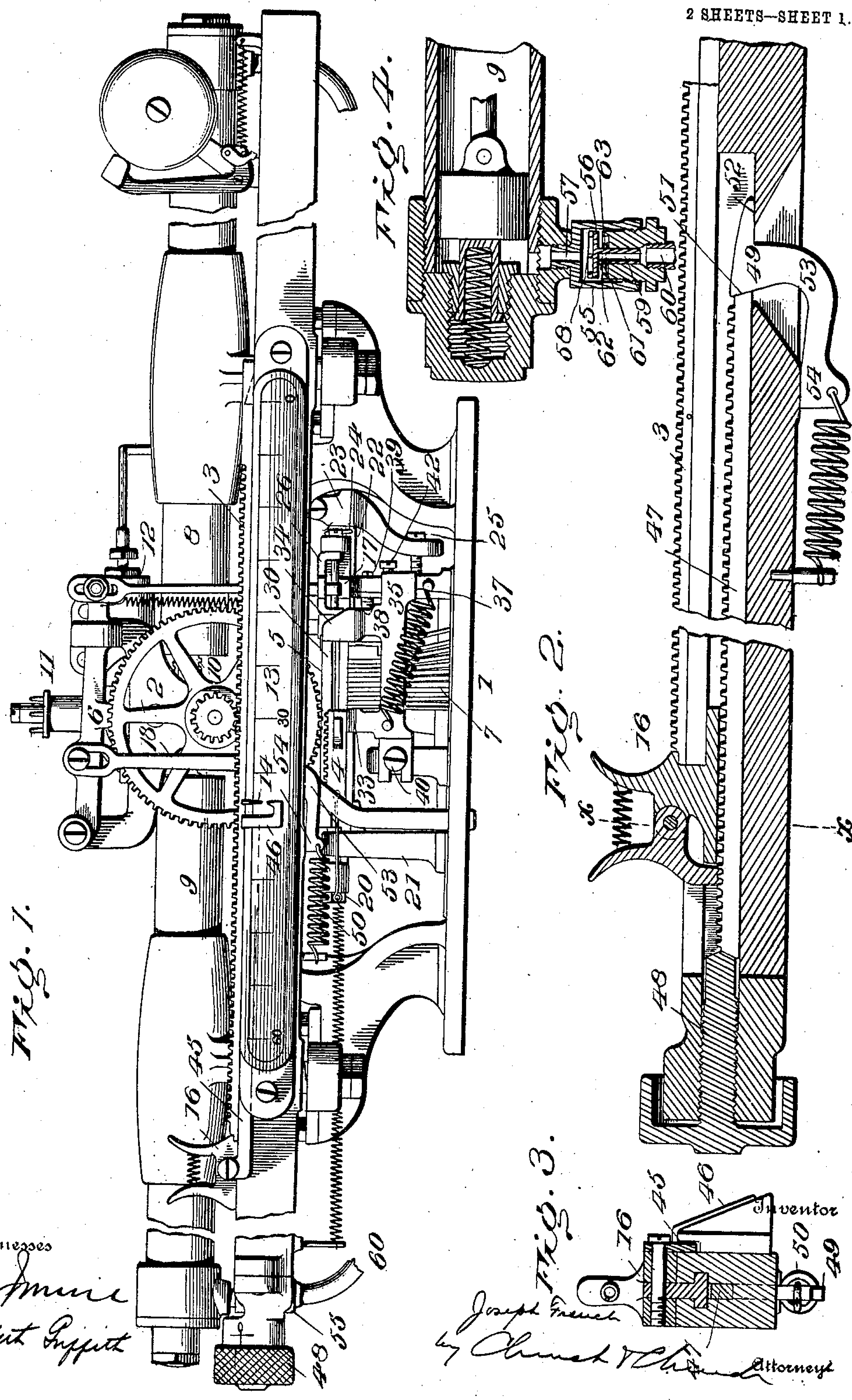
No. 828,470. PATENTED AUG. 14, 1906.

J. FRENCH.

LINE MEASURING MECHANISM FOR PERFORATORS.

APPLICATION FILED NOV. 2, 1903.

2 SHEETS—SHEET 1.



Witnesses

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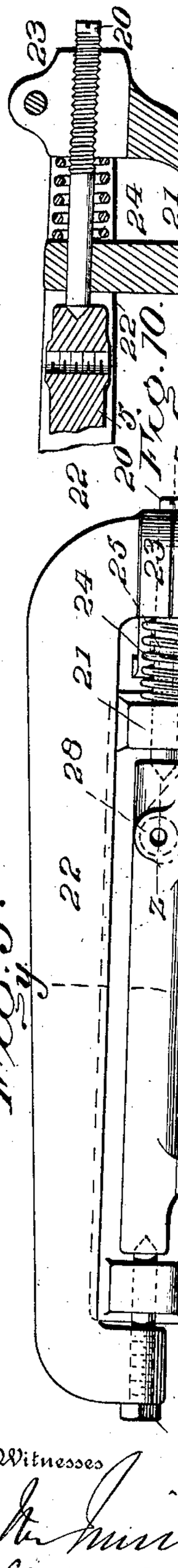

Fig. 10.

Fig. 8.

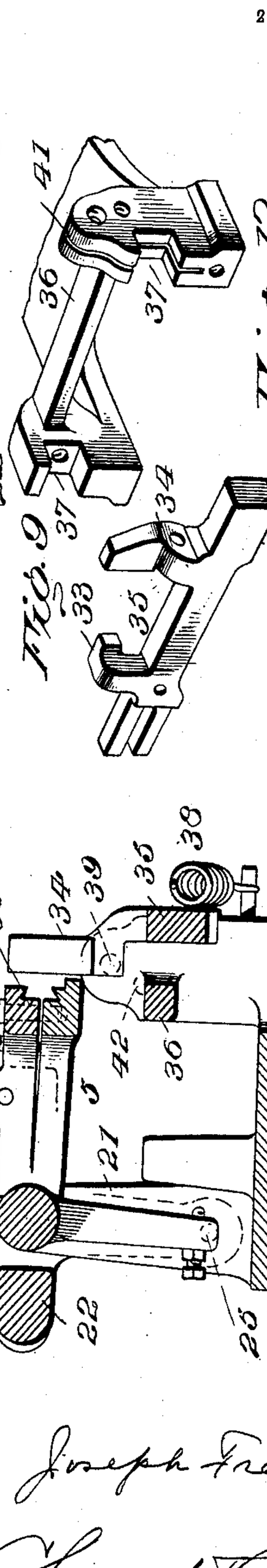

Fig. 9.

Fig. 12.

Fig. 5.

Fig. 11.

Fig. 6.

Fig. 7.

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LINE-MEASURING MECHANISM FOR PERFORATORS.

No. 828,470. Specification of Letters Patent. Patented Aug. 14, 1906.

Application filed November 2, 1903. Serial No. 179,583.

To all whom it may concern:

Be it known that I, JOSEPH FRENCH, of Woonsocket, county of Providence, State of Rhode Island, have invented certain new and useful Improvements in Line-Measuring Mechanism for Perforators; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the figures of reference marked thereon.

This invention relates to improvements upon or applicable to the line-measuring mechanism of keyboard-perforators; and it has for its objects to facilitate the construction, assembling, and adjustment of the parts constituting said mechanism and to render it more efficient in use, to which end the invention consists in the novel constructions, combinations, and arrangements of parts, as hereinafter fully described, and pointed out in the claims.

In the accompanying drawings, illustrating the preferred form of embodiment of said improvements, Figure 1 is a front elevation of the line-measuring mechanism. Fig. 2 is a longitudinal section of the line-stop and its adjustable rack. Fig. 3 is a transverse section on the line *x x*, Fig. 2. Fig. 4 is a sectional view through the head of the motor-return cylinder, showing the cushion-stop and retarding-valve. Fig. 5 is a top plan view of the units-rack carrier, its supporting-yoke, and the units-bar-positioning frame. Fig. 6 is a section on line *y y*, Fig. 5. Fig. 7 is a view in perspective of the units-rack carrier. Fig. 8 is a similar view of the supporting-yoke. Fig. 9 is a view in perspective, showing the units-bar-positioning frame and its supports detached. Fig. 10 is a sectional view on the line *z z*, Fig. 5. Fig. 11 is a detail view, partly in section, showing the adjusting devices for the units-bar frame. Fig. 12 is a detail view of the adjusting devices for the units-rack guide.

Corresponding numerals designate like parts in the several figures.

The line-measuring mechanism illustrated represents the improved form of Patent No. 654,115, described in application, Serial No. 179,049, filed October 29, 1903, of which the essential features are the frame 1, units-wheel 2, line-rack 3, units-rack 4, units-rack carrier 5, holding-pawl 6, stop-bar 7, motor-cylinder 8, motor-return cylinder 9, motor-rack 10, chart or scale carrier 11, scale-motor 12, line-scale 13, line-scale pointer 14, line-stop 16, stepped lifting-cam 17 for the units-rack carrier and holding-pawl, and release connection 18. The movements of advance of the units-wheel and line-rack are induced by air-pressure supply to the motor-cylinder. The units-rack and holding-pawl are moved successively into and out of engagement with the units-wheel and operate as an escapement in effecting successive advances of the line-rack, the degree of each movement being determined by the stop-bars, which serve to admeasure the throw of the units-rack. A part moving in unison with the line-measuring mechanism—to wit, the motor-rack—serves as a gage to admeasure the advance of the justification-scale-actuating devices when pressure is admitted to the scale-motor. A movable indicator provided with actuating devices (not shown) coöperates with the movable scale to designate thereon the justification fraction or signals appropriate to the line, the divisions of the scale indicating in one direction the amount of space remaining to be filled by justification and in the others the division of that space by the number of justifying-spaces contained in the line. Upon the completion of a line pressure is transferred from the motor to the motor-return cylinder, the holding devices for the space-counter and units-wheel are released, and the parts are returned to normal position. As will readily be understood, extreme accuracy, both as to position and movement, is an essential, and facility of adjustment and immunity from displacement and excessive wear are very desirable qualities in the construction of an acceptable mechanism of this kind.

The three principal adjustments provided for have relation to the units-rack, the stop-bars, and the line-stop. Where the units-rack is in retracted position or out of engagement with the units-wheel, it is important that its teeth should be in position to enter between the teeth on the units-wheel, so as to properly register with the latter when moved into engagement. Heretofore this adjustment was accomplished through the medium of the two pivot-screws supporting the units-

rack carrier; but this was troublesome, inasmuch as both pivot-screws, together with their jam-nuts, had to be separately manipulated, and trial adjustments were rendered necessary on account of the displacement of the carrier by the loosening up of either screw. To obviate these defects and render this adjustment at once easy and positive, the pivot-screws 20 of the units-rack carrier instead of being secured in the bearings 21 on the frame are carried by a yoke 22, their inner ends being fitted to slide longitudinally in said bearings 21, so that by the movement of frame 22 the pivot-screws, together with the units-rack carrier, can be shifted bodily and simultaneously without disturbing the pivot-bearings. One of the screws 20 is formed of predetermined or standard length, and its head engages yoke 22, while the other screw 20 is received in a split nut 23, provided with a pinching-screw for holding it against displacement and in adjusted position. Between the yoke 22 and one of the bearings 21 is arranged a spring 24, tending at all times to press said frame 22, together with the units-rack carrier mounted thereon, in one direction, and a screw 25, engaging a lug on said yoke 22, operates as a stop for holding and a means for adjusting the yoke in opposition to the pressure of the spring. Thus by a proper manipulation of screw 25 the units-rack carrier, together with its attachments, including the units-rack, can be shifted in a direction to vary the relation of the teeth on the rack to those on the wheel and effect registration one with the other.

The units-rack 4 is mounted to reciprocate between guides in the outer edge of its carrier 5, and to insure a proper initial fit and permit of adjustment in case of wear the front bar 30 of the carrier is divided longitudinally into two parts, each containing a section of the way or guide for the units-rack, the supporting-arms being also partially divided, so that they may be sprung slightly to vary the distance between the guiding-sections.

At or near each end of the front bar 30 and preferably in line with each supporting-bar is located a clamp-screw 31 and a set-screw 32, the one for drawing the sections of the guide or way together and the other for separating them or measuring their approach. Thus either or both ends of the way can be adjusted to accommodate the movable units-rack.

The distance traversed by the units-rack when in engagement with the units-wheel is admeasured by the position of that one of the stop-bars engaged by the units-rack during its forward motion.

The stop-bars are serially arranged in contact and determine by their thickness relative degrees of feed movement; but as the units-rack has a fixed starting-point or abutment 29, from which each measurement is taken, it is important that the stop-bars as a whole should be properly located with relation to said starting-point. With this end in view the stop-bars are held together as a series between two jaws 33 34, formed upon or carried by a bar 35, the proximate or engaging faces of said jaws projecting to one side or in rear of said bar and being gaged to correspond with the dimensions of the stop-bars to be received between them. This bar 35 forms the front guide for the stop-bars, a bar 36 on the frame forming the rear guide, and said bar 35 is secured to the frame in a manner to permit longitudinal adjustment to vary the relation of the series to the starting-point of the units-rack. Thus the ends of the bar 35 are received in bearings 37 on the frame, a spring 38 operating in antagonism with a set-screw 39, serving for adjustment, and a clamping-screw 40 for retaining the jaws in position. To prevent accidental displacement, the adjusting-screw 39 is threaded through a split nut 41, a set-screw 42 serving to spring the sections of the nut, and thus hold the screw against movement. Thus by a proper manipulation of screw 39 the adjustment of the entire series of stop-bars can be accomplished without disturbing the relation between the individuals of the series, which is liable to occur if the adjustment of the positioning-jaws 33 34 is separately effected. This arrangement also facilitates the substitution of different sets of stop-bars, each set being accompanied by its appropriate gage in the form of bar 35, with jaws 33 34 fixedly secured thereto, so that when the separate stop-bars have been coupled with the appropriate punch-levers or other actuators they can be accurately positioned without danger of displacement or binding by the application of the jawed bar.

The jaw 34 of the stop-bar holder is extended so as to project across the path of the units-rack beyond the stop-bars, and it serves as a guard to prevent the escape or mutilation of the units-rack should the latter from any cause not be arrested by a units-bar while engaged with the units-wheel and under the influence of its motor, as sometimes occurs, as when the stop-bars are removed or are so operated as to be wholly or partially withdrawn from the path of the units-rack before engaging and arresting the latter.

The length of line to be measured is predetermined by the adjustment of line-stop 16, which engages the end of line-rack 3 to arrest the units-wheel and its connections. Heretofore a separate scale was employed for setting the line-stop; but this has been dispensed with and said line-stop provided with a bar 45, sliding in ways and furnished with a lateral extension overlying the line-scale and terminating in a pointer 46. This pointer registers with the line-scale pointer 14 when the line-rack is in engagement with the line-stop.

The line-stop is movable in guides on the frame and is provided with a locking-pawl for engagement with a stationary rack 47. This rack 47 is received in a groove formed beneath the line-rack and is removably and adjustably secured in position therein. For this purpose the opposite ends of the rack-bar are beveled, as seen in Fig. 2, and one end is engaged by the beveled end of the adjusting-screw 48, while the opposite end contacts with a shoe 49, which has a spring 50 attached to it. The shoe 49 is constructed and arranged for ready application to and withdrawal from the rack-bar, to which end its head is formed with a beveled shoulder 51, overlapping the end of the rack-bar, and a rear bearing 52, resting upon the bottom of the rack-bar guide. An arm 53, passing through a slot in the frame, has its end bent or curved forward beneath the rack-bar to provide a bearing 54 against the under surface of the frame. The spring 50 is attached to this arm and tends to hold the shoe against its bearing-surfaces with the shoulder 51 in engagement with the rack-bar and at the same time to press the rack-bar into engagement with and cause it to follow the movements of the adjusting-screw 48, so that by the manipulation of the latter the rack-bar and connected mechanism may be set to position. The shoe 49 can readily be inserted in place or withdrawn therefrom by grasping its arm 53 and tilting the same against the pressure of the spring, when the head can be withdrawn or inserted through the opening.

In the practical operation of the mechanism it sometimes happens that the escapement devices governing the units-wheel and its motor will temporarily lose control either through improper adjustment, accidental displacement, or the excessive inertia incident to too-quick action. The immediate effect is a racing of the units-wheel and a resulting mutilation of its teeth. To prevent this, an automatic check or governor device has been applied in a manner to temporarily arrest the motor-rack whenever its speed is increased above the normal rate. In the present instance the automatic checking function is imposed upon the pressure-throttling valve of the motor-return cylinder. Within the valve-casing 55, Figs. 1 and 4, is located a valve or disk 56, mounted to reciprocate freely toward and from the port 57, leading to the motor-return cylinder. Ample space is provided between the walls of the chamber and the valve for the free passage of air, and small grooves or restricted passages 58 are formed in the face of the valve, so that when seated against the head containing port 57 to cover the latter the inlet to the motor-return cylinder will be diminished or throttled as compared with the free outlet formed by the withdrawal of the valve from its seat, under the influence of the escaping air when the exhaust is opened. The valve is guided by a stem working in the head opposite that containing port 57, and said stem is provided with a longitudinal duct 59, open at one end to the supply and exhaust conduit 60 and communicating with the interior of the valve-chamber in rear of valve 56 through a lateral port 61. Surrounding the stem 58, in rear of valve 56, is seat 62, against which the valve may contact to close the passage, and a spring 63 for normally holding the valve away from said seat. The spring 63 is tensioned to hold the valve from its seat 62 under normal conditions—that is, when the machine is operating at maximum speed—under which conditions the admission of pressure in conduit 60 will advance valve 56 to cover port 57, and thus throttle the passage to the motor-return cylinder to prevent shock, and when said cylinder is exhausting through conduit 60 the valve will be retracted against and be upheld by spring 63, so as to provide a free passage for the air. When, however, the units-wheel is released for a period in excess of the maximum feed movement, the pressure in the motor-return cylinder and in the valve-chamber above the valve is increased materially above that incident to the normal exhaust and overcoming the resistance of spring 63 quickly forces valve 56 upon its seat 62, thereby closing the exhaust-passage and arresting further motion of the motor-rack until normal conditions are restored, as by the reëngagement of the escape mechanism with the units-wheel. It is obvious that as this checking or governing function is independent of the one-way-throttling function, separate valves might be employed; but on the score of simplicity and expense it is preferred to unite them in a single structure.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a line-measuring mechanism for perforating-machines such as described the combination with the units-wheel, motor and escapement mechanism including a units-rack and admeasuring-stops for the latter, of a units-rack carrier supported in a yoke, the latter adjustably mounted upon the frame, to vary the relation of the units-rack to the units-wheel.

2. In a line-measuring mechanism such as described, the combination of the following elements, to wit; a units-wheel driven by a motor; an escapement device for said units-wheel, including a units-rack movable into and out of engagement therewith; a units-rack carrier pivotally supported in a yoke and provided with bearings on the frame; and means for adjusting said yoke, to vary the position of the units-rack.

3. In a line-measuring mechanism such as described, the combination with the units-

rack carrier, of supporting-pivots attached to a movable yoke and engaging said carrier, fixed bearings engaging said pivots, and means for simultaneously effecting adjustment of the yoke and carrier to vary the position of the units-rack.

4. In a measuring mechanism such as described the combination with the units-rack carrier, and its supporting-pivots, of a yoke to which both pivots are secured, fixed bearings for the pivots, and adjusting devices applied to the yoke for simultaneously shifting both pivots relatively to the fixed bearings; substantially as described.

5. In a measuring mechanism such as described and in combination with the units-rack carrier thereof, pivots engaging opposite ends of the carrier and secured to a yoke, and bearings on the frame for the reception of said pivots.

6. In a measuring mechanism such as described the combination with the units-rack carrier, its pivots, and the fixed bearings therefor, of a yoke connecting said pivots for simultaneous adjustment, and means for adjusting said yoke.

7. In a measuring mechanism such as described the combination with the units-rack carrier, its pivots and the fixed bearings for the latter, of a yoke connecting said pivots, for simultaneous movement, and an adjusting means for said yoke including an adjusting-screw and a spring.

8. In a measuring mechanism such as described the combination with a units-rack, of a units-rack carrier whose front bar containing the guiding-surface is split or separated longitudinally and provided with adjusting devices for varying the relative positions of the opposite guiding-surfaces.

9. In a measuring mechanism such as described the combination with the units-rack, of the units-rack carrier formed with a longitudinally split or divided guide or way, with adjusting-screws at or near each end thereof.

10. In a measuring mechanism such as described the combination with the units-wheel, units-rack and units-rack carrier, of the series of stop-bars and the positioning-jaws therefor, the latter connected for simultaneous adjustment.

11. In a measuring mechanism such as described, the combination with the series of stop-bars controlling the escapement devices, of the positioning-jaws embracing said stop-bars and rigidly secured to a connecting-bar, bearings on the frame for the attachment of said bar, and a screw for shifting the connecting-bar.

12. In a measuring mechanism such as described the combination with the units-rack and stop-bars, of the positioning-jaws embracing the stop-bars, one of said jaws projecting into the path of the units-rack to form a limiting-stop therefor.

13. In a measuring mechanism such as described the combination with the line-rack, pointer, line-scale and line-stop, of the pointer carried by the line-stop and coöperating with the line-scale.

14. In a measuring mechanism such as described the combination with the line-scale and line-measuring devices, of the line-stop carrying a pointer in operation relative to the line-scale.

15. In a measuring mechanism such as described, the combination with the line-rack, line-scale, and line-stop, of the bar attached to said line-stop, movable in guides on the frame and provided with a laterally-projecting arm overlying the line-scale and provided with a pointer.

16. In a measuring mechanism such as described the combination with the adjustable line-stop and its retaining-pawl, of the rack-bar, adjusting-screw and spring-actuated shoe.

17. In a measuring mechanism such as described the combination with line-stop, and a rack provided with beveled ends, of the set-screw engaging one end of said rack, the shoe engaging the opposite end of the rack, said shoe being provided with a rear upper bearing and an arm passing through an opening in the frame to form a front upper bearing, and a spring attached to said arm and serving to retain the shoe in position and to hold the rack in engagement with the adjusting-screw.

18. In a measuring mechanism such as described provided with a motor, an escapement mechanism and a motor-return cylinder, and in combination therewith, an automatic governor for closing the exhaust from the motor-return cylinder.

19. In a measuring mechanism such as described provided with a units-wheel, an escapement therefor and motor and motor-return cylinders, and in combination therewith, a valve located in the conduit leading to the motor-return cylinder and acting under the influence of abnormal pressure in said cylinder to close said conduit and interrupt the exhaust therefrom.

20. In a measuring mechanism such as described provided with motor-driven escapement-controlled measuring devices, and a motor-return cylinder opposing the motor, and in combination therewith, a cut-off for the exhaust of the motor-return cylinder, means for maintaining the cut-off in inoperative position under normal conditions as to pressure, and means for actuating the cut-off by abnormal increase of pressure.

21. In a measuring mechanism such as described the combination with the motor-return cylinder and its one-way throttling-valve, of a spring sustaining said valve in open position under normal pressure, and a seat against which the valve closes, to interrupt

the exhaust, when the pressure acting in opposition to the spring is sufficient to overcome the latter.

22. In a measuring mechanism such as described and in combination with the motor-return cylinder thereof, a one-way throttling- and reverse cut-off valve controlling the supply and exhaust passage communicating with said cylinder, said valve throttling the supply of pressure to the cylinder, opening under normal exhaust-pressure and closing under abnormal exhaust-pressure produced by the excessive speed or traverse of the motor-return piston.

23. A combined one-way throttling and cut-off valve for the motor-return cylinder of a measuring mechanism such as described, comprising the following elements: a valve-casing provided with a valve-chamber and two oppositely-disposed ports; a valve member responsive to the flow of fluid in said chamber, and adapted, when moved in one direction to partially close one port, and, when moved in the other, to close the opposite port; and a spring acting upon the valve member during a portion of its closing movement to prevent closing under pressures less than the resistance interposed by said spring.

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