Figs. 3 and 8, by means of which the record-sheet 22 is secured to the said rollers by passing the said hooks through the said sheet. One end of the record-sheet 22 is first fastened to the roller 10 and the same wound upon the said roller, and the opposite end attached to the roller 11, and the median portion of said sheet resting upon the feed-roller 7. The feed-roller 7 on being turned by the mechanism, as previously described, will cause the sheet 22 to be slowly moved from the roller 10, and all slack is simultaneously taken up by the roller 11 by means of the mechanism as previously described—namely the spring 20 and its connections.

To one side of the frame 5 is attached a vertical rod 25 in any mechanical manner, but in such a way that the said rod may be turned when desired. The location of the said rod and its attachments can be seen by referring to Fig. 5; but the construction of said rod and its parts is better illustrated in Fig. 7.

26 represent the plates with bearings formed in the same for the said rod, and to the said rod is rigidly attached an arm 27, which is adapted to come in contact with the frame and thereby limit the movement of the said rod. Near the upper end of the said rod is rigidly secured a second arm 28, and to the lower surface of said arm is fastened any suitable elastic material 29, such as rubber, which is adapted to be brought in contact with that end of the roller which is provided with the pins, the sheet 22 being interposed between the said elastic material 29 and the roller 7 for holding said sheet in contact with the said pins. 30 represents a coil-spring, which encircles the said rod 25 and is interposed between the arm 27 and the upper bearing 26, and its tension being exerted downwardly against the arm 27 the arm 28 is pressed in a downward direction and brought into contact with the sheet 22. To the upper end of

the said rod is secured a circular plate 31, which provides means for turning the said rod 25, and in consequence moves the elastic material 29 out of contact with the sheet 22, which operation is performed when it is desired to remove the old sheet and insert a new one in the machine.

Having given a general description of the mechanism used in connection with and for operating the record-sheet, I shall now proceed to describe the construction and operation of the devices which I employ for imparting motion to the pencil or marker for indicating the pressure of the air from the index-sheet.

32 represents a casting which is rigidly attached to the frame 5 by a plate 33 encircling the said casting or in any other suitable and mechanical manner. Screwed into the casting is a suitable casing 34, which provides means for attaching the device to the air-supply or air-exit, as may be desired, said casing being provided with a valve 34^a. The said casing 34 is screwed into an opening 35, formed in the said casting 32, and said opening is in communication with a second vertical opening 36.

37 represents a tapering Bourdon spring, which is circular in form and somewhat flattened in cross-section and is provided with an air-space 38, the construction of which can be better seen in Fig. 11. That end of the spring provided with an air-space 38 is in communication with the opening 35, formed in the casting 32, the said end of the spring being securely fastened in the vertical opening 36, also formed in said casting. The opposite end of the spring 37 is provided with ears 39, and to said ears is loosely secured an arm 40 by means of a suitable bolt 41.

42 represents a bracket provided with two horizontal bearings 43, within which an oscillating shaft 44 is mounted. Upon the said shaft 44 and between its bearings 43 is secured a plate 45, and located upon the latter is a slotted plate 46, the slot of which embraces the shaft 44. The plate 46 is adjustable upon the plate 45, and is locked against movement by the screw 47. The said arm 40 is movably secured to the said slotted plate 46 by means of a screw 48, thereby forming a movable connection between the spring 37 and the shaft 44 for the purpose of accurately adjusting the recording-arm.

In order to compel the marker-arm to always assume its normal position, I employ a coil-spring, such as 49, which encircles the shaft 44 below the plate 45, one arm of which bears against the plate 45 and the opposite end against the bracket 42.

The pencil or marker is carried by a spring-arm 51, one end of which is rigidly secured to the shaft 44, and is adapted to be turned by the same. To the opposite or free end of the spring-arm 51 is secured a clasp, such as 52, within which a suitable pencil 53 is adapted

to be inserted, said pencil being normally held in contact with the record-sheet by means of the spring-arm 51. The air on passing into the opening 35, formed in the casting 32, will pass into the air-space 38, formed in the spring 37 and the pressure of said air will cause the said spring to move more or less, according to the pressure of the air in the direction as shown by the arrow in Fig. 11, which in turn causes the pencil or marker to move upon the index-sheet 22 in the direction as shown by the arrow in Fig. 1, causing a mark to be made upon the said sheet while the same is being moved in a longitudinal direction by the mechanism heretofore described.

54 represents a plate which is secured transversely to the frame 5 of the device, as better illustrated in Figs. 2 and 3, upon which the record-sheet 22 also rests and provides a rigid surface for the pencil 53, and located above said plate is a second graduated plate 55, the upper surface of which is provided with numbers ranging from "10" to "120," indicating the number of pounds pressure the device is adapted to indicate. By means of this plate the recorder also serves to indicate the pressure at any given time.

The record-sheet when properly placed in the machine is interposed between the two plates 54 and 55 and is adapted to freely move between the same, said plates forming no obstruction whatever.

It will be understood from the foregoing description that when the device is properly set up and the same attached to the air-supply or air-exit the record-sheet and pencil or marker will be operated simultaneously, giving the number of pounds pressure and the time when said amount of air is applied to the brakes.

My invention may also be advantageously applied to the brake-cylinder, in order that it will give the exact pressure of air that is adjusted on the brake-piston, or in various other manners well known with like results. Having fully described my invention, what I claim is—

1. In a pressure-recorder, the combination, with the record-sheet-operating mechanism, of a curved actuating-spring, a spring-held oscillating rod carrying a recording-arm, a plate secured to said rod at right angles thereto, a second plate adjustable upon the first-mentioned plate and provided with a longitudinal slot receiving said rod, said plate being adapted to be bound to the first-mentioned plate, and a bar pivotally connecting the free end of the spring with the free end of the slotted plate, substantially as and for the purpose set forth.

2. In a pressure-recorder, the combination, with the record-sheet-operating mechanism, of a Bourdon spring, a spring-held oscillating rod carrying a recording-arm, a plate carried by said rod and adjustable laterally with relation thereto, and connection between the

free end of the Bourdon spring and said adjustable plate, substantially as and for the purpose set forth.

3. In a pressure-recorder, the combination, 5 with the record-sheet-carrying rollers, of an intermediate feed-roller and a longitudinally and laterally movable spring-held arm provided with a plate projecting at right angles thereto and over one end of the feed-roller, 10 said plate carrying a cushion upon its opposing surface, substantially as and for the purpose set forth.

4. A pressure-indicator consisting of a frame, clock-gearing carried by the same, a 15 feed-roller, such as 7, loosely mounted in said frame and provided with a gear-wheel 6, which gear-wheel is in connection with the said clock-gearing and adapted to be turned by the same, a roller, such as 10, loosely mounted in the 20 said frame, a roller 14, provided with a pinion 13 and adapted to be rotated in one direction only, a plate 54, carried by the said frame, upon which the record-sheet 22 is adapted to rest, a plate 55, located above said sheet, indicating the number of pounds pressure, a 25 spring 37, provided with an air-space 38 and adapted to be actuated by the pressure of air contained in said space, an arm 40, movably secured to the said spring, a shaft 44, movably 30 mounted or attached to the said frame and having an arm 45 attached to the same, a slotted plate, such as 46, movably secured to said plate 45, to which the said arm 40 is attached, a spring-arm 50, attached to the upper 35 end of the said shaft, a marker carried by the said arm and adapted to be brought in contact with the record-sheet, and a device located to one side of the machine and adapted to be brought in contact with the upper 40 surface of the record-sheet for holding the same against the feed-roller, whereby the same

is fed under the said marker, substantially as described.

5. A pressure-indicator consisting of a frame, clock-gearing carried by the same, a 45 feed-roller 7, adapted to be rotated by the said gearing, a record-sheet 22, adapted to be fed by the said roller, a roller 10, to which one end of the said sheet is attached, a second roller 11, to which the opposite end of the 50 said sheet is removably attached, a pinion 13, carried by the said roller, a gear-wheel 16, adapted to mesh with the said pinion, a spring 20 for actuating the said gear-wheel 16 in one direction only, hooks 24, attached to the said 55 rollers, providing means for attaching the said record-sheet to the same, pins, such as 8, carried by the said feed-roller, mechanism carried by the said frame and adapted to be brought in contact with the upper surface of 60 the said record-sheet, pressing the same against the said feed-roller, a spring 37, provided with air-space 38 and adapted to be actuated by the air contained in the same, an arm 40, attached to the said spring, an oscillating shaft 65 44, movably secured to the frame of the device, suitable connections between the said arm 40 and said shaft, a coil-spring 49, encircling said shaft and adapted to press against the connections between said arm 40 and the 70 shaft, and a spring-arm 50, attached to the upper end of the said shaft and carrying a suitable marker which is adapted to be brought in contact with the record-sheet, substantially as described. 75

In testimony whereof I affix my signature in presence of two witnesses.

WYATTE F. DE FOREST.

Witnesses:

C. K. JONES,
C. F. KELLER.