

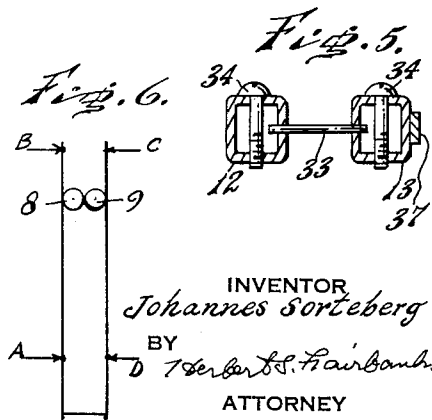
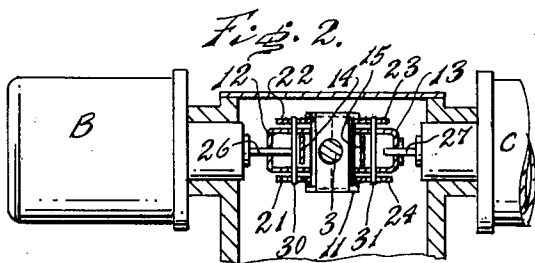
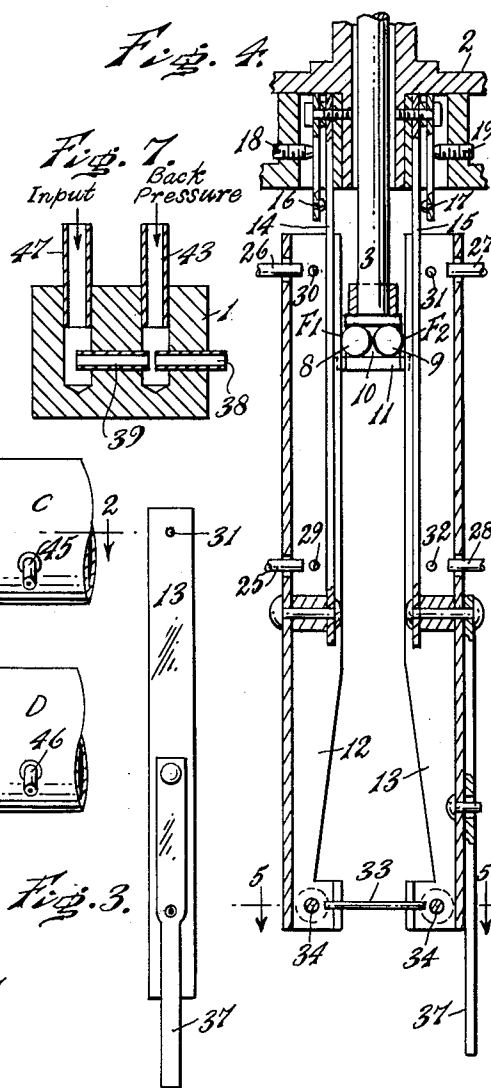
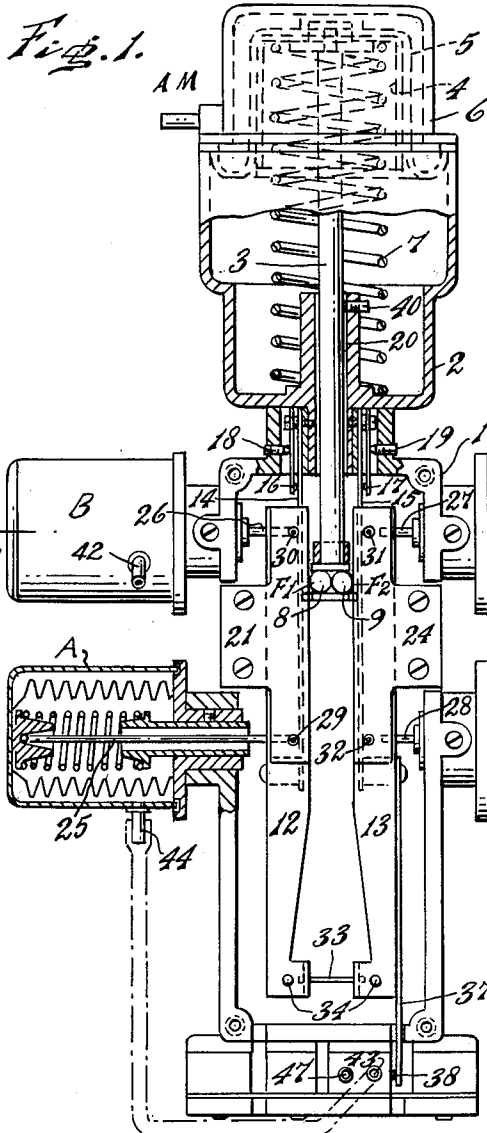
April 16, 1963

J. SORTEBERG

3,085,744

AUTOMATICALLY BALANCED WEIGHBEAM SYSTEMS

Filed July 19, 1960



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3,085,744 AUTOMATICALLY BALANCED WEIGHBEAM SYSTEMS

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Filed July 19, 1960, Ser. No. 43,931
2 Claims. (Cl. 235—61)

The object of this invention is to devise a novel automatic weighbeam system which can be used as a ratio totalizer for addition or subtraction, and, when used with auxiliaries, for controlling other devices and mechanisms.

A further object of the invention is to devise a mechanical expression for the equation

$$A = \frac{b}{a}(B - C) + D$$

where A, B, C and D represent forces, and a and b are variable arms of a weighbeam system. Reference is made to my prior Patent No. 2,918,214 in which the above problem has been solved by a construction which is different from that disclosed in the present application.

A further object of the invention is to devise a novel weighbeam system having two opposing weighbeams interconnected to form a U-shaped arrangement capable of flexing at the web or corner portions. Each weighbeam has a movable fulcrum, the fulcrums being in fixed relationship with each other with means for automatically or manually moving said fulcrums, and means are provided for balancing the moments of the weighbeam system by changing one of the forces transmitted to the weighbeam system.

With the foregoing and other objects in view as will hereinafter clearly appear in the detailed description and the appended claims, my invention comprehends a novel automatically balanced weighbeam system.

For the purpose of illustrating the invention, I have shown in the accompanying drawings a preferred embodiment of it which I have found in practice to give satisfactory and reliable results. It is, however, to be understood that the various instrumentalities of which the invention consists can be variously arranged and organized, and the invention is not limited, except by the scope of the appended claims, to the exact arrangement and organization of these instrumentalities as herein set forth.

FIGURE 1 is a schematic view in elevation and partly in section of an automatically balanced weighbeam system embodying my invention.

FIGURE 2 is a section on line 2—2 of FIGURE 1.

FIGURE 3 is a face view of a weighbeam and baffle member.

FIGURE 4 is a sectional elevation on a larger scale of the U-shaped weighbeam structure and supporting means.

FIGURE 5 is a section on line 5—5 of FIGURE 4.

FIGURE 6 is a diagram showing the application of forces.

FIGURE 7 is a sectional view of the nozzle assembly. Similar numerals of reference indicate corresponding parts.

Referring to the drawings:

A body portion 1 has an air motor AM, the base 2 of which is mounted on the body portion. The air motor has a rod 3 mounted in it for linear movement, and its outer end is connected to a cap 4 having a diaphragm 5 within a housing 6 mounted on the base 2. A spring 7 opposes inward movement of the rod 3.

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Fulcrum rollers 8 and 9 are confined in a raceway 10 of a cage 11. The raceway 10 permits the lateral movement of the fulcrum rollers and prevents their longitudinal movement relative to the cage.

Two weighbeams 12 and 13 are suspended from the body portion by leaf springs 14 and 15 which are laterally adjustable by levers 16 and 17 and screws 18 and 19. The contact lines between the fulcrum rollers 8 and 9 and the weighbeams become the fulcrums F1 and F2.

The rod 3 is guided in a bearing 20 in the air motor base 2, and cage 11 is confined between guide plates 21, 22, 23 and 24. The fulcrum rollers 8 and 9 bridge across the guide plates which absorb the difference, if any, between the forces A plus B and the opposing forces C plus D produced by load cells A, B, C and D which act upon the weighbeams through thrust rods 25, 26, 27 and 28 which are perpendicular to the weighbeams and pairwise on the same center line.

The weighbeams are U-shaped in cross section, and are equipped with pins 29, 30, 31 and 32 which absorb the thrust of the rods. The contact lines between the rods and pins become the end fulcrums of the weighbeams.

The weighbeams are not connected together at their upper ends but are connected together at their lower ends as in my prior Patent No. 2,918,214 by a spacing member 33 shown in the form of a rod extending into the weighbeams and are clamped thereto by clamping screws 34. The lower ends of the weighbeams are formed into a rectangular structure, and the screws compress opposite sides of the rectangular construction to clamp the rod in position.

It will thus be apparent that instead of providing a rectangular weighbeam structure as in my prior patent herein identified, I form a U-shaped weighbeam structure with corner portions flexing or pivoting.

The weighbeams are spaced apart by the linkage of the rod or strip 33 so that they are parallel.

The weighbeam structure has an extension 37 which faces the nozzle of a nozzle assembly 38 which latter has a restriction 39.

The fulcrum rollers may be manually positioned and locked in position by a set screw 40 locking with the rod 3, or pneumatically and automatically as disclosed in FIGURE 1. The construction and arrangement permits the two fulcrum rollers to be positioned anywhere along the weighbeams.

Load cells B, C and D are assumed to be of the same construction as load cell A, but only the load cell connected to the back pressure tap 43 must be bellows equipped.

The back pressure tap 43 of the nozzle assembly is connected with the tap 44 of load cell A. Taps 42, 45 and 46 are loading connections for load cells B, C, and D. 47 is the nozzle input tap.

In the operation, air is introduced to the nozzle at input tap 47 and the back pressure is piped from the tap 43 to the load cell it is desired to automatically control, in this case the tap 44 of load cell A.

In normal operation, the forces represented by A, B, C and D are exerted on the weighbeams through the media of bellows or springs. Any one or two of these variable forces can be eliminated since it is only necessary to have one force to balance against another force.

When the system is in equilibrium:

$$(A - D) \times a = (B - C) \times b$$

i.e.

$$A = \frac{b}{a}(B - C) + D$$

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If one of the variables are changed, i.e., B, C or D, the equilibrium will be disturbed and cause the weighbeam extension 37 to move towards or away from the nozzle, as the case may be. This will correspondingly lower or raise the back pressure from the nozzle, which, when transmitted to load cell A, will increase or decrease force A until balance is restored.

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

1. A weighbeam system, comprising two opposed parallel weighbeams, means to connect said weighbeams at one end only to form a U-shaped structure, said weighbeams being capable of flexing with respect to the connecting means and with respect to each other, movable fulcrum means for said weighbeams, end fulcrum

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points for each weighbeam, means for transmitting a force to each end fulcrum point of each weighbeam, means for moving said movable fulcrum means, and means for balancing the moments of the weighbeam structure by changing one of the forces transmitted to the weighbeam structure.

2. The construction defined in claim 1, wherein said weighbeams are extended at one end a substantial distance beyond the adjacent fulcrums and their connecting means is fixed to the weighbeams at their extended ends.

References Cited in the file of this patent

UNITED STATES PATENTS

2,918,214

Sorteberg

Dec. 22, 1959