

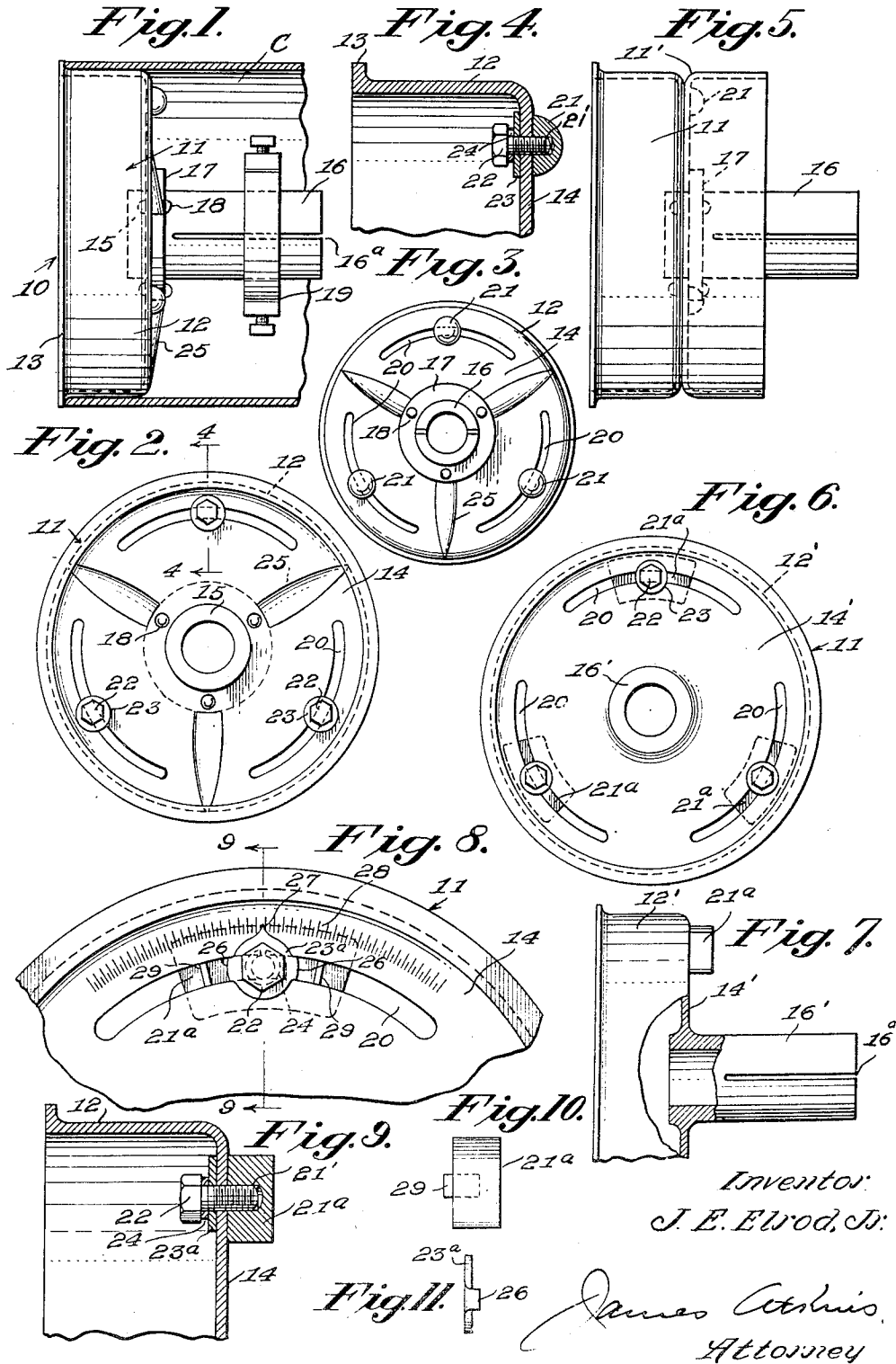
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BALANCING MEANS FOR ROTARY STRUCTURES

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BALANCING MEANS FOR ROTARY STRUCTURES

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This invention relates to balancing means for rotary structures.

The invention, while not being limited thereto, is particularly concerned with spinning cylinder heads and involves improved balancing means therefor which is applicable to existing spinning cylinder heads.

A primary object of the invention is to provide dynamic balancing means for spinning cylinders or other rotary structures, which embodies a plurality of weights which are adjustable in circles whose centers are in the axis of rotation of the cylinder or other rotary structure.

A further and more specific object of the invention is to provide dynamic balancing means for spinning cylinders which are supported at their ends by heads, including vertically disposed disk portions whose centers coincide with the axes of rotation of the cylinders, and wherein the balancing means are in the form of weights supported by the disks in equally spaced relation to the axes thereof and which are adjustable about said axes for dynamically balancing the cylinders.

A still further object of the invention is to provide dynamic balancing means for spinning cylinders, the heads of which embody cup-shaped body portions for supporting opposite ends of the cylinders with the cup-shaped body portions open at the opposite ends of the cylinders, and wherein the balancing means comprise weights supported by the body portions and which are readily adjustable from within the open ends thereof.

Other objects and advantages of the invention will become apparent in the course of the following detailed description, taken in connection with the accompanying drawing, wherein:

Figure 1 is a side elevational view of the improved spinning cylinder head with a preferred form of balancing means operatively associated therewith, the head being shown in supporting relation to one end of a spinning cylinder.

Figure 2 is an elevational view as observed from the left of the head shown in Fig. 1.

Figure 3 is an elevational view, on a somewhat reduced scale, as observed from the right of the head shown in Figure 1.

Figure 4 is an enlarged vertical sectional view in the plane of line 4-4 on Figure 2.

Figure 5 is a side elevational view of a modified form of cylinder head.

Figure 6 is an elevational view similar to Figure 2 showing a cylinder head of the form now

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used but being provided with the improved balancing means in slightly modified form.

Figure 7 is a broken side elevational view of the cylinder head according to Figure 6, partly in section.

Figure 8 is a substantially enlarged fragmental elevational view showing the application of a calibrated scale in proximity to one of the adjustable balancing units.

Figure 9 is a vertical sectional view in the plane of line 9-9 on Figure 8.

Figure 10 is an end elevational view of the weight shown in Figure 8.

Figure 11 is an edge view of the disk washer shown in Figure 8.

While the present invention is more particularly concerned with balancing means for spinning cylinders and other rotating bodies by means of adjustable weights to be located as near as possible to the ends of the cylinders or other rotating bodies, it embodies also an improved form of spinning cylinder head per se.

The heads as now constructed embody an elongated cylindrical hub and a cup-shaped body portion including an end wall of disk form which projects from the hub adjacent one end thereof and a cylindrical flange concentric with the hub and projecting from the margin of said end wall in the direction of said one end of the hub.

This structure is shown in Figures 6 and 7, wherein the successive elements referred to are designated 16', 14' and 12', respectively.

This head is now constructed by a casting operation which requires costly machining operations which, with the cost of the casting operation, renders the head substantially expensive in its construction.

In accordance with the present invention, the cup-shaped body portion 11 of the head 10 is formed by a stamping operation, and such portion includes a cylindrical flange 12 having a free edge provided with a cylinder end-engageable flange 13. The flange 12 at its opposite edge merges into an end wall 14 of disk form.

The hub embodies a casting including a relatively short cylindrical end portion 15 and a relatively long cylindrical portion 16 disposed on opposite sides of a flange 17 which is provided with apertures for receiving rivets 18.

While the hub according to the present invention is formed by a casting operation, its form is such that its production by this method is relatively simple and inexpensive. The hub is readily associated with the stamped body portion by inserting the hub end 15 through an opening in the

wall 14 and then inserting the rivets 18 through aligned apertures in the wall 14 and flange 17 and then heading the rivets for firmly connecting the hub and stamped body portion.

The hub, in keeping with the usual form as shown in Figures 6 and 7, is provided with one or two longitudinal slots 16^a, and the hub is frictionally secured to a spinning cylinder shaft, as by means of the member 19.

While the spinning cylinder structure, generally, forms no part of the present invention, it may be here stated that a head 10 is secured in each end of the cylinder C (only a portion of which is shown in Fig. 1) and a shaft is secured in the hub of each head, which shafts project axially from opposite ends of the cylinder and are supported by bearings on trackways therefor.

The improved balancing means in accordance with the present invention includes the provision of a plurality of slots 20 (preferably three) in the wall 14 of the cylinder head, and such slots are disposed concentrically of the hub and are of substantial circumferential extent.

A weight 21 is adjustably supported on the wall 14 within the range of each slot 20 and is provided with a tapped bore 21' for receiving the shank of a bolt 22 which extends through the slot 20. A disk form washer 23 and a split locking washer 24 (see Figure 8) are disposed intermediate the wall 14 and the head of the bolt 22 with the disk washer directly engaging the wall 14 in opposition to the weight 21.

With this construction, the spinning cylinder which is provided with these heads is more accurately balanced in association with a dynamic balancing machine by adjusting in each head one or more of the weights 21 as is indicated to be necessary by the balancing machine, and thereby properly distributing the rotating mass relative to the axis of rotation.

It is to be noted that while the weights 21 are disposed behind the walls 14, the bolts 22 are readily accessible from the open ends of the cup-shaped body portions for ready access thereto.

The weights 21 are shown as of substantially semi-spherical form, but same may be of various other forms as well as of other sizes, and the weights may be of any desired material.

It is to be further noted that in forming the cup-shaped body portions 11 by a stamping operation, relatively light gauge sheet material may be used, and in order to reinforce the wall portions 14, same may be provided with pressed-out ribs 25 or other deformations which extend from the hub-receiving opening to adjacent the flange 12, and such ribs or other deformations are disposed between the adjacent ends of the slots 20. The formation of these ribs can be formed with facility in a stamping operation.

In Figures 6 and 7 the improved balancing means is shown in operative association with a spinning cylinder head of the present cast iron form and wherein the wall 14' is provided with the slots 20. The weights 21^a shown in Figures 6 and 7 are of block-like form, but the weights 21 may be used if desired.

In the use of the block-like form of weight 21^a, which may be desirable in many instances, means is provided to maintain same in proper position relative to the axis of rotation of the head, and it is desirable that scales be provided adjacent each of the weights, in which event the disk-form washer will be provided with a pointer, and accordingly the washer should be retained against rotation on its axis.

The purpose of the calibrated scale is to enable the operator of the balancing machine to have a reference as to how far to shift the weights and to aid him in obtaining a very fine adjustment. Thus, after practice, the operator knows by the reading given by the machine how many calibrations to shift the weights. In fact, it is possible to furnish him with a table to refer to for each diameter body.

The calibrated scale is, of course, applicable and desirable with the forms of weights shown in Figures 1 to 5, inclusive.

In Figures 8 to 10, inclusive, is shown an embodiment which may replace that of Figures 1 to 4 or 6 and 7, and wherein the washer 23^a is provided with ears 26 which rest in the slot 20, and the washer is provided with a pointer 27 for cooperation with a calibrated scale 28 on the wall 14.

The weight 21^a, due to its non-symmetrical form relative to the axis of bolt 22, should be retained in permanent fixed relation relative to the axis of rotation of the head, and accordingly such weight is provided with a pair of lugs 29 which rest in the slot 20. However, it is essential that the weights of whatever form be positively retained against rotation about the axes of their retaining means and which is effected by the washers 23 and 24 in Figures 1 to 5, 8 and 9.

The scale 28 may be formed by any suitable means and by its provision greater accuracy of adjustment is attainable.

In Figure 5 is shown a modified form of head wherein a pair of cup-shaped body portions 11 and 11' is provided with their walls in juxtaposition and the flange 13 eliminated from the portion 11'. This form of head provides for greater surface engagement of the cylinder and therewith which may be desired on larger diameter cylinders.

While I have disclosed my invention in accordance with certain specific structural embodiments thereof, such is to be considered as illustrative only, and not restrictive, the scope of the invention being defined in the following claims.

What I claim and desire to secure by U. S. Letters Patent is:

1. Dynamic balancing means for a rotatable body including a wall portion having an axis of rotation, said means comprising an elongated curved slot in said wall portion concentric with said axis of rotation and having parallel opposed walls, a weight of elongated form in the direction of said slot disposed adjacent one side of said wall portion and having a threaded recess therein intermediate the ends thereof, a bolt including a tool-engageable head and a threaded shank, the shank only of said bolt extending through said slot and having threaded connection with said recess in said weight, the head of said bolt being disposed adjacent the opposite side of said wall portion for tool engagement thereof to draw the weight into frictional engagement with said wall portion and for releasing same for adjustment lengthwise of said slot, and a lug projecting from said weight at each side of said recess and being engageable in said slot for restraining said weight against rotation about the axis of said bolt.

2. The structure according to claim 1, together with a disk-form washer on said bolt and disposed between said wall portion and the head of said bolt, a scale on said wall portion adjacent to and lengthwise of said slot, and a pointer on said washer directed toward said scale.

3. The structure according to claim 2, together

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with a pair of ears on said washer engageable in said slot.

4. Dynamic balancing means for a rotatable body including a wall portion having an axis of rotation; said means comprising an elongated curved slot in said wall portion concentric with said axis of rotation and having parallel opposed walls, a weight disposed adjacent one side only of the wall portion and having a threaded recess therein, and a bolt including a tool-engageable head and a threaded shank, the shank only extending through said slot and having threaded connection with said recess in said weight, the head of said bolt being disposed adjacent the opposite side of said wall portion for tool engagement thereof to draw the weight into frictional engagement with said wall portion and for releasing same for adjustment lengthwise of the slot, said weight including a relatively large area flat wall engageable with said wall portion, and a projection from said wall and in spaced relation to said recess, said projection being engageable

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in said slot for retaining said weight against rotation about the axis of said bolt.

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