Nov. 5, 1940. W. P. HILGER ET AL 2,220,370

DRUM FOR SMOOTHING SURFACES

Filed March 29, 1940 2 Sheets-Sheet 1

Fig-1

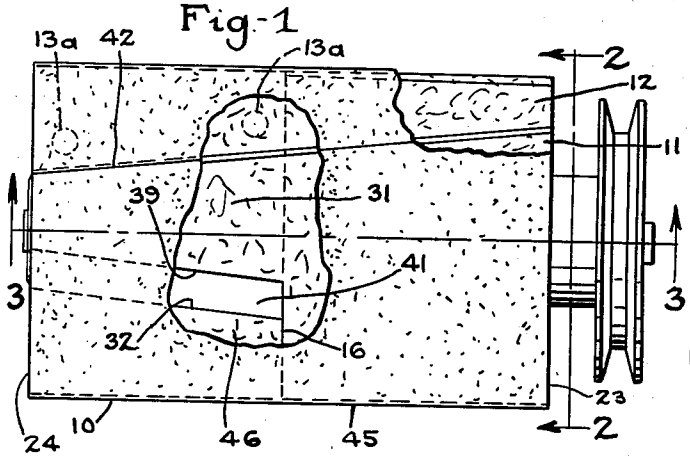
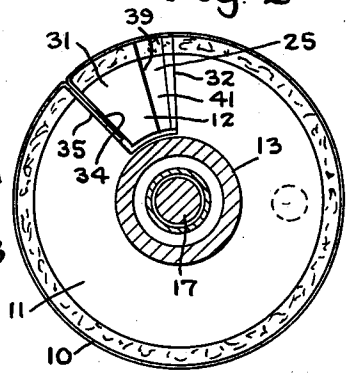


Fig-2



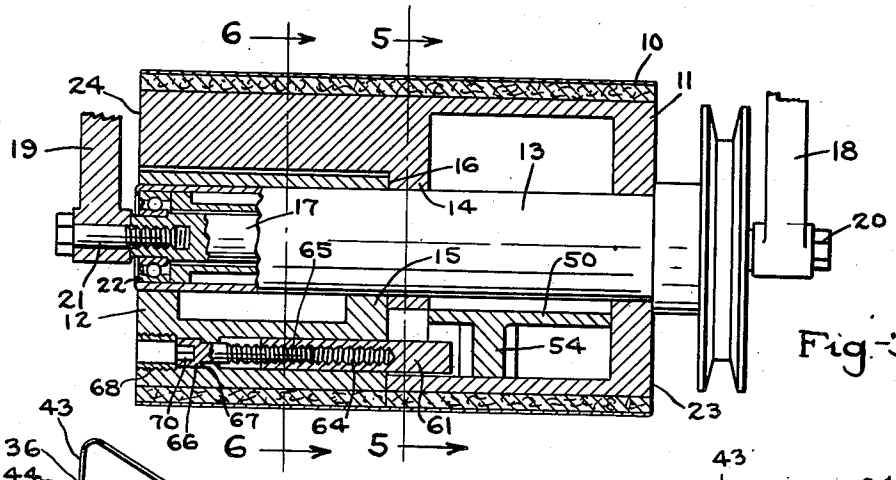


Fig-3

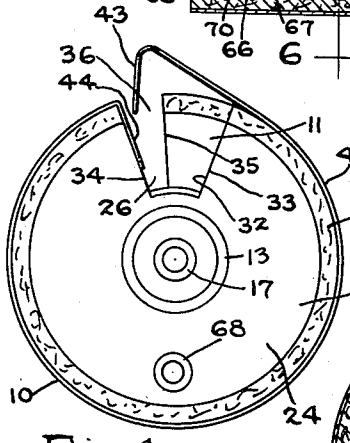


Fig-4

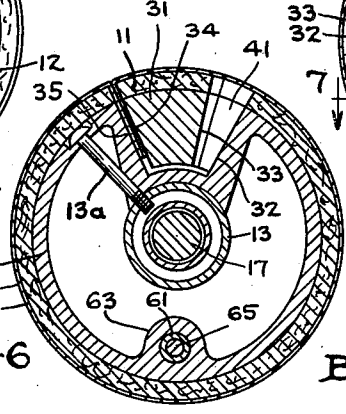
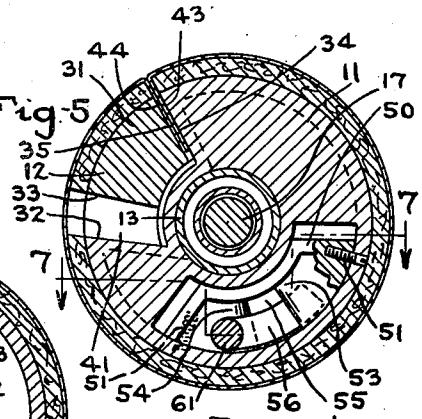


Fig-6

Fig-5



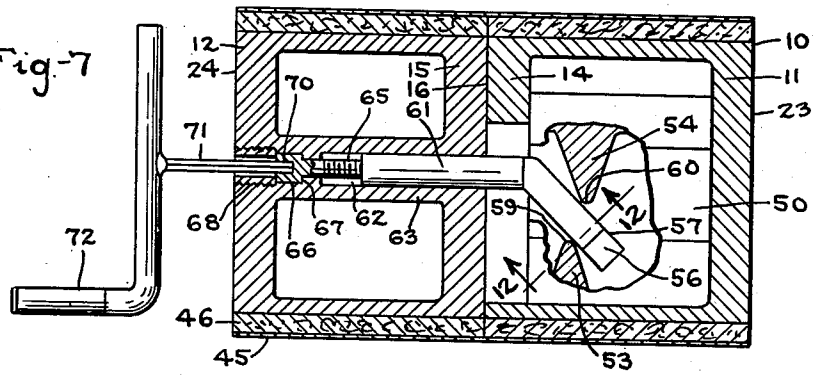
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Fig-7



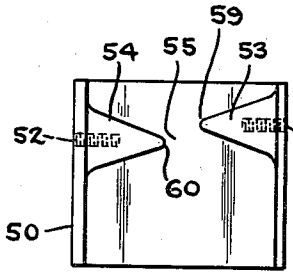


Fig-9

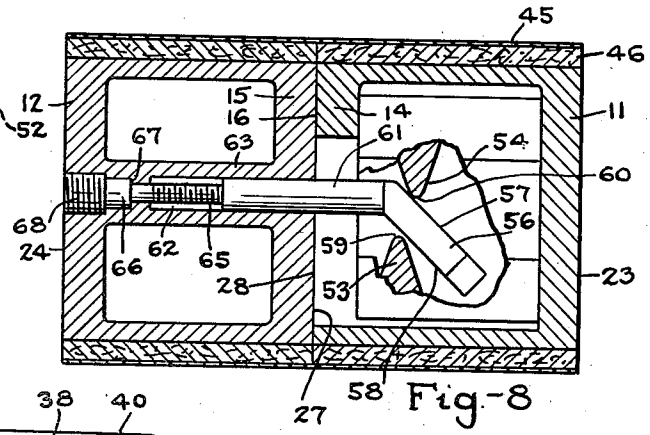
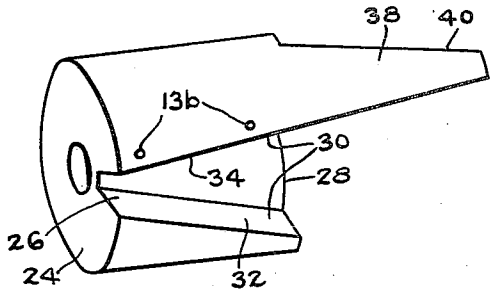


Fig-8



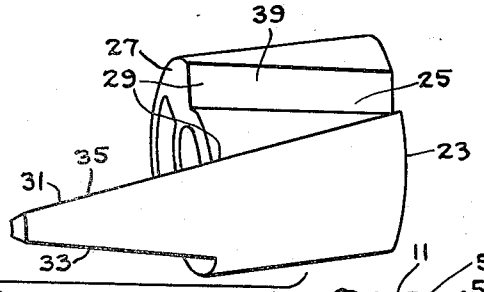
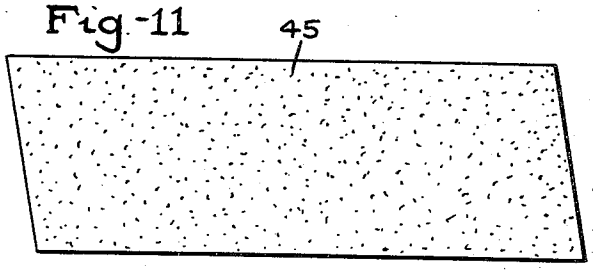


Fig-10

Fig-11



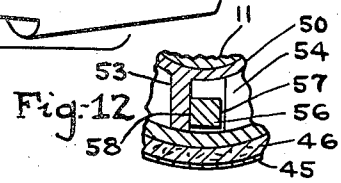


Fig-12

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UNITED STATES PATENT OFFICE

2,220,370

DRUM FOR SMOOTHING SURFACES

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Application March 29, 1940, Serial No. 326,630

9 Claims. (Cl. 51—194)

Our invention relates to a drum for smoothing surfaces employed in floor surfacing machines known as floor sanders, in which a drum or roller having applied thereto an abrasive sheet is mounted for rapid rotation with the abrasive material of the sheet in contact with a wooden surface such as a floor surface.

In such appliances the actual abrasion of the wooden surface is directly effected by sharp particles of considerable size formed of carborundum or hard substances held upon a sheet. Such abrasion sheets have some of the characteristics of sandpaper, and for this reason the machines employing such sheets have been called floor sanders.

These abrasive sheets are necessarily stiff and heavy, and it is of the highest importance that they be secured upon the sanding drum, so that they lie perfectly flat thereon over all, that they may be held firmly and immovably on the drum, and that they may be readily removed and replaced by fresh sheets.

It is therefore a principal object of our invention to provide a sanding drum to which the abrasive sheet may readily be attached and when attached will be held perfectly tight on the drum to present a smooth running cylindrical surface in operation.

It is a further object of our invention to construct a sanding drum formed of two sections adapted to be separately received upon the mandrel, said sections being provided with offset portions extending the full length of the sanding drum, said offset portions having parallel faces adapted to receive the ends of the abrasive strip.

It is a further object of our invention to make said drum sections so that the full length extension on each of them will be respectively spaced from the adjacent face of the other section, whereby the two sections may be relatively spaced to open and close the full length space between them.

It is a further object of our invention to provide a key member slidable in one section and having a part engageable with cam faces in the other section together with manually-operative means for causing said key member to move longitudinally, whereby the two sections will be relatively rotated to open or close the full length abrasive-paper-holding jaws, as may be desired.

It is a further object of our invention to form the key member in two integrally formed parts, one a cylindrical pusher member movable endwise on one of the sections parallel to the axis of the drum and having thereon a second part or cam piece which is angularly disposed relative to the pusher rod section, said angularly disposed part engageable with cam members on the second section so that when the same is caused to move endwise of the pusher rod in either direction the cam piece will cause said second section to rotate relative to the first section.

It is a further object of our invention to provide in conjunction with said slidable key member means for sliding the same which shall consist of a threaded screw engaging an internally threaded opening of said member together with a crank member for rotating the screw, whereby the sliding of the member may be effected with a desired degree of power.

The full objects and advantages of our invention will appear in connection with the detailed description thereof, and the novel features by which the advantageous results of the invention are secured will be particularly pointed out in the claims.

In the drawings illustrating an application of our invention in one form:

Fig. 1 is a side elevation view of our sanding roller with a strip of abrasive paper held thereon in operative position.

Fig. 2 is an end elevation sectional view taken on line 2—2 of Fig. 1.

Fig. 3 is a longitudinal sectional view taken on line 3—3 of Fig. 1 and showing the drum as mounted in the sanding machine.

Fig. 4 is an end elevation view of the drum showing the paper receiving the jaws spread apart.

Fig. 5 is a transverse sectional view taken on line 5—5 of Fig. 3.

Fig. 6 is a similar transverse sectional view taken on line 6—6 of Fig. 3.

Fig. 7 is a longitudinal sectional view through the drum taken on the irregular section line 7—7 of Fig. 5.

Fig. 8 is a similar view showing the parts in a different position.

Fig. 9 is a view of the cam element removed from the drum.

Fig. 10 is a semi-perspective view of the two sections of the drum separated but showing their relation one to the other.

Fig. 11 is a plan view of a strip of abrasive paper such as is adapted to be applied to the drum.

Fig. 12 is a sectional view taken on line 12—12 of Fig. 7.

Generally considered the drum 10, Fig 3, is

composed of a pair of sections 11 and 12 adapted to be applied to a supporting mandrel 13, whereby the sections will have their respective inner ends 14 and 15 in engagement at 16, as clearly indicated in Figs 1, 7 and 8 And when the ends of sections 11 and 12 are so in engagement they form in effect a single drum held by mandrel 13. In practice this mandrel and the attached drum 10 will be journaled to rotate about a fixed shaft 17 rigidly held in arms 18 and 19 by bolts 20 and 21, the mandrel 13 being mounted to rotate about shaft 17 upon ball bearings 22, all as clearly shown in Fig. 3.

As clearly shown in Fig. 6, the drum section 12 is secured to mandrel 13 by means of screw bolts 13*a*, there being a pair of said screw bolts as indicated by the screw openings 13*b*, shown in Fig. 10. Drum section 11, however, is left free to rotate upon mandrel 13 independently of drum section 12, thus making possible relative rotary movement of the two drum sections for the highly important purpose later to be described. Although this relative movement of the two drum sections may take place, in fact it is possible to have such movement only in connection with the means for effecting the relative movement which will later be described.

The form of the two drum sections 11 and 12 and their relation to each other is very well shown in Fig. 10, wherein it is clear that each of these sections is similar and symmetrically complementary, but not identical, as is true for example with the ends. The outer ends 23 and 24 of sections 11 and 12, respectively, are plane-faced and completely cylindrical except for a V-shaped cut-out portion indicated at 25 in Fig. 8, and at 26 in Fig. 9. The cut-out portions 25 and 26 diverge and expand through the inner faces 27 and 28 of the sections 11 and 12, as indicated at 29 and 30 of Fig. 10.

From the face 27 of section 11 there is a projecting member 31 having an over all length equal to the length of section 12 or 11 and adapted to sit within the cut-out portion 26 of section 12 and having walls parallel to the walls of said cut-out portion but being smaller in area than said cut-out portion, so that the face 32 of cut-out portion 26 will be parallel with and may engage face 33 of projection 31, and face 34 of cut-out portion 26 may engage the face 35 of projection 31. But the engagement of such faces cannot take place simultaneously, but when faces 32 and 33 are in engagement, as viewed in Fig. 4, there will be a gap, indicated at 36 of Fig. 4, between faces 34 and 35.

Similarly, from face 28 of section 12 there is a projecting member 38 having an over all length equal to the length of section 11 or section 12 and adapted to sit within the cut-out portion 25 of section 11 and having walls parallel to the walls of said cut-out portion but being smaller in area than said cut-out portion, so that the face 39 of cut-out portion 25 will be parallel with and may engage face 40, and projection 38 and face 35 of cut-out portion 25 may engage the face 34 of projection 38. But again the engagement of such faces cannot take place simultaneously, but when faces 34 and 35 are in engagement, as viewed in Fig. 1, there will be a gap, indicated at 41 of Fig. 1, between faces 32 and 39.

From the above it will be apparent that faces 34 and 35 extend diagonally across the whole length of the drum, as indicated at 42 in Fig. 1, and that these faces 34 and 35 constitute the jaws for holding and gripping turned-down ends 43 and 44 of the abrasive paper strip 45 which has been wound about the composite drum 10 or a layer of felt 46 on said composite drum. It will also be apparent that the two sections 11 and 12 making up the composite drum 10 are mounted upon the mandrel 13, see Fig. 3, to permit them to be rotated relatively, whereby the jaw faces 34 and 35 may be caused to recede from one another to release the abrasive strip 45 or to approach one another to engage the turned-in ends 43 and 44 of abrasive strip 45. And, likewise, it is important that this engagement by jaw faces 34 and 35 shall exert a considerable degree of force upon the abrasive strip ends 43 and 44, so that the encircling abrasive strip may be held securely during the sanding operation.

To effect this movement with the desired force we provide a cam piece 50 which is semi-cylindrical and is secured to drum section 11 by screws 51, as clearly indicated in Fig. 5. The screws 51 enter threaded bores 52, Fig. 9, extending into oppositely disposed V-shaped cam members 53 and 54. As clearly indicated in Figs. 7, 8 and 9, the cam members 53 and 54 are slightly offset circumferentially so as to leave a space 55 between them which runs in a plane at an angle to the axis of drum 10. Entering this space at a quite sharp angle (Figs. 7 and 8) is a cam arm 56 which has flat faces 57 and 58, Fig. 12, that engage respectively the end 59 of cam member 53 and the end 60 of cam member 54. The cam arm 56 is integral with a pusher rod 61 which is slidably mounted in a bore 62, Figs. 7 and 8, extending along a boss 63 formed integrally with drum section 12, Fig. 6. The pusher rod 61 is formed with an internally threaded bore 64. Threaded into this bore is a threaded screw member 65 having thereon a head 66 engageable on one side with an internal flange 67 and on the other side with an externally threaded nut or washer 68 which holds the screw member 65 against longitudinal movement. The top of head 66 is provided with a socket 70 adapted to receive the shaft 71 of a turning tool having thereon a crank 72. It follows that when the screw member 65 is rotated by means of crank 72 it will cause the pusher rod 61 and the cam arm 56 to move longitudinally near the outer circumferential area of the composite drum 10 formed of drum sections 11 and 12. Because of the square faces 57 and 58 on cam arm 56 engaging the cam ends 59 and 60, the pusher rod 61 is held from turning and the full power of the screw is exerted through cam arm 57 upon the cam ends 59 and 60, which will have the effect of turning the drum section 11 one way or the other relative to drum section 12. This of course will open or close the slots 41, Fig. 1, between respective short walls 33 and 32 and 39, 40 of cam sections 11 and 12, correspondingly opening and closing elongated slot 36 between jaw faces 34 and 35 to cause said jaw faces to engage and grip or to release the bent-over ends 43 and 44 of the abrasive strip 45.

The advantages of our invention will quite clearly appear from the foregoing description. The strip-holding jaws 34 and 35 obviously can be operated with the utmost ease by merely inserting the wrench rod 71 into the socket 70 of the screw member 65 and rotating it. Also, by reason of the powerful cam action upon the sides of angularly disposed cam piece 56 at a point toward the outer circumference of the drum section 11, this rotation not only can be effected with certainty and ease but very strong pressure

can be applied to the paper ends between holding jaws 34 and 35 not only to hold them rigidly secure but to give a small amount of stretch to the encircling abrasive paper whereby it will be secured upon the outer surface of the sanding drum 10 or the layer of felt 46 thereon so stretched as to present a smooth immovable cylindrical surface. Furthermore, as clearly appears, the open shorter slots 41 (when the jaws 34 and 35 are in clamping position) are angularly disposed relative to the cylindrical surface so that at no time will the shock of the grinding or sanding action be permitted along the length of said slots. For this reason the sanding paper over the slots will be able to perform its function without being rendered even partially ineffective because of being sunk, even in a small degree, into the space of the slots. This is also true when the long clamping slot 36 is fully closed, clamping the ends of the abrasive paper. Above all, the entire construction is so simple in operation that it does not require an expert or even one specially trained to use it. Any one who can bend the ends of paper strips and turn a crank can assemble the abrasive strip upon the composite cylinder in the effective manner above described, and of course the removal of such strip when it is worn out is effected even more simply.

It will be noted also that there are no slots or holes in the abrasive paper which can be prepared by simply cutting it at the indicated angle from the roll. No shims or paper wedges are required between the clamping jaws, which is the case with many other types of holders, and these jaws hold the paper firmly all the way across, and the resulting groove where the paper is held is so narrow that in effect the abrasive surface is continuous. It is not only easy to cut the paper but very easy to change the paper. The drum is perfectly cylindrical at all times after the paper has been applied thereto. There is a positive take-up of the paper with no slip at any time.

Also, the mounting of the sections of the drum on the mandrel, as is done in our invention, makes it practicable to withdraw the sanding drum from the mandrel at any time to permit waxers, steel wool buffers and the like to be substituted for the sander. The essential thing about the sander of course is the layer of abrasive paper on the outside of the sander drum, and, as above pointed out, this layer may be applied easily and with the utmost effectiveness, and when worn out may be removed with equal ease.

A further very great advantage of the means for clamping the paper provided by our invention is found in the fact that as the paper is clamped it is slightly stretched and drawn very tight and smooth upon the surface of the drum and over the irregular openings which permit the clamping movement. This insures a smooth, firm and unyielding operative surface of the sanding paper upon the sanding drum, which is a factor in causing it to produce the very best results in operation.

We claim:

1. A sanding drum comprising a pair of cylindrical sections having inner ends in engagement to form a composite drum member for receiving a strip of abrasive paper, said cylindrical sections each having a cut-out portion and an extension going into the cut-out portion of the other member, forming clamping jaws extending along the faces of the cut-out portion and an extended member for receiving the ends of a paper strip and holding them clamped to bind the strip upon the drum.

2. A sanding drum comprising a pair of cylindrical sections having inner ends in engagement to form a composite drum member for receiving a strip of abrasive paper, said cylindrical sections each having a cut-out portion and an extension going into the cut-out portion of the other member, forming clamping jaws extending along the faces of the cut-out portion and an extended member for receiving the ends of a paper strip and holding them clamped to bind the strip upon the drum, and means for rotating said sections relatively to cause the jaws to grip said ends of the paper strip.

3. A sanding drum comprising a pair of cylindrical sections having inner ends in engagement to form a composite drum member for receiving a strip of abrasive paper, said cylindrical sections each having a cut-out portion and an extension going into the cut-out portion of the other member, forming clamping jaws extending along the faces of the cut-out portion and an extended member for receiving the ends of a paper strip and holding them clamped to bind the strip upon the drum, a slide in one section having a cam arm thereon entering the other section, a cam surface on the second section engageable by said cam arm, and means to project the slide and cam arm to cause the second section to rotate relative to the first section.

4. A sanding drum comprising a mandrel and two sections held on said mandrel to form the complete drum, said sections having portions extending the full length of the drum to form jaws for clamping the ends of an abrasive strip, a slidable cam member for causing one of said jaws to rotate relative to the other, and a screw threaded into a portion of said member for sliding the same.

5. A sanding drum comprising a mandrel and two sections held on said mandrel to form the complete drum, said sections having portions extending the full length of the drum to form jaws for clamping the ends of an abrasive strip, a slide in one section having a cam arm thereon entering the other section, said slide being provided with an internally threaded bore, a screw in said bore, and means extending outside of the section for operating the screw, whereby said slide and the cam arm thereon will be operated to cause one section to rotate relative to the other.

6. A sanding drum comprising a mandrel and two sections held on said mandrel to form the complete drum, said sections having portions extending the full length of the drum to form jaws for clamping the ends of an abrasive strip, means mounted in one of the sections and having a part extending into the other section for causing the sections to be rotated relatively, and manual means for operating the same.

7. A sanding drum comprising a mandrel and two cylindrical sections held for relative rotation on said mandrel to form the complete drum, said sections having portions extending the full length of the drum to form complementary jaws for clamping the ends of an abrasive strip, a slide mounted near the outer circumference of one of said sections, said slide having a cam arm thereon entering the other section, a cam piece on the second section engaged by said cam arm, and means for causing the slide and cam arm to move longitudinally to cause the cam arm to engage the cam piece and rotate one of said sections relative to the other.

8. A sanding drum comprising a mandrel and two sections mounted on said mandrel, one of them being rigidly connected thereto and the other adapted to rotate thereon, said sections having portions extending the full length of the drum to form complementary jaws clamping the ends of an abrasive strip, a pusher pin mounted in and near the outer circumference of one of said sections and having a cam arm thereon entering the other section, means on said other section adapted to be engaged by the cam piece and rotate said other section when the pusher pin and attached cam piece are moved longitudinally, and means for moving them longitudinally.

9. A sanding drum comprising a mandrel and two sections held on said mandrel to form the complete drum, said sections having portions extending the full length of the drum to form jaws for clamping the ends of an abrasive strip, endwise movable means mounted on one of the sections and having a flat-sided cam piece extending into the other section, two cam projections spaced apart and having said cam piece positioned between them with each flat-side in engagement with one of said cam pieces, and manual means for moving the member endwise to cause the cam piece to engage the cam projections and rotate said other section relatively to the first named section.

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