March 1, 1960 G. D. ALVORD 2,926,773

VIBRATORY FEEDER SUSPENSION

Filed Sept. 22, 1953

4 Sheets-Sheet 1

Fig. 1.

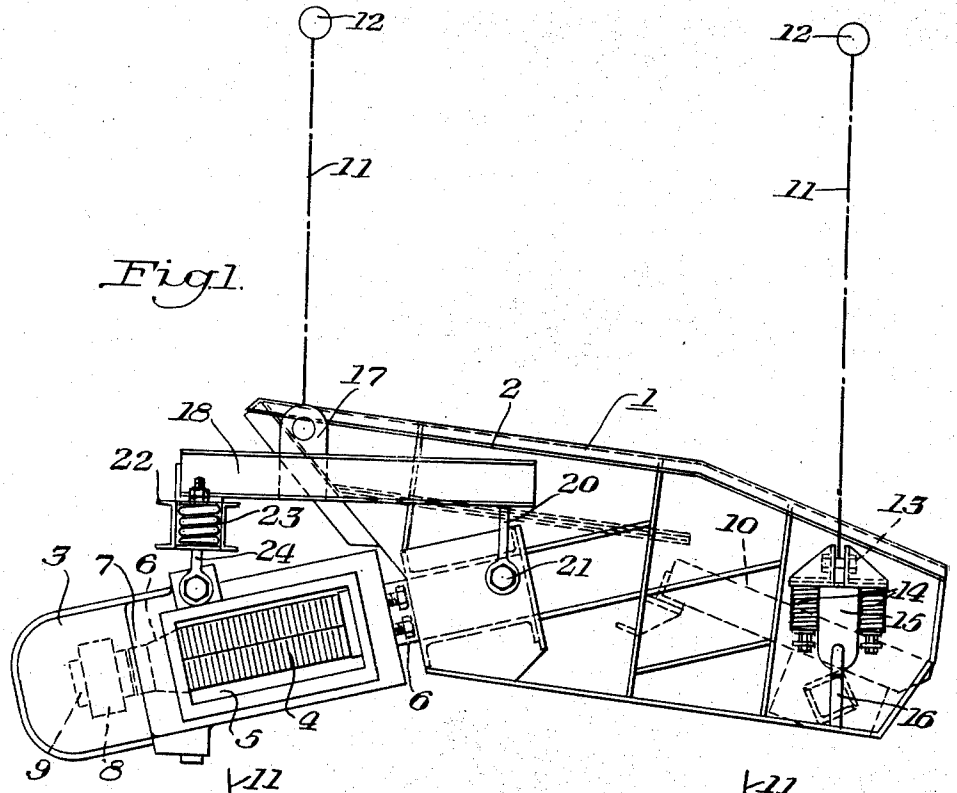
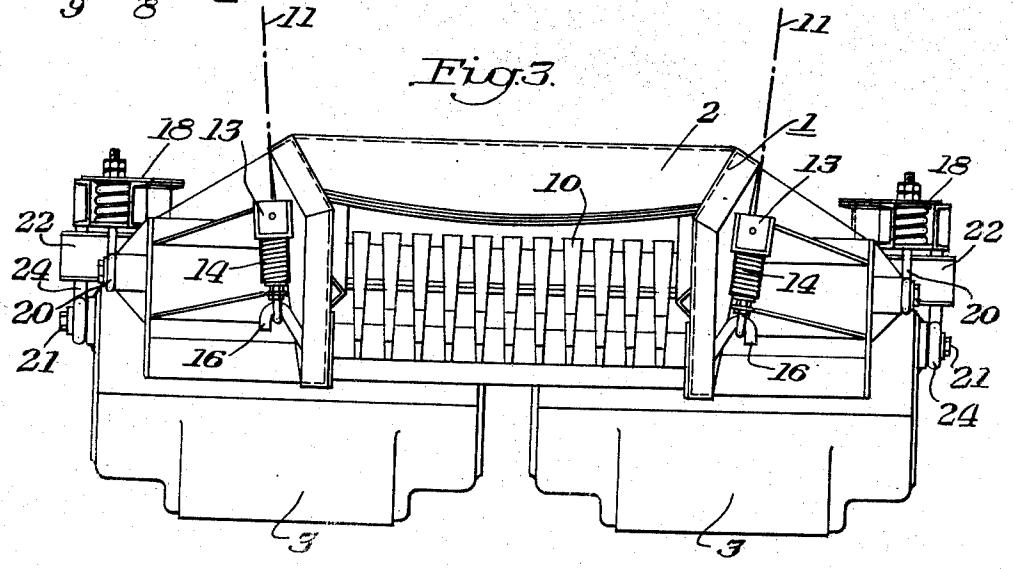


Fig. 3.



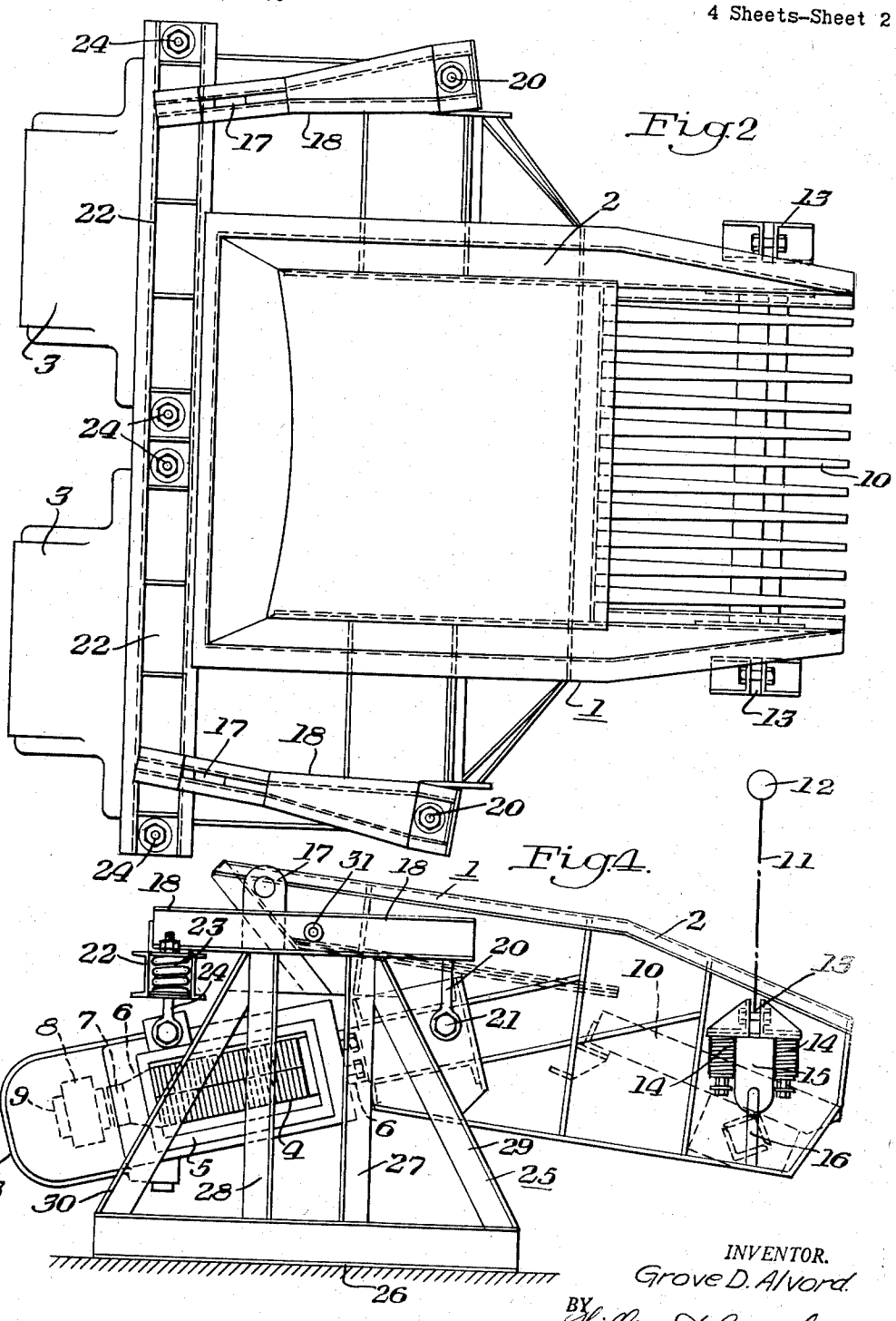
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Fig. 6.

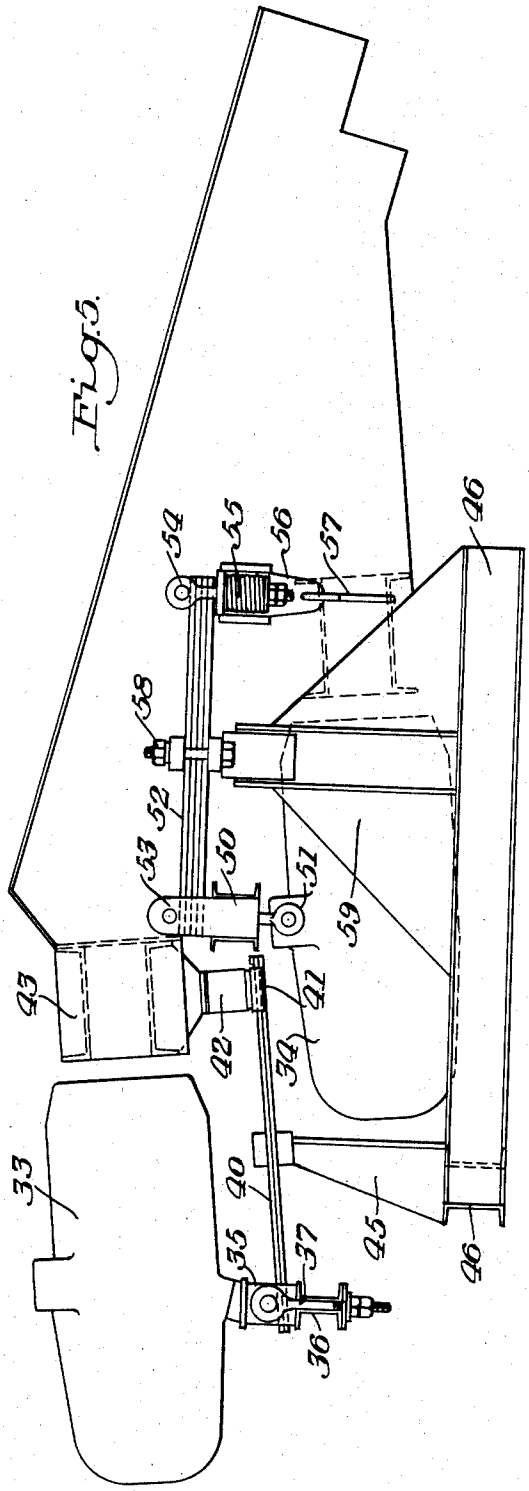
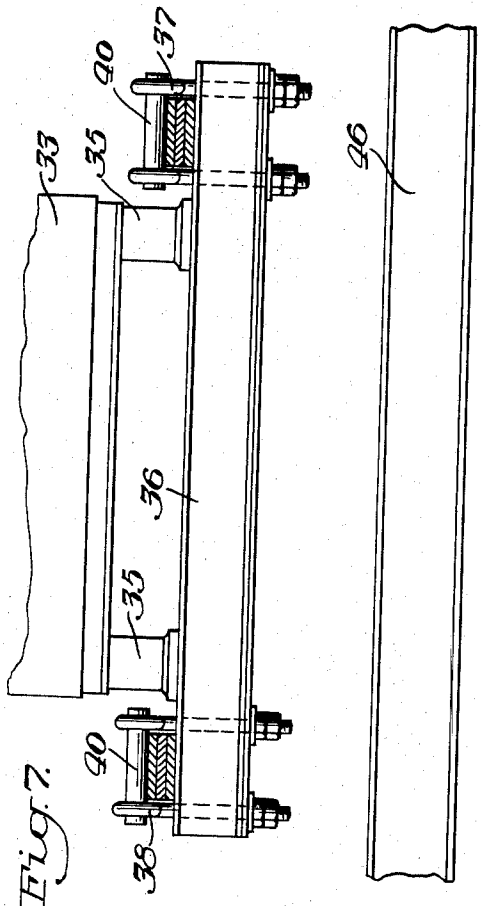


Fig. 7.



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Fig. 6.

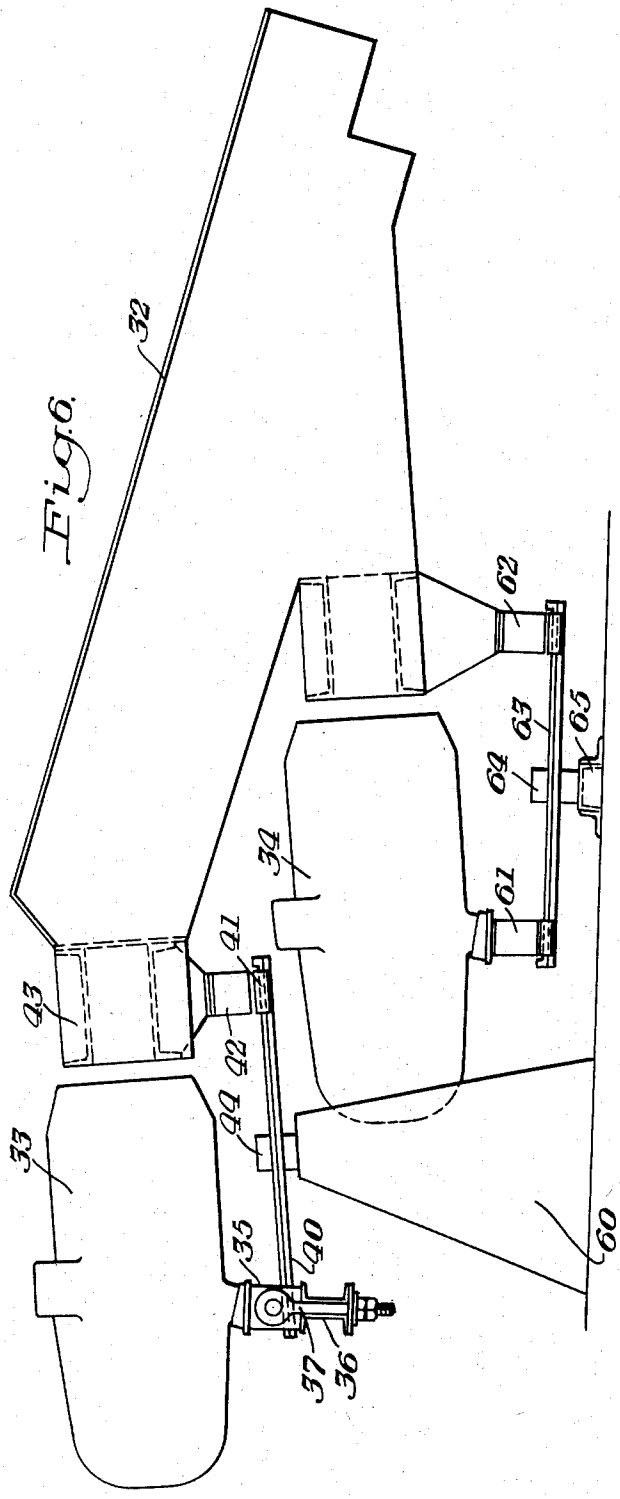
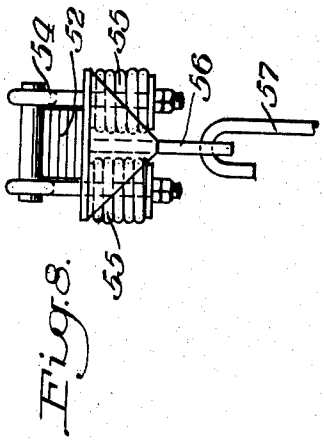


Fig. 8.



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VIBRATORY FEEDER SUSPENSION

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Application September 22, 1953, Serial No. 381,636

8 Claims. (Cl. 198—220)

This invention relates generally to vibratory feeder suspension and more particularly to an improved balanced beam structure for suspending vibratory feeders.

In supporting heavy vibratory feeder conveyors or vibratory grizzly feeders, independent resilient suspension means are fastened to opposite sides of the motor base and conveyor trough. When a heavy load is placed on these feeders, the flexible spring members connecting the motor base and the trough to provide tuned reciprocation of the latter, are subjected to bending stresses which disrupt their tuning and sometimes cause breakage of the clamping brackets around the center of the springs and the springs themselves. Since the flexible spring members are between the motor base and the trough, the springs and the clamping bracket around the center thereof are in the most vulnerable position.

The principal object of this invention is the provision of a feeder suspension structure that relieves the bending stresses on the springs between the motor base and feeder trough by proportioning the suspension load thereon. This is accomplished by providing a balance beam suspended intermediate of its ends and one end supporting the motor base while the other end supports some part of the conveyor trough between the flexible tuning springs and the trough hanger. This type of suspension relieves the springs of the bending stresses permitting them to operate uninhibited and preventing breakage of the springs and the spring clamping member.

The connections between the beam and the feeder motor and trough may both be resilient, or one may be direct and the other resilient. The division of the load through these connections may be equal and in some installations the load on one hanger to the beam may be greater than the load to the other hanger with the balance being made by the lever distances between these hanger positions and the fulcrum of the beam which is the main or intermediate support for the beam.

One or more of the hangers attaching the feeder to the beam for suspension may be resilient or directly connected. If one is resilient it functions for both hanger connections to the beam and the latter oscillates about its pivot which is preferably suspended by cable or supported directly by a foundation through a steel stand.

In most feeder installations the beam balance suspension merely supports the motor end of these feeders and the trough end has an additional independent suspension with its resilient connection. In some installations there is no need for this forward suspension.

In some installations a single central beam may be suspended by cable with the secondary hangers connecting this beam to the opposite sides of the motor base and trough. In most heavy installations duplicate beams are employed, one on each side of the feeder with the suspension members either hanging by cable to the beam fulcrum or being made from the foundations.

The wide installations having two motors in parallelism and the very heavy units employ a transverse beam to assemble the motors as a unit and hangers connect the

opposite ends of this beam to the balance suspension beam.

The tranverse beams are also employed for single motor units wherein it is desired to position the balance beams beyond the side limits of the feeder. A transverse beam can be employed for each part of the feeder, the motor base and the trough. The balance beam is then fastened at its ends to these transverse beams and the fulcrum position is selected along the beam to properly divide the suspension load thereon whether it be balanced or unbalanced.

The suspension balance beam need not be a rigid member. It can be fabricated from leaf springs and thus eliminate the use of a flexible connection between the balance beam and the feeder parts. This character of suspension beam structure provides a better balanced and vibratory support for the vibratory feeder as it relieves the bending stresses on the vibratory springs and also permits the motor base and trough to freely vibrate at their proper amplitude uninhibited.

Other objects and advantages appear hereinafter in the following description and claims.

The accompanying drawings show for the purpose of exemplification without limiting the invention or claims thereto, certain practical embodiments illustrating the principles of this invention wherein:

Fig. 1 is a view in side elevation of a twin motor grizzly feeder and a rigid balance beam supported by cables.

Fig. 2 is a top plan view of the structure shown in Fig. 1.

Fig. 3 is an end view of the structure shown in Fig. 1.

Fig. 4 is a view in side elevation of a similar feeder structure supported from a stand.

Fig. 5 is a view in side elevation of a tandem motor feeder having a spring balance beam supported directly from a foundation.

Fig. 6 is a view similar to Fig. 5 illustrating a modification in the mounting.

Fig. 7 is a detailed view of the hanger mounting for the top motor shown in Figs. 5 and 6.

Fig. 8 is a detailed view of the hanger mounting for the trough shown in Figs. 5 and 6.

Referring to Figs. 1, 2 and 3 of the drawings, the feeder **1** comprises a trough member or conveyor means **2** and the motor base means **3** which are connected together by the flexible spring means **4** which are represented by a multiple series of leaf springs clamped at their ends in the windows **5** of the motor casting and are secured intermediate of their ends by the clamping bracket **6** which is rigidly connected to the feeder trough **2** and which also supports the armature member **7**. The electromagnetic field member **8** is mounted on the core member **9** to complete the electro-magnetic motor within the motor base means **3**. The driver thus constitutes the electromagnetic motor made up of the armature **7**, the field member **8** and the core member **9**. A grizzly screen is indicated at **10** in the fore part of the trough.

This feeder is suspended by the cables **11** on both sides of the feeder which hang from suitable rigid supports indicated at **12**. The cables at the fore part of the trough are received by the independent bracket members **13** which have mounted thereon the resilient spring members **14**. The springs within these hangers hold the fore part of the trough in suspension through the pivotal attachment link **15** detachably connected to the hook **16** that is welded or otherwise secured to the side of the fore part of the trough. A hanger of this character is mounted on each side of the trough as indicated by the bracket members **13** in Fig. 2.

The suspending cables **11** at the rear of the conveyor trough terminate at the link or fulcrum member **17**

fastened to the beam or evener 18 which in this instance is a rigid member constructed of two channel members mounted back to back and welded together. The fore part of the beam is provided with the hanger pivotal attachment link 20 which is pivoted to the side of the conveyor as indicated at 21. A beam 22 connects across both of the feeder motors as illustrated at Fig. 2 and suspends the same through suspension members 23 having helical springs held in compression by the pivotal attachment or hanger members 24. As shown in Fig. 2 there are four of the hanger members 24, one on each side of the twin motor base means 3. An evener or balance beam 18 is secured adjacent each end of the beam 22.

It will be noted that the hangers 20 and 24 support the motor and the rear end of the trough. These hangers may be equally spaced relative to the fulcrum or the load may be divided differently for different character of load of the material being conveyed. The lever lengths from the hangers to the fulcrum are chosen to properly balance the load relative to each other and to the fore suspension to relieve the springs of any twisting action.

In the structure as illustrated in Fig. 4 the fore part of the conveyor means 2 may be supported by the suspension cable 11 in the manner previously described. However, the rear portion of the trough is suspended from below as illustrated by the stand members 25 on each side of the conveyor which are supported on the foundation 26.

The apex of the stands 25 carry the fulcrum 31 of each beam 18 and properly balance the structure in the same way as that described in Fig. 3. Thus the suspension may be by means of cables from above or it may be by means of stands directly supported from a foundation or by a combination of the two as illustrated in Fig. 4.

In the structure having two motor base means 33 and 34 in tandem, as shown in Fig. 5, the rear motor base means 33 is supported by the posts 35 on the beam 36 which beam has a pair of hanger members 37 and 38 adjacent each end thereof and in which are clamped the ends of the leaf spring members 40 which in this structure function as the balance beam or evener.

The leaf springs 40 which form the beam or evener have socket members 41 at the end of the adjustable spacer or hangers 42 that are secured to the underside of the trough connecting member 43. Since the beams are formed by the leaf springs 40 and their fulcrums are attached intermediate the beam ends the fulcrums are mounted on the vertical supports 45 mounted on the foundation. As in the other previous views, there are two flexible beam members 40, one on each side of the feeder as illustrated in Fig. 7.

The second transverse beams 50 pass over the top of the front motor base means 34 and are attached thereto by the hangers 51.

These hangers are likewise supported on the end of the balance beam or evener 52 by means of the clamp members 53. These balance beams have secured to their other ends the hanger members 54 which are in turn connected by the spring members 55 and 56 to the hook members 57 which are welded or otherwise secured to the fore part of the conveyor.

The flexible balance beams or eveners 52 are secured intermediate their ends through the fulcrum 58 to the vertical suport 59 which is likewise mounted on the base 46.

As shown in Fig. 8 the clamping hangers 54 are attached to the ends of the springs forming the balance beams 52 that are provided with duplicate spring members 55 that are placed in compression by the connecting link 56 which is attached to the hook 57. There are two of these structures, one mounted on each side of the feeder.

Referring now to Fig. 6, the balance beam 40 of the rear motor base means 33 is supported independently on the ground by means of the support members 60 whereas the support member 59 of the forward motor base means 34 has been eliminated and replaced by the adjustable stems or hangers 61 and 62 which are secured to the opposite ends of the flexible balance beam or evener 63, the intermediate portion of which is secured by means of the fulcrum clamp 64 to the foundation stand 65. The front ends of the beams 40 and 63 support the conveyor means 32. Thus the suspension for the tandem motors as shown in Fig. 6 is mounted wholly under the motors and independently secured to a suitable foundation. Whereas, in the structure in Fig. 5 the resilient suspension member of the rear motor base means 33 is mounted beneath the same and the resilient suspension member of the front motor base means 34 is mounted above the sides of this feeder.

The invention disclosed herein is not limited in its application to the details of construction and arrangement of parts as illustrated in the accompanying drawings, since the invention is capable of other embodiments and of being practiced in various ways.

I claim:

1. A conveyor supporting structure comprising a motor base, a trough, flexible springs connecting the motor base and the trough to provide tuned conveying reciprocation for the trough, a beam structure, hanger means directly connecting the rear end of the beam structure to the motor base, a second means directly connecting the front end of the beam structure to the rear end of the trough, a forward means directly and independently supporting the forward end of the trough, and a support intermediate the ends of said beam structure to proportion and support the load of the motor base and the rear end of the trough to relieve the flexible springs and cooperate with the forward hanger to support the trough.

2. The structure of claim 1 which also includes a resilient means interposed in said hangers.

3. A conveyor suspending structure, comprising a conveyor trough, a plurality of motor bases, flexible springs connecting each motor base to said conveyor trough to provide tuned conveying reciprocation for the trough, a conveyor support frame having a transverse beam structure and longitudinal weight balanced beam means, said transverse beam structure connected to one end of said weight balanced beam means, hanger means directly suspending said conveyor trough from the other end of said weight balanced beam means, second hanger means directly suspending each motor base from said transverse beam structure, said conveyor trough and motor bases being suspended from opposite ends of said weight balanced beam means, a support suspending said weight balanced beam means at the center of its weight, at least one of said means being resilient in suspending said conveyor structure.

4. The structure of claim 3 characterized in that said motor bases are mounted in tandem relative to said motor conveyor, the supporting frame for each motor base being independent from each other.

5. The structure of claim 3 characterized in that said weight balanced beam means are constructed of horizontally disposed leaf springs.

6. The structure of claim 3 characterized in that said weight balanced beam means has two components one on each side of each motor base.

7. The structure of claim 3 characterized in that said motor bases are mounted side by side in parallel relation to each other.

8. A conveyor supporting structure, comprising a conveyor trough, a plurality of motor bases, flexible springs connecting each motor base to said conveyor trough to provide tuned conveying reciprocation for the trough, a

pair of frames each comprising a transverse beam structure and a pair of longitudinal beam means connected together, hanger means directly connecting each motor base to a transverse beam structure, additional hanger means directly connecting the other end of each longitudinal beam means to said conveyor trough to support said conveyor trough and motor bases on opposite sides of said flexible springs, and a support intermediate the ends of each longitudinal beam means located at the center of weight of the same, said pair of frames are mounted in tandem relative to each other.

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