

Sept. 23, 1941.

J. K. WOOD

2,256,784

SPRING DEVICE

Filed Feb. 28, 1939

3 Sheets-Sheet 1

Fig. 1.

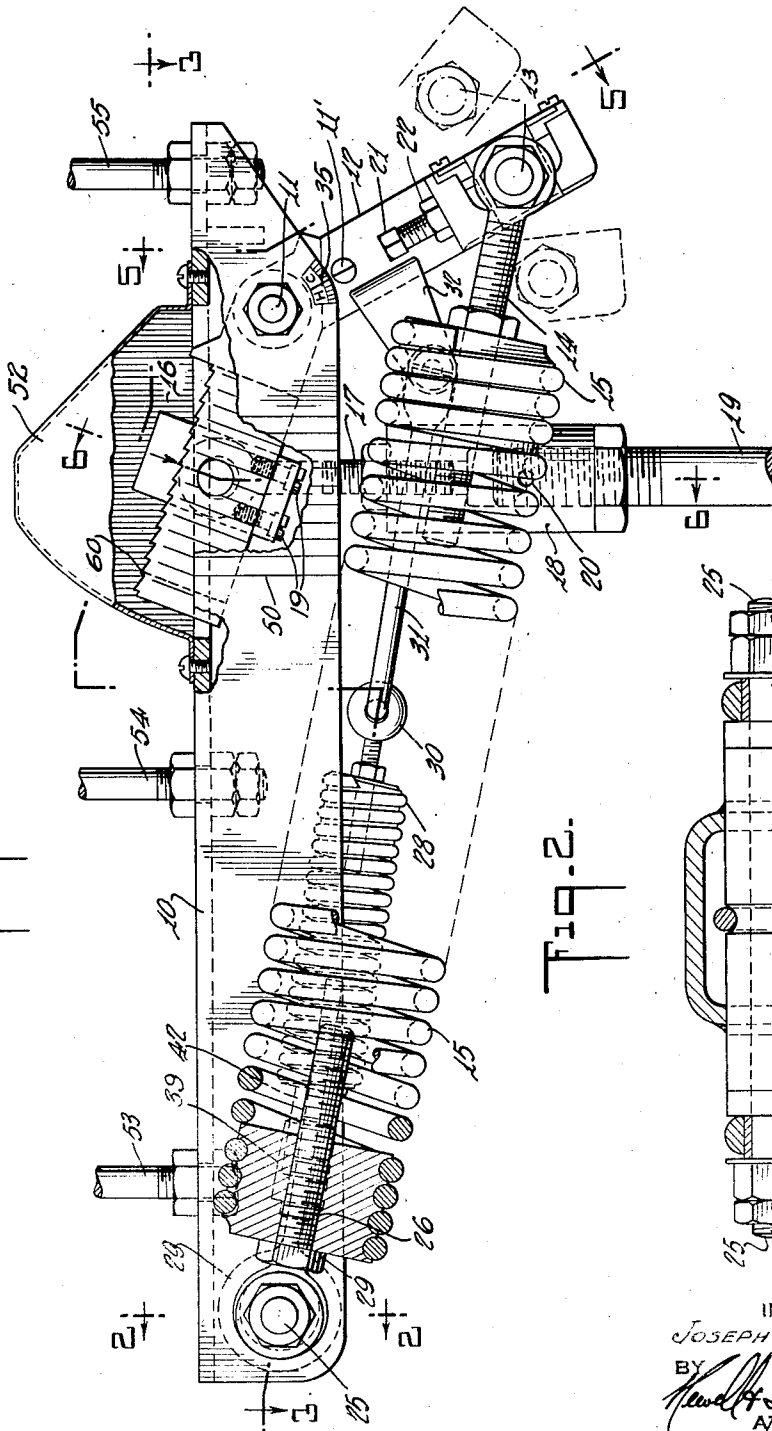
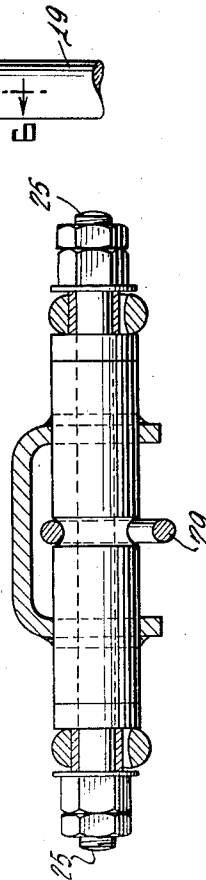


Fig. 2.



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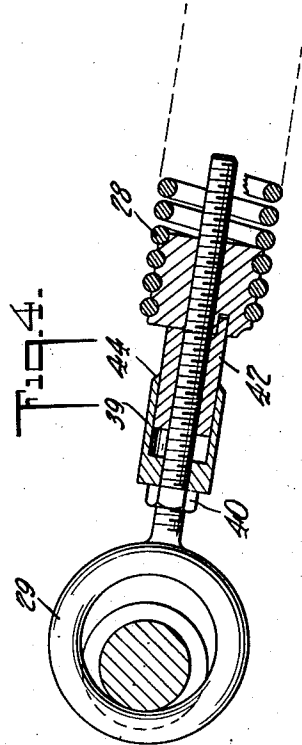
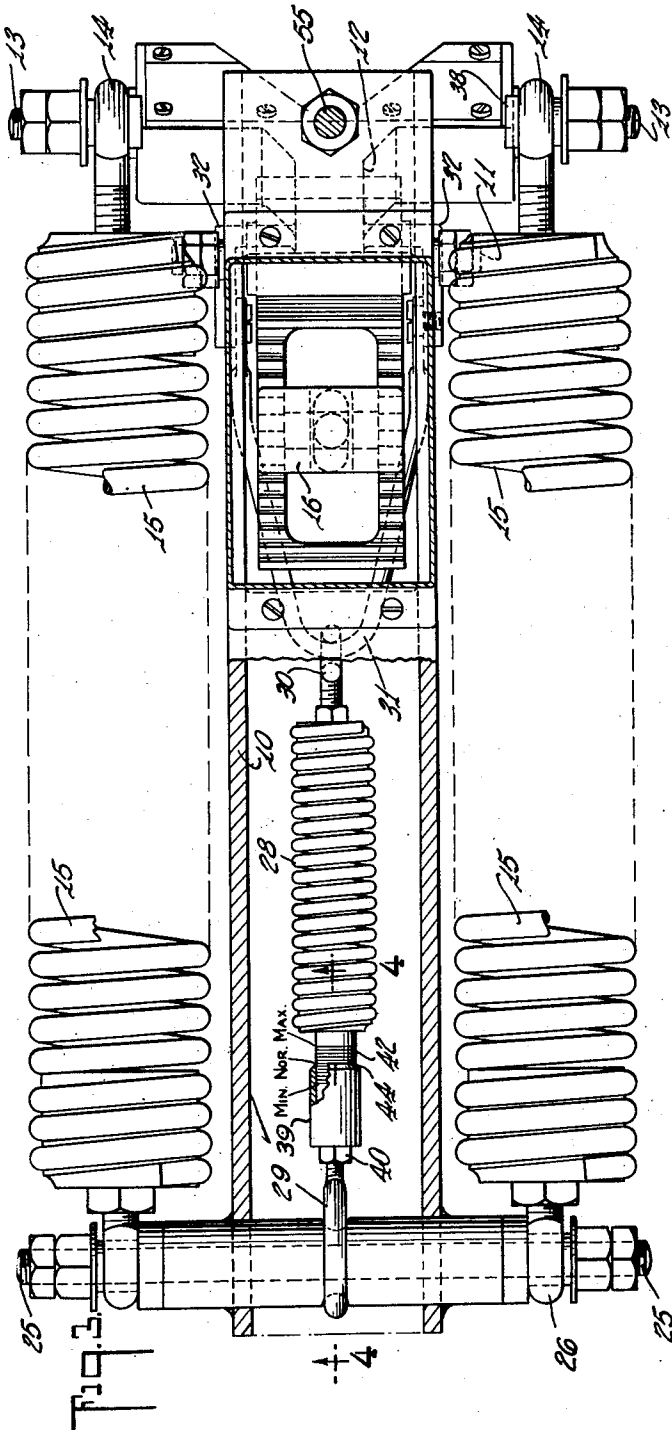
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3 Sheets-Sheet 2



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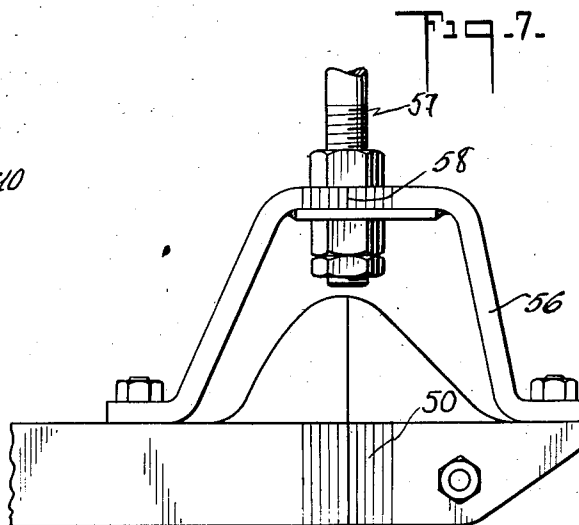
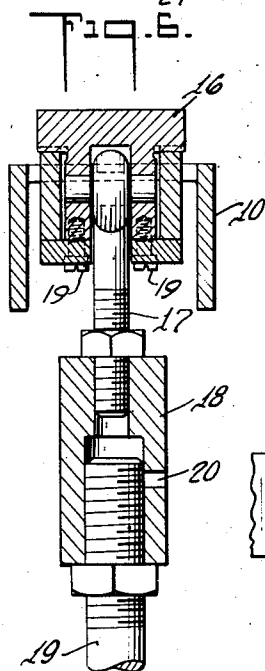
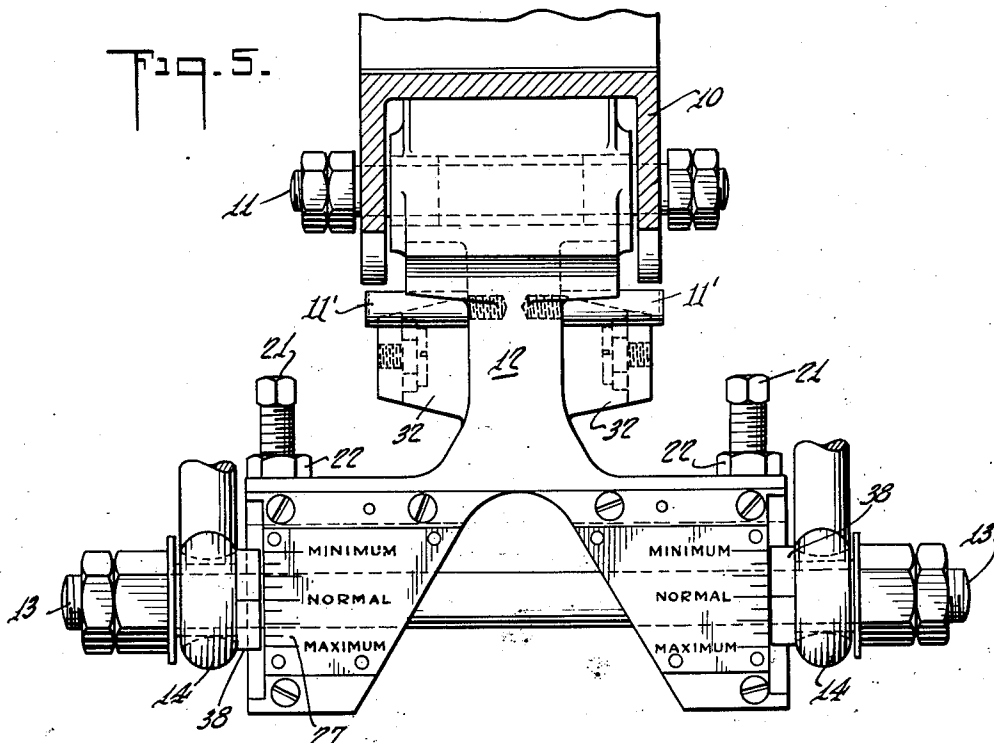
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3 Sheets-Sheet 3



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2,256,784

SPRING DEVICE

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Application February 28, 1939, Serial No. 259,009

2 Claims. (Cl. 248—54)

This invention relates to spring support of the general type set forth in my prior Patents Nos. 1,816,164 and 1,937,135 and in my copending application, Serial No. 20,511 filed May 9, 1935 now Patent No. 2,145,704.

More particularly this invention relates to a device which is adjustable to accurately adapt the device to the particular load which it supports. In devices of the type set forth in my prior patents and applications, it is important that the device should operate in the particular angular range for which it is designed; and inasmuch as one of its primary purposes is to afford accurate support to movable loads it is an important feature of these devices that they should be adjustable to vary to some degree the force exerted upon the load. Although means for adjustment is disclosed in my prior patents, some difficulty has been experienced with these devices due to the fact that the adjustment if made by a mechanic not familiar with such devices might not be properly correlated at various parts of the device, or that the device might not be properly adjusted to operate within the angular range of movement for which it was designed.

Accordingly, it is one of the objects of the present invention to provide a device in which correlated and cooperating indicating means are provided to facilitate proper adjustment at all parts of the device.

Another object of the invention is to provide a compact and rugged structure of the type described.

Other objects of the invention will be apparent to those skilled in the art from the following description and the accompanying drawings.

In these drawings I have shown a preferred embodiment of my invention, but it will be understood that the invention may likewise be embodied in other forms and that numerous constructional features of the particular embodiment shown are optional, being chosen for reasons of convenience.

In these drawings:

Fig. 1 is a view partly in elevation, partly in section of a spring hanger embodying my invention;

Fig. 2 is a view in vertical section taken on line 2—2 of Fig. 1;

Fig. 3 is a view partly in section, partly in plan taken on line 3—3 of Fig. 1;

Fig. 4 is a detail sectional view taken on line 4—4 of Fig. 3;

Fig. 5 is a view partly in end elevation, partly in section taken on line 5—5 of Fig. 1;

Fig. 6 is a detail section taken on line 6—6 of Fig. 1; and

Fig. 7 is a diagrammatic view in elevation partly broken away showing an alternative mounting.

In these drawings I have shown a combined frame and housing member 10 in which near one end a lever or bell crank lever 12 is pivoted on the bolt 11. Near one end of this bell crank is adjustably secured the pivot bolt 13, on which the eye-bolts 14 attached to the main springs 15 are pivoted; and the other end of the bell crank is notched at 60 as clearly shown in Fig. 1, and adjustably engages, by means of these notches, the clevis bearing member 16 in which is mounted the clevis bolt 17 and the turnbuckle 18 on which the load is supported through the rod 19. The clevis bearing member 16 is locked in position on lever 12 by means of clamping screws 19 and the pivot bolt 13 is held in its adjusted position and moved from one position to another by means of the adjusting screws 21 and lock nuts 22.

At the opposite end of the frame 10 is another pivot bolt 25 to which the eye-bolts 26 at the opposite end of the main springs 15 are secured.

Between the main springs 15 supplementary spring 28 is secured at one end to the pivot bolt 25 through the eye-bolt 29 and the other end through the eye-bolt 30 and the link 31, is secured to the arm 32 on the side of the lever 12. This "booster" spring is made adjustable by means of the right and left hand threads respectively on the eye-bolts 29 and 30, which screw into the correspondingly threaded end plugs of the booster spring 28.

Thus it will have been seen that adjustments for various loads may be made at 29, at 13 and at 16 and adjustment of the angular range of movement for a given vertical range of movement of the load is made at 18. According to the present invention these several adjustments are correlated and proper adjustment is facilitated by means of several scales associated respectively with each of these several points of adjustment, which indicate at a glance when the several adjustments are properly correlated.

In the first place a travel scale is provided at the pivot 11 as shown at 35. This is an angular scale with radial graduations which come into line with an index line on the end of stud 11' on the lever 12 or any member secured to said lever to swing about its pivot and near the

scale 35. These graduations are marked to indicate, respectively, the median line on which the operating range should be centered and a high and low limit of the proper operating range. Thus, by adjustment of the turnbuckle 18 under the mean and extreme condition the actual range of operation is properly centered with respect to the intended range of operation of the support device.

On the face of the lower arm of the lever 12 I have provided another scale 37 with lines adapted to be aligned with the corresponding indices on a part secured to the pivot bolt 13 e. g., its bearing block 38. This scale indicates the adjustment of the main springs 15.

On the eye-bolt 29, I have provided a barrel nut 39 which is threaded at one end onto the eye-bolt 29 and locked in position by means of the lock nut 40. Its opposite edge is beveled at 44 so as to provide an easily observed index for the scale on the cylindrical member 42 attached to the spring clutch.

As the spring is turned on the eye-bolts 29 and 30 to shorten or lengthen the booster spring 28 the cylindrical scale member 42 attached to the end plug of the spring at one end moves in and out of the index barrel 37, thus indicating the degree of adjustment by the point at which the index edge 44 stands on the scale. When a proper adjustment is secured, this point on the scale member 42 will correspond to the point at which the index on the bearing block 38 stands on the scale 37 and in this way it is assured that the supplemental or compensating action of the spring 28 will be properly related to the primary action of main springs 15, whatever may be the adjustment required.

On the side of the housing at 50, I have provided a fourth scale composed of a series of relatively long vertical lines, each corresponding to one position of adjustment determined by the teeth on the notched arm of the bell crank lever 12 and the clevice bearing member 16 when the lever 12 is in the median position as indicated by the scale 35. The particular adjustment in which the device stands is clearly indicated by the alignment of the center of the bolt 17 with one or another of these vertical lines, and these lines moreover serve to secure a proper mounting of the device, since they may be aligned with a plumb line and with the supporting bolt or turnbuckle members 17, 18, etc.

Ordinarily devices of this character are ordered from engineering drawings and specifications, in which the load and movement of each device is predetermined. Accordingly the device when it is sent from the factory will have a star or other significant indication stamped onto each scale at the proper point of adjustment or to indicate the proper range of movement. This will give an approximately accurate adjustment for purposes of installation; and, after the device is properly installed and with the load supported therefrom, a more perfectly accurate adjustment may be made as described above by adjusting the turnbuckle 18 at mean and extreme conditions respectively to bring the range of movement within the proper range of operation of the device, and preferably with the mean condition occurring at the median line on the scale, and likewise by making corresponding adjustment at 21 and at 28, as indicated on the scales 42 and 37 respectively, until the load is accurately supported. Unless, however, the adjustment at 16 is properly made the range of

operation will not properly correspond with the proper range of movement as indicated on the scale 35 and it may be impossible to reach accurate support for the load by the adjustments at 21 and 28. It is an important advantage of my invention, therefore, that the scale 50 indicates at a glance whether the adjustment 16 has been properly made. This indication will ordinarily be facilitated either by a significant marking, such as a star, etc., at the proper position for the particular hanger and the particular load or by indications of actual load in pounds at the various positions on the scale, from which the proper position for the given load can be quickly and readily determined.

In the case illustrated, in order to facilitate adjustment of the member 16 on the arm 12, I have provided an opening in the housing 10 and a light dust cap 52 which is readily removable as shown. In the case of heavier hangers, however, it may be important to use this portion of the housing for additional structural strength in the frame and in such case adjustment may be made, e. g., by a long screw driver inserted from the bottom or in other convenient manner.

In Fig. 7, I have shown a portion of the hanger constructed in this way and on it mounted a yoke or bracket which may be used with either type of support device. In the ordinary case, as shown in Fig. 1, these devices are supported by long bolts 53, 54 and 55 which pass through the openings in the frame 10 and these bolts are threaded to receive nuts to secure the frame in place. Where, however, it is not convenient to use more than a single support bolt this may be conveniently accomplished by means of the adapter bracket 56 shown in Fig. 7. This, as here indicated, is bolted to the top of the support device through the holes provided for the bolts 54 and 55 and in turn engages a support bolt 57 through a single hole (not shown) in its top. An indicator line 58 on this member provides an alignment index for mounting. This line and one of the lines of the scale 50 should, when the device is properly mounted, be plumb with the center line of the bolt 57 by which the device is hung. Line 58 should be in alignment with the center line of the supporting rod or turnbuckle 17, etc., and with the corresponding line of the scale 50. Thus, a bracket should be used which has its hole drilled in alignment for the particular adjustment of the member 16 or may be provided with a slotted hole and a scale 58 as shown corresponding to the scale 50.

A typical use for supporting pipe lines of a device as defined in my invention may be as follows:

The Rated capacity (supporting pull in pounds when Load indicator is set to "Normal"), Adjusted capacity (supporting pull in pounds specified by customer), and Total travel (maximum for particular hanger in inches), are stamped on the plate at the factory. Hangers are shipped set to the Adjusted capacity and with the letters "H" and "C" stamped on the Travel scale 35 at points corresponding to the "hot" and "cold" position respectively of the pipe, provided of course, the actual vertical expansion expected is given by the customer. Otherwise the customer must stamp these letters in their proper places. Actual travel should straddle "Mid" line on Travel scale 35, each division of which equals $\frac{1}{10}$ of the Total travel of the hanger.

It is assumed first that the section of piping to be supported is held in place temporarily by

ropes or chains, with the ends welded or bolted to adjacent section. It is further assumed that hanger rods of the proper lengths and spacing, are in place.

The Adapter bracket, if one is used, is bolted to the hanger, making certain that the lines 57 and 50 on the bracket and hanger frame are in alignment.

The hanger is swung into place so that the load line 50 is in alignment with the vertical axis of the lower or load hanger rod 17, etc. It is then secured to the single upper hanger rod if an Adapter bracket is used, or to the two or three upper hanger rods if no bracket is used. In any case the upper hanger rod or rods should be aligned with or parallel to the load lines 50—57. Upon removing the temporary supporting means the lower rod 19 is turned into the right and left threaded nuts of the hanger turnbuckle 18 and the pipe clamp (not shown) respectively until the Travel indicator points to reading "C" on the Travel scale 35 if the pipe is cold, and to "H" if the pipe is hot. The lower rod 19 should be long enough so that it will appear in the "sight" hole 20 of the hanger turnbuckle 18 and pass entirely through the pipe clamp nut. This setting is secured by cotter pins or lock-nuts.

If the ends of the pipe section are free it is possible to adjust for exact balance as follows: Turn the lower hanger rod until the Travel indicator 35 points to reading "C" or until the pipe begins to rise. If the latter happens first it means that the supporting pull of the hanger is more than the pipe weight—hence the Load and Booster indicators should be moved corresponding amounts toward "Minimum" until the Travel indicator 35 points to "C". When all hangers on the section of pipe are thus adjusted, the temporary supporting means should be removed. Then, if the Travel indicator moves toward "Low" the supporting pull of the hanger is less than the pipe weight and the Load and Booster indicators should be moved toward "Maximum" until the Travel indicator moves to "C". When this is accomplished for all hangers, the ends of the pipe section should be welded or bolted to the adjacent sections.

Each division on the Load scale between "Normal" and "Maximum" corresponds to a definite percentage increase in load and between "Normal" and "Minimum" and to a definite percentage decrease in load.

Up to this point, in all probability, the insulation covering will not have been applied and the balancing of its weight must be provided for by increasing the supporting pulls of the hangers in proportionate amounts. If these amounts exceed the available range of spring adjustment then adjustment must be made

at 16 or the spring units will have to be replaced by the next larger size.

Whenever a pipe line suspended on my Hangers is subjected to a hydrostatic test, the hangers should be fitted with "Travel stops 60" during the test. Hydrostatic testing without Travel stops may cause an "unbalance" which would subject the pipe line to excessive strains. Stops hold the pipe line in the proper "cold" position during the test and prevent "unbalance."

The markings 61 on the Travel stop 60 are identical with those on the Travel scale 35. The Travel stop is fitted to the hanger after first cutting it on the line that corresponds to the "cold" position on the Travel scale. Now, fit Tongue 62 on Travel stop into groove 63 on the lever 12 and secure to lever by use of threaded rod 64 screwed into tapped hole 65. After completing test, remove Travel stop and threaded rod.

What I claim is:

1. An adjustable constant tension support adapted for carrying high temperature pipe lines, of the type having a spring, a crank arm connected to the spring for transmitting the force of the spring to the pipe line load carried thereby, said crank arm varying the mechanical advantage between the spring and load as the load moves, a supplemental spring connected to the crank arm and adapted to compensate for variation in the force of the first spring as applied to the load, and a fixed frame in which said crank arm is pivotally mounted and to which one end of the first-named spring and one end of the supplemental spring, respectively, are connected, and which support further comprises an adjusting device for said first-named spring having a scale, and an adjusting device for said second-named spring having a scale, each of said scales having corresponding graduations to indicate corresponding adjustments of said respective springs to give compensation to the first spring by the supplemental spring, and a travel indicator having cooperating parts on the crank arm and frame respectively, to show variations in the position of the pipe line load caused by thermal expansion and contraction, whereby the adjustment of the adjusting devices may be related to the position of the operating parts.

2. An adjustable constant tension support of the type and including the combination defined in claim 1, in which the frame comprises a housing member of substantial width and said combination further includes a bolt of substantial length for carrying the load from the crank, and said housing is provided on its side with straight line indicating means aligned with the bolt when the parts are properly related for carrying the load.

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