Feb. 3, 1959 H. L. HARTZELL ET AL 2,872,537

DISTRIBUTOR STRUCTURE

Original Filed Dec. 23, 1953

3 Sheets-Sheet 1

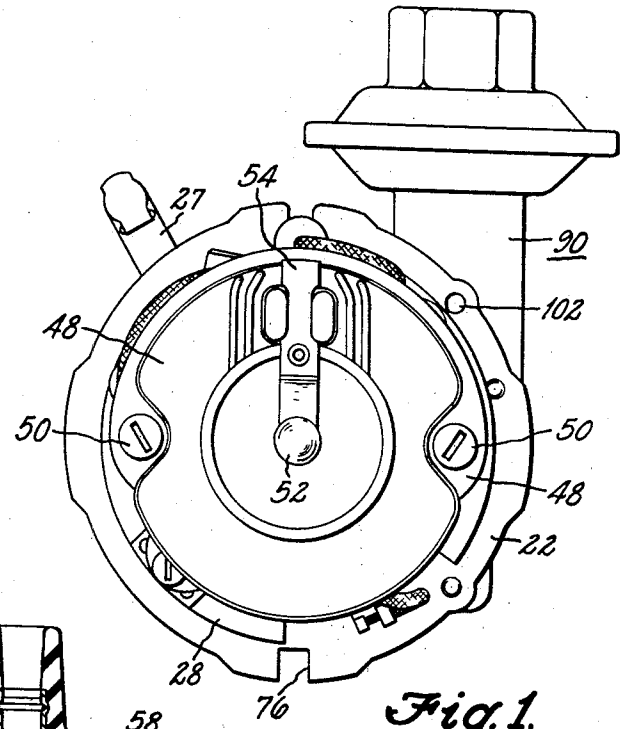


Fig. 1.

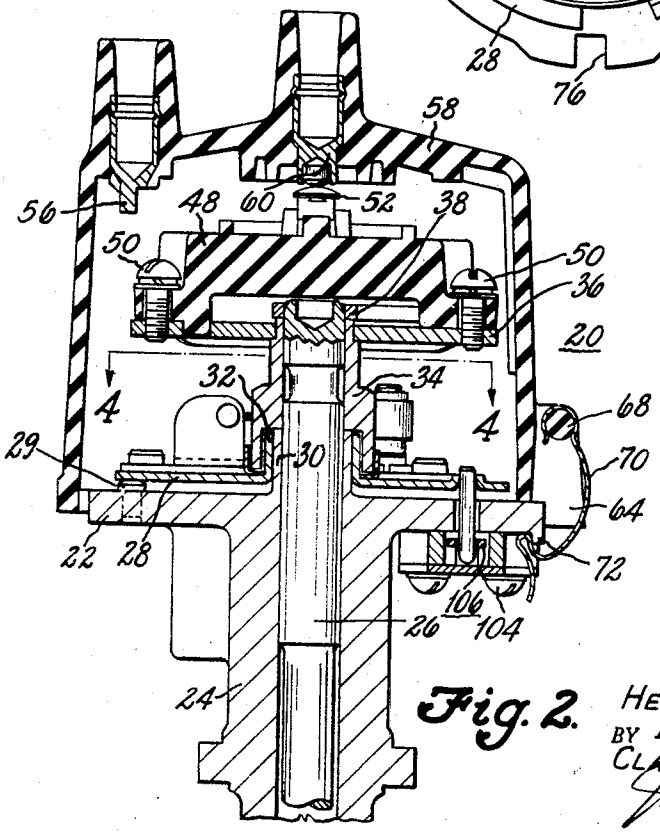


Fig. 2.

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DISTRIBUTOR STRUCTURE

Original Filed Dec. 23, 1953 3 Sheets-Sheet 2

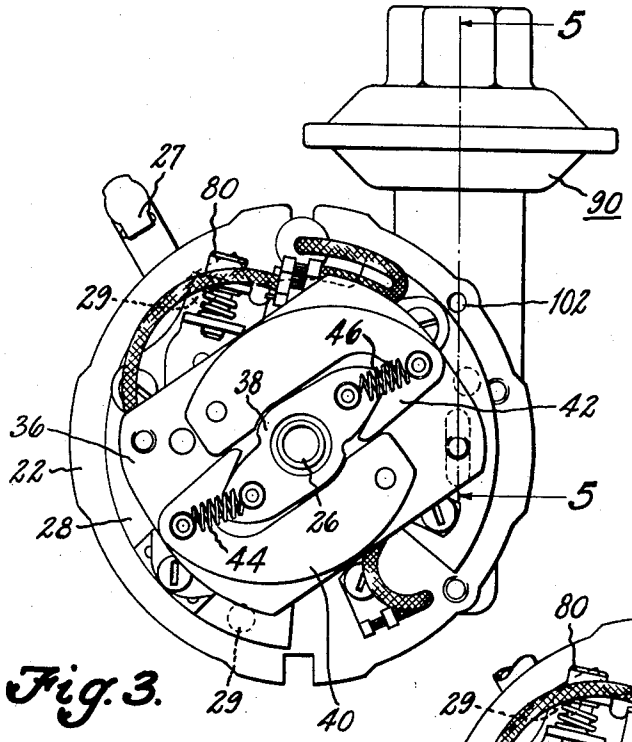


Fig. 3.

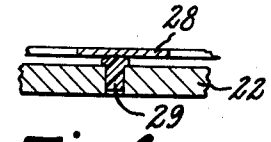


Fig. 6.

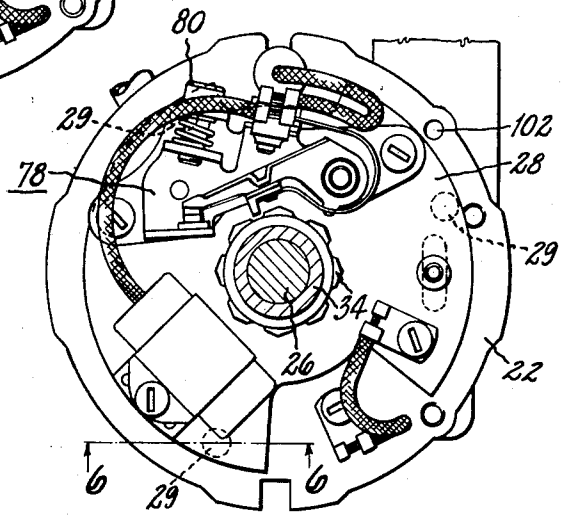


Fig. 4.

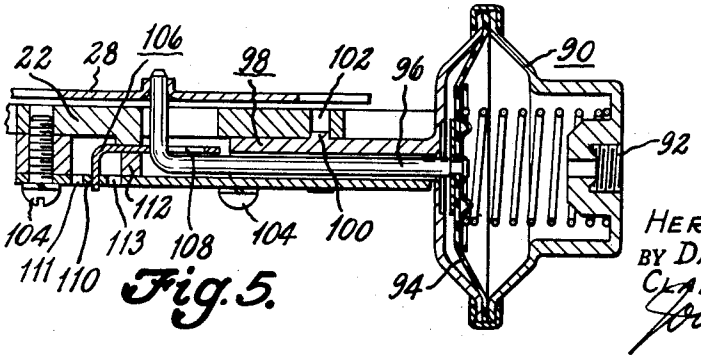


Fig. 5.

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Original Filed Dec. 23, 1953 3 Sheets-Sheet 3

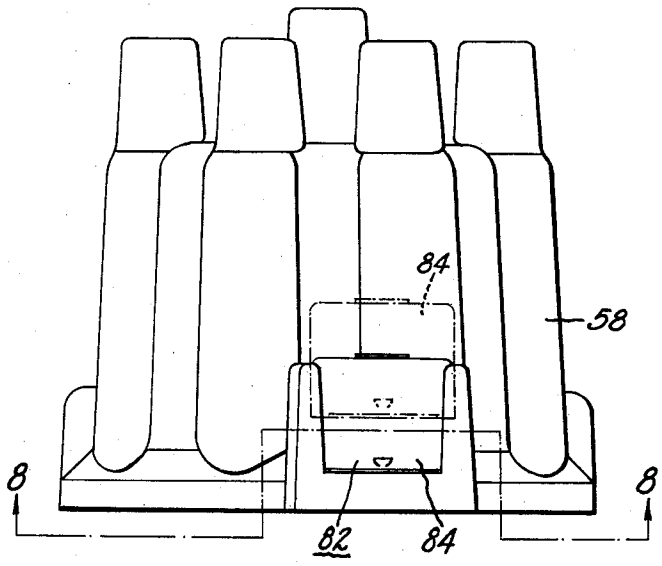


Fig. 7.

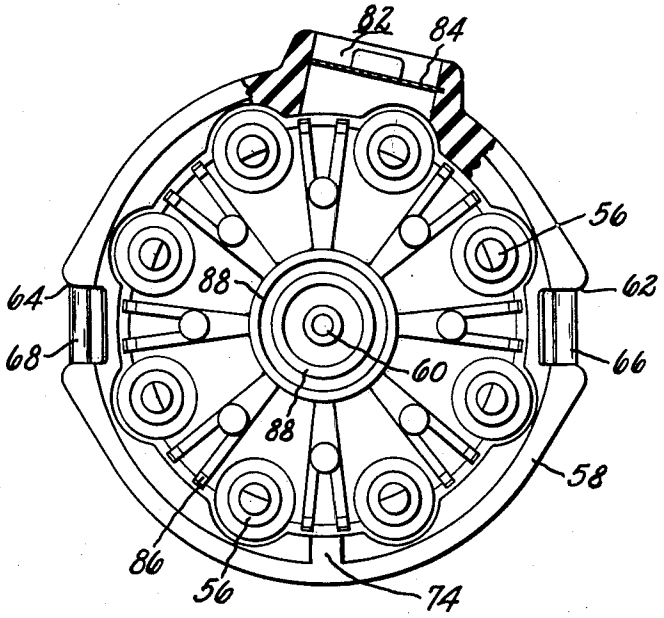


Fig. 8.

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DISTRIBUTOR STRUCTURE

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Original application December 23, 1953, Serial No. 400,024, now Patent No. 2,769,047, dated October 30, 1956. Divided and this application September 6, 1956, Serial No. 608,275

3 Claims. (Cl. 200—31)

This invention relates to a distributor and is particularly concerned with an improved distributor wherein the operating elements thereof are inverted in order to accomplish improved operation within the distributor.

This application is a division of our copending application, Serial No. 400,024, filed December 23, 1953.

One of the objects of the invention is to provide a distributor structure wherein the breaker plate carrying the circuit breaker is carried in close proximity to the bearing for the rotating shaft which carried the operating cam for the circuit breaker, thereby eliminating to a major degree plate wobble and other attendant difficulties normally existent in conventional designs of distributor structures.

In carrying out this object, it is a further object to support the breaker plate on a central bearing also used as the distributor shaft bearing and to simultaneously utilize peripheral supports therefor for preventing wobble or misalignment of the plate.

Another object of the invention is to provide a centrifugal device for automatically advancing the cam in a distributor in response to the speed of the engine with which the distributor is used wherein said centrifugal device is positioned above the cam and at the outermost end of the distributor shaft where it is easily accessible for repair or adjustment.

Another object of the invention is to provide a distributor wherein the distributor cap acts as a housing for all the parts therefor whereby a more accessible distributor is provided which can be manufactured at reduced cost.

A still further object of the invention is to provide a circuit breaker element for use in a distributor wherein externally accessible means are provided for adjustment of the breaker points, which means are accessible through a window in the cap, which window is closed by a sliding panel at the outside of the cap.

Another object of the invention is to provide improved attachment means for attaching the cap to the base of the distributor, said means comprising spring clips which resiliently engage the cap and the base and thereby eliminate the use of rivets, screws, etc., which normally are used to attach the clips to either the distributor housing or the distributor cap.

Still another object of the invention is directed to the improved vacuum control apparatus, which adjusts the position of the breaker plate in response to engine suction and a mounting means therefor which includes a vacuum control device that may be mounted on the distributor base by means of a plurality of screws and which is automatically positioned through positioning lugs so that the actuating means thereof is in proper alignment with the breaker plate.

In carrying out the above object, it is a further object to provide removable limiting means in said vacuum control device for selectively limiting the extent of adjustment of the breaker plate whereby major adjustments can be made together with external means for facilitating minor adjustments for vacuum cut-in.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein preferred embodiments of the present invention are clearly shown.

In the drawings:

Fig. 1 is a top view of the improved distributor with the cap removed.

Fig. 2 is a vertical section through the distributor with the cap in place.

Fig. 3 is a top view of the distributor with the rotor removed and showing the centrifugal mechanism.

Fig. 4 is a section with the cap removed taken on line 4—4 of Fig. 2, showing the breaker plate assembly.

Fig. 5 is a sectional view taken on line 5—5 of Fig. 3 and shows the vacuum control mechanism.

Fig. 6 is a view in section taken on line 6—6 of Fig. 4, showing one of the supporting buttons or bearings used for the breaker plate.

Fig. 7 is a plan view of the distributor cap.

Fig. 8 is a view partly in section taken on line 8—8 of Fig. 7.

A conventional type distributor is shown in Patent No. 2,125,368, issued to J. F. Arthur and assigned to the assignee of the present invention. In this distributor, it will be noted that the centrifugal mechanism is located beneath the breaker plate whereby the cam actuating the circuit breaker and carried by the plate is spaced a considerable distance from the bearing and wherein the breaker plate, due to the disposition of the bearing for the distributor shaft, is often subjected to wobble because of the opening and closing of the circuit breaker by means of the cam. This wobble is occasioned by the remote positioning of the bearings from the operating element. The present invention is directed to a distributor which eliminates this breaker plate wobble to a major degree and simultaneously provides a distributor which is more easily accessible for adjustment and repair and which in general includes an inversion of the usual elements of the conventional distributor. In this connection, it will be observed that the circuit breaker and the rubbing block portion thereof which engages the cam 34 is in the same horizontal plane as the center bearing. This contributes to the stability of the breaker plate since this relative position eliminates turning moments with respect to the breaker plate as caused by action of the cam against the rubbing block of the circuit breaker wherein the bearing for the plate is in a different horizontal plane than the cam acting upon the circuit breaker. This particular disposition of parts not only stabilizes the circuit breaker plate and thereby eliminates plate wobble but improves the timing relation since there is less effect on the points due to bearing wear. It is for this reason that the journal 30 for the bearing 32 is upturned so that the effective center of the bearing is in a horizontal plane substantially the same as the center of the rubbing block whereby all movement of the cam on the circuit breaker rubbing block is thrust movement in a single plane without any tendency toward turning moments.

Referring to Fig. 2, a distributor 20 is shown having a bottom or base plate 22 which includes an elongated bearing member 24 in which a distributor shaft 26 is journaled. The bearing 24 is lubricated through tube 27 or by any other suitable means. A breaker plate 28 is journaled around a bearing 30 formed by an upturned collar on the base 22, which bearing is an extension of bearing 24. In this connection, a separate bearing suitably attached to the base may also be used. The breaker plate 28 has an upturned flange or collar 32 centrally located thereof which fits over the bearing 30 whereby the breaker plate is rotatably journaled around the distributor shaft 26 and on the extension 30 of the bearing

24. In other words, the bearing 24 which is preferably integral with the base plate 22, forms a portion of the bearing 30 for the distributor shaft 26 and also is the bearing for the breaker plate 28. In order to prevent breaker plate wobble, a plurality of buttons 29 are provided which are retained in apertures in the base 22. These buttons 29 are preferably equally spaced adjacent the outer periphery of the base to provide adequate support for the plate 28. The buttons 29 may be made of any suitable material, for example, nylon, Bakelite, porous metal or other low friction, good wearing material and may be carried by the plate 28 instead of base 22 if desired. A cam 34 is positioned adjacent the upper end of the shaft 26, which cam carries a centrifugal weight support plate 36 at its upper end which is immovably attached thereto. The plate 36 is apertured in the center thereof so that the shaft 26 may pass therethrough. The upper end of shaft 26 carries a wing-shaped plate 38 as shown in Fig. 3, which plate is fixedly mounted on the shaft. The plate 36, together with its attached cam 34, are movable relative to the shaft and plate 38 through a predetermined degree of rotatable movement. The plate 36 has a pair of centrifugal weights 40 and 42 pivotally mounted thereon, which weights are attached by means of springs 44 and 46 adjacent their outer extremities of the wing-shaped plate 38. As the shaft 26 rotates, it drives the attached plate 38, the plate 36 and cam 34. However, as the speed increases, the pivoted weights 40 and 42 are centrifugally thrown outwardly for adjusting the cam advance with respect to the shaft in an advanced position whereby the timing is automatically advanced in response to the speed of the engine through a predetermined range. The function of this centrifugal mechanism is not new and is used in all distributors and therefore further explanation thereof is not believed necessary, the unique feature of the present mechanism being that the centrifugal mechanism is carried above the cam and external of the distributor housing whereby the centrifugal mechanism is easily accessible for repair or adjustment.

Covering the centrifugal mechanism is a recessed rotor 48, formed from a suitable insulating material such as Bakelite, which is attached to the plate 36 by means of screws 50. The rotor 48 includes a spring contact 52 which is electrically connected to a rotor terminal member 54. The spring contact 52 engages a central terminal 60 in the cap 58. When the rotor is turned by the shaft 26, the rotor terminal member 54 progressively passes adjacent various terminals 56 in the cap.

The cap 58 includes two depressions 62 and 64 at opposite sides thereof adjacent the bottom of the cap which are bridged by bars 66 and 68 formed from the same material as the cap which in general is a suitable Bakelite compound. The bars 66 and 68 are adapted to receive the curved ends of a pair of clip springs 70 as noted in Fig. 2 which may be snapped under the base plate 22 of the distributor for holding the cap in place. In this connection, the base plate preferably has a pair of retaining ledges 72 formed thereon adjacent the point that the clips 70 will engage the base plate. In order to properly position the cap 58 with respect to the base 22, a lug 74 is provided at the inner periphery thereof which engages a notch 76 in the base plate 22. In this manner, the cap 58 may be properly positioned at all times with respect to the base plate 22 so that the clips will engage the ledges 72.

Proper positioning of the cap is also required to properly position an adjustment means 80 for a circuit breaker 78 carried on the breaker plate 28. This adjustment means 80 is noted in the form of a screw shown in Fig. 4 which is accessible externally of the distributor through a window 82 in the side of the cap 58. The window 82 includes a slidable closure member 84 which is retained and may be raised in side slots to a dotted line position shown in Fig. 7 so that a tool can be passed through the window 82 into engagement with the adjustment screw 80. In this manner, the circuit breaker 78 may be adjusted while the engine is running and without removal of the distributor cap 58. The external adjustment may be similar to that disclosed in copending application, Serial No. 371,118 assigned to the assignee of the present invention or it may be of any suitable design.

The underside of the cap 58 is noted in Fig. 8 and includes a plurality of molded spacing members 86 which are provided between each terminal or contact 56 for preventing arcing or leakage therebetween due to moisture, etc. The central contact 60 is protected against similar malfunction by a plurality of concentric rings 88 molded therearound. Both rings 88 and the spacing members 86 are of sufficient height to perform the desired function.

The breaker plate 28 is adapted to be rotated through a predetermined angle of rotation in order to change the timing. This is accomplished by moving the circuit breaker with respect to the cam. This movement is dominated by engine suction which is transmitted through a vacuum control device 90 which is attached to the engine manifold by a tube, no shown, leading to a connection 92 in a device. The vacuum device comprises a spring biased diaphragm 94 which is drawn outwardly or to the right as noted in Fig. 5 by engine vacuum. This moves a centrally attached lever 96 which is bent at its free end to engage the breaker plate 28 by passing through an aperture therein.

In the present embodiment, the vacuum device 90 is made of a die casting which includes a longitudinally extending support 98 cast thereon. The support 98 has a positioning pin 100 which is adapted to fit within an aperture 102 in the base plate 22 to accurately position the vacuum device with respect to the plate. Thus when the lever 96 is attached to the breaker plate 28 and the positioning pin 100 is in the aperture 102 the vacuum device 90 is properly positioned with respect to the distributor. It may thus be removably attached to the base plate 22 by means of a plurality of screws 104.

In order to limit the degree of movement transmitted to the breaker plate by the vacuum device 90 an L-shaped metal limiting device 106 is provided which has a longitudinal slot 108 therein through which the lever 96 passes. The other end of the limiting device 106 passes through a slot 110 in the housing 98 and the limiting device is held against movement by an abutment 112 in the housing. The limiting device 106 cannot be moved out of position since it passes through the slot 110 and bears against the abutment 112 while simultaneously being held between the abutment 112 and the base plate 22. This limiting device 106 is an important part of the invention since it is apparent that the same vacuum device may be used with various distributors wherein the degree of desired movement of the breaker plate is different. In this instance, the same vacuum device is used but the limiting device is changed therein to one having a slot 108 of any desired length to provide the required limit of rotational movement of the breaker plate. A limited adjustment of the slot 110 is also possible, in view of slots 111 and 113 which are positioned on each side of the strap carrying the slot 110. These slots 111 and 113 may be used as insert points for a screwdriver which can be used to move the dividing strip carrying the slot 110 in either direction for effecting minor adjustments in either direction of the limiting device 106.

From the foregoing, it will be apparent that I have provided a distributor which is substantially inverted from the standard distributor in that the breaker plate is supported on the base of the distributor against plate wobble and wherein the cam is carried by the distributor shaft and is attached thereto immediately adjacent the bearing for the shaft which bearing also acts as the bearing for the breaker plate. In this manner no appreciable

wobble can take place during operation of the circuit breaker. Furthermore, the centrifugal weight device for varying cam advance is at the upper end of the distributor shaft and is entirely enclosed by the rotor so that upon removal of the rotor the centrifugal device may be readily adjusted without dismantling the distributor as is necessary in standard type devices. The use of the Bakelite distributor cap as a housing for all the parts of the distributor makes these parts more readily accessible for adjustment and repair and reduces the cost of the unit since less metal is used and fewer machining operations are required in the manufacture of the distributor. The cap includes a window or aperture therethrough which facilitates breaker plate adjustment while the engine is in operation through the insertion of a tool through said window and into engagement with the breaker plate adjustment means.

Another improvement embodied in this distributor resides in the vacuum device for changing the position of the breaker plate in accordance with the engine suction wherein a removable limiting means is provided which may be changed for various operational functions of the vacuum device so that the operative vacuum device is limited in its action upon the breaker plate.

In general, the distributor described herein provides improved operation with greater ease of manufacture and improved facility toward repair or adjustment.

While the embodiments of the present invention as herein disclosed, constitute preferred forms, it is to be understood that other forms might be adopted.

What is claimed is as follows:

1. A distributor assembly, comprising in combination, a base, a breaker plate carried on said base and rotatable with respect thereto, a vacuum control including a housing, said housing being mounted on said base on the side opposite to said breaker plate, an operative connection passing through said housing below said breaker plate and connecting the vacuum control with the breaker plate including a cylindrical rod of relatively small diameter whereby the control is capable of rotatably moving the breaker plate, and a sheet metal member having a limiting aperture receiving one end of said rod and clamped between a portion of said housing and said base

for positively limiting the movement of said operative connection.

2. A distributor assembly comprising in combination, a base plate, a breaker plate carried by and rotatable on said base plate, a vacuum device including a vacuum sensitive means and an elongated attachment member therefor, said device being attached to said base plate through said member with said vacuum means positioned remote from the breaker plate, a connecting rod of cylindrical cross-section having a portion located below said breaker plate connecting said vacuum means to said breaker plate, and a sheet metal member having a limiting aperture receiving one end of said rod clamped between the attachment member and the base acting on the rod for limiting the extent of movement of said rod whereby the rotation of the breaker plate by the vacuum sensitive means is controlled.

3. A distributor assembly comprising in combination, a base plate having an elongated aperture therethrough, a breaker plate carried by and rotatable on said base plate, a vacuum device including a vacuum sensitive means and an elongated attachment member associated therewith for attaching the device to said base on the side of the base plate opposite to the side carrying the breaker plate, a connecting rod located below said breaker plate having an upturned end portion passing through said aperture into engagement with the breaker plate and having its other end attached to said vacuum sensitive means, and an L-shaped member having an opening of predetermined size receiving the upturned portion of the connecting link for limiting movement of said connecting rod, said L-shaped member having its first leg portion clamped between said base plate and said attachment member and having its second leg portion positioned within a slot formed in said attachment member.

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