

Oct. 25, 1932.

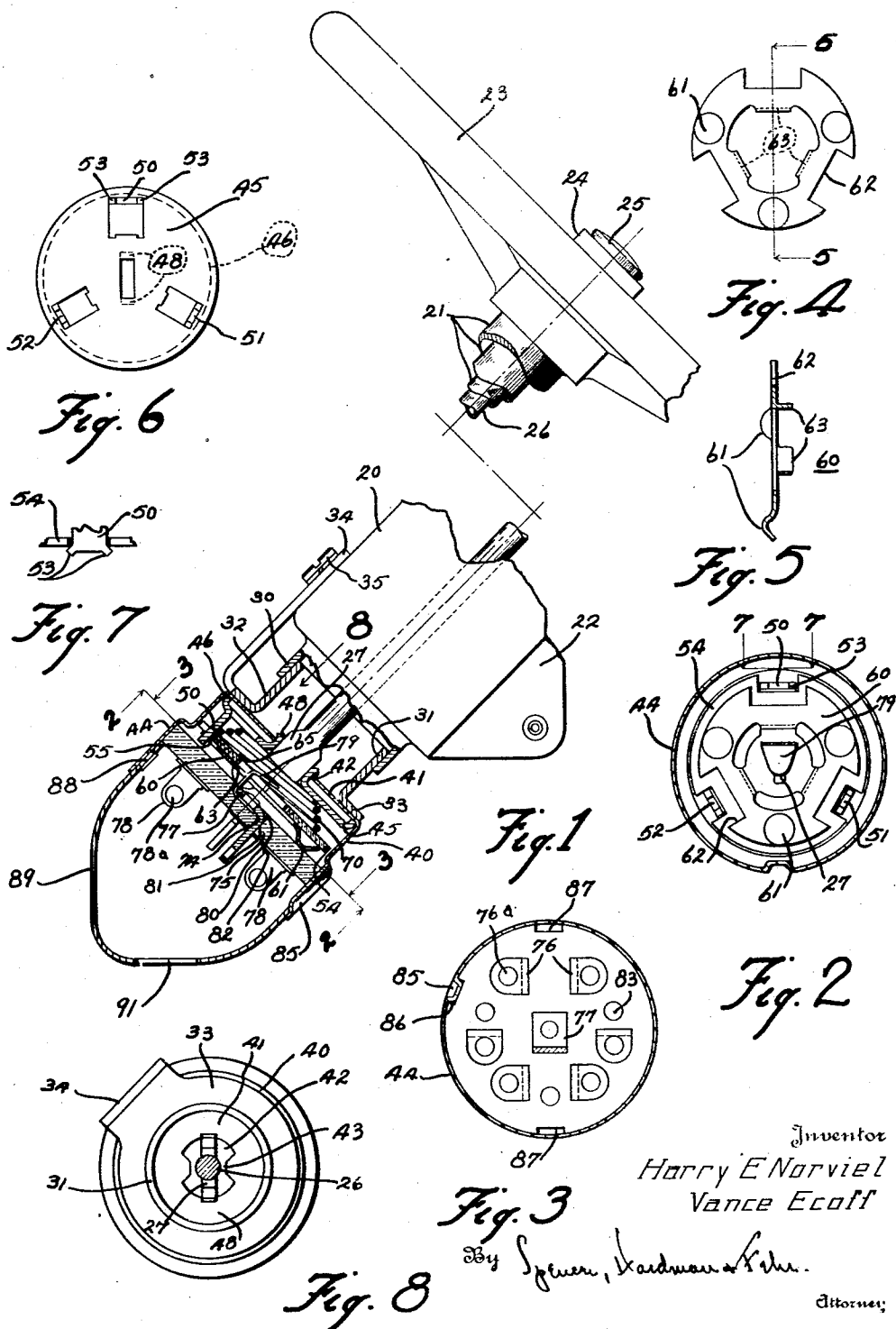
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1,884,148

SWITCH

Filed April 28, 1930

2 Sheets-Sheet 1



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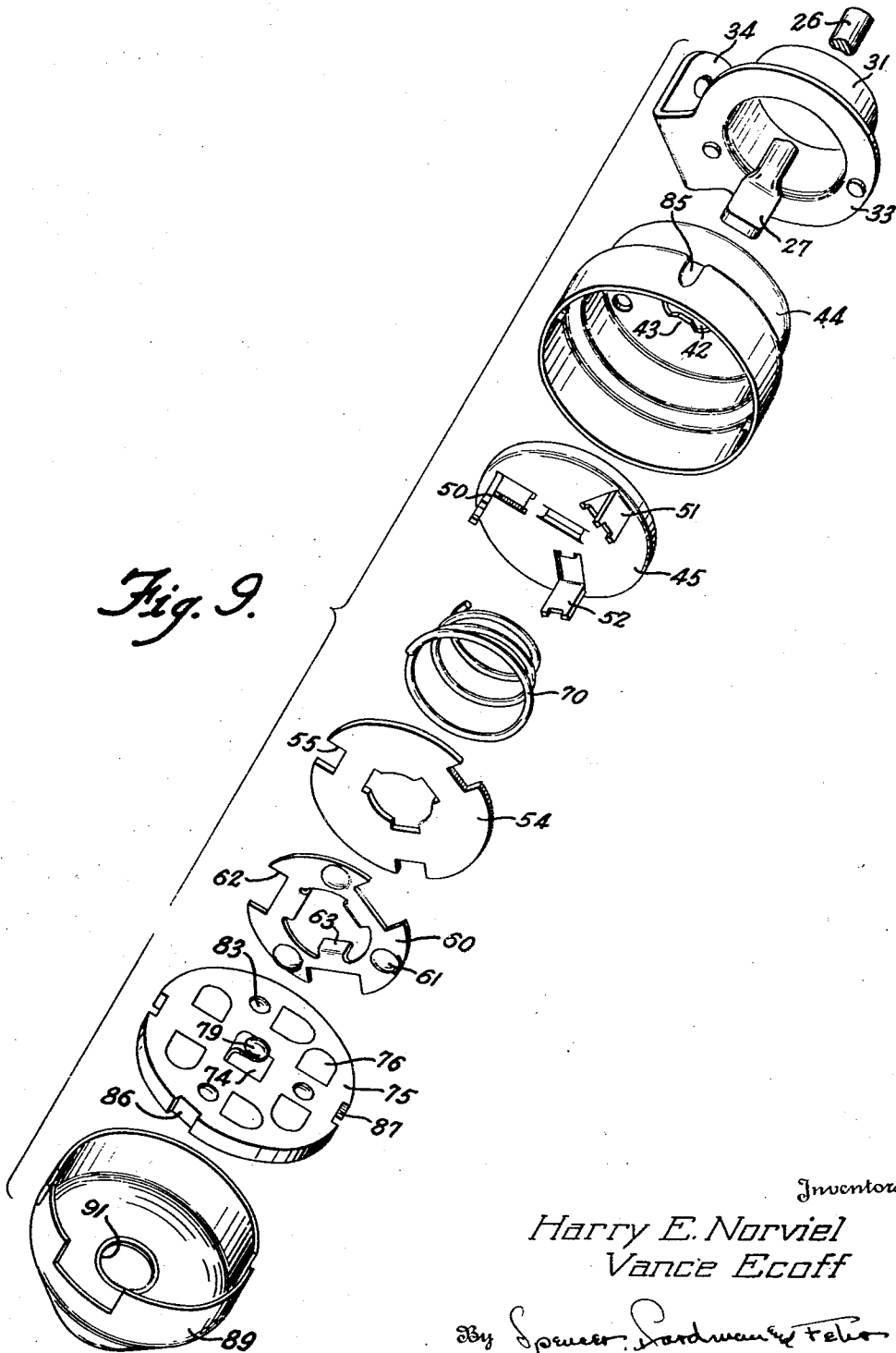
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Fig. 9.



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SWITCH

Application filed April 28, 1930. Serial No. 447,948.

This invention relates to circuit closers of the character used in automotive engineering, and is particularly concerned with that type of multi-circuit switch adapted to be mounted at the lower end of the steering column and controlled by a member operable therethrough.

It is an object of the invention to provide a storm-proof structure that will always insure the best of conditions for efficient operation.

It is another object of the invention to provide a switch of the class described that is permissible of manufacture at a relatively low cost, easy and quick assembly, and that is composed of a minimum of parts.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein a preferred embodiment of one form of the present invention is clearly shown.

In the drawings:

Fig. 1 is a view in elevation of the steering column structure, showing the improved switch structure in longitudinal section, and means of supporting the same relative to the steering column.

Fig. 2 is a transverse sectional view through the switch structure substantially as indicated by the line and arrows 2-2 of Fig. 1.

Fig. 3 is a transverse sectional view of the switch structure substantially as indicated by the line and arrows 3-3 of Fig. 1.

Fig. 4 is a plan view of the movable contact member.

Fig. 5 is a sectional view of the same substantially as indicated by the line and arrows 5-5 of Fig. 4.

Fig. 6 is a plan view of the driving washer forming a part of the improved switch structure, and is a view taken from the contact support side thereof.

Fig. 7 is a detailed view as indicated by the line and arrows 7-7 of Fig. 2 and illus-

trates the means of maintaining the driving plate and contact supporting member in assembled relation.

Fig. 8 is a view of the switch structure substantially as indicated by the arrow 8 of Fig. 1, illustrating the association of certain parts thereof.

Fig. 9 is an exploded view of the switch structure contributing to the present invention.

With particular reference to the drawings, 20 indicates a gear housing or portion of the steering column enclosing one or more control tubes 21, and providing an attaching lug 22 by which the steering column may be secured to a rigid portion of the vehicle structure. At the top end of the steering column there is provided the usual steering wheel 23, at the axis of which is one or more control manuals 24, and a switch operating button 25. The switch operating button 25 is usually connected with a rod or tube 26 having driving engagement with a switch structure, later to be described, by means of the non-rounded or driving portion 27.

In the present instance the lower portion of the support 20 terminates in a chambered portion 30 which may be a cylindrical sleeve or the like. Within the sleeve is disposed a complementary cylindrical extension 31 of an attaching bracket 32. The attaching bracket 32 may be formed from a sheet member so as to provide the flange 33 centrally of which is drawn out the cylindrical extension 31, and at one or more places at the periphery thereof, provided with an attaching lug 34. Provision is made for securing the bracket to the column by a screw 35 driven through the lug 34, maintaining the same in engagement with the support 20 after the parts have been assembled as illustrated in Fig. 1.

To the attaching bracket 32 a switch housing is secured, as by spot welding or other desired means. The housing in the present instance comprises a cylindrical cup 40 having

a flat bottom or head member 41 for convenience of securing the same to the bracket 32. The head 41 is centrally apertured at 42 in non-rounded fashion so as to provide the inwardly projecting portions 43 operating as stops against rotation as will later appear. The housing 40 is expanded or enlarged in form at 44 for the reception of a switch back and cover member as will be described later. The chamber within the portion 40 and between the head member 41, and the said switch back, form an enclosure for the switch structure or contact actuator mechanism.

The contact actuator mechanism is illustrated in section in Fig. 1, and in plan in Fig. 2, and comprises in main a driving disc or washer 45 as illustrated in plan in Fig. 6, supporting a contact closing means for co-operation with the switch back. The driving washer is formed into a relatively shallow cup so as to provide a cylindrical like or axially extending flange or rib 46, at or near the periphery thereof, which is of such substantial diameter as to nicely fit within the portion 40 of the housing and form a bearing engagement against the head member 41. This provides a bearing engagement between the driving disc and housing cup of a minimum of engaging surface, and thus materially reduces the frictional resistance to operation.

At the center of said disc an elongated or oblong and non-rounded aperture is provided, that affords mating and driving engagement with the non-rounded portion 27 of the control member 25. In forming this aperture 47 the metal that is normally punched therefrom is allowed to hang at the ends of the aperture, and bent to form the axially extending tongues 48. These tongues are disposed substantially at diametric points about the aperture, and when the disc 45 is assembled with the housing member 40, the tongues project outwardly through the aperture 42 as illustrated in Figs. 1 and 8. The ends of the tongues are bent over to provide retaining engagement with respect to the head member 41.

In the assembled form the tongues 48 are loosely received in the aperture 42, and permit the rotation of the disc 45 within the housing 40 to the limits defined by the aperture 42 and tongues 48. That is, the driving disc may be rotated within the housing 40 so far as limited by the tongues 48 coming into engagement with one or the other stop provisions 43.

At circumferentially spaced points about the driving disc 45 and concentric with the aperture 47 as a center, driving tongues 50, 51 and 52 are struck out to extend axially in a direction opposite to the retaining tongues 48, as will appear by reference to Fig. 1. At each corner of these driving tongues 50, 51 and 52 a small ear or lug 53 is allowed to

remain, which, after a contact supporting ring or plate 54 has been assembled with the driving disc, are bent over or staked as indicated in the detail of Fig. 7. This staking of the ears 53 prevents the removal of the plate 54 from the driving tongues. The contact supporting plate 54 is of dielectric material, and is complementarily notched at 55 to mate up with the driving tongues 50, 51 and 52, and here it may be noted that the driving tongues and notches are so disposed with respect to size and position that but one-way engagement can be had between the said driving disc and contact supporting plate.

Secured upon the plate or ring 54 is a movable contact member 60 having contact points 61 for engagement with a switch back 75, later to be described, and alternating with peripheral notches 62 that provide clearance with respect to the driving tongues 50, 51 and 52. The contact member 60 also has axially extending tongues 63 for disposition within notches 64 of said supporting plate, the said tongues being clinched against the plate as indicated at 65. A contact urging spring 70 rests against the driving disc 45 and lies within the group of driving tongues 50, 51 and 52 so as to engage the contact supporting member 54, and when assembled between the disc and plate normally urges the contact supporting member outwardly along the driving tongues toward the retaining provisions 53 thereof, all as illustrated in Fig. 1.

As earlier stated, a switch back and terminal member 75 is disposed within the enlarged portion 44 of the housing, and carries a plurality of conductor elements 74, comprising a circular row of contact members 76 grouped about a central point or contact 77, concentric with the said back. Each of the conductor elements is formed of sheet metal, bent into angular, or L-shaped members at the extreme ends of which are provided the contact points 76 and 77 on the one arm and terminal members 78 at the other arm. The extreme ends of each element are provided with bores or recesses 76a and 78a respectively, for purposes as will presently appear.

The central contact includes this and more as illustrated principally in Fig. 1, in that the contact arm 77 of the conductor element is secured to a resilient U-shaped contact 79 that is disposed for engagement with the switch driving rod 26. The terminal portion of each of these contact members is substantially the same. The switch back 75 is of molded form or otherwise fashioned to provide surface recesses 80 with adjoined apertures 81 through the said member which makes provisions for the reception of contact and terminal members, as will be seen by reference to Fig. 1. That is, the contact portions 76 lie within the surface depressions 80, while the angular extensions forming the

terminal portions 78 protrude through the apertures 81 as illustrated. Over each of the terminal members a washer is placed and may be secured as by staking at 82. In addition to the above appointments the switch back may have disposed at proper points among the contact members 76, depressions 83 which operate as off detents for the contact member 60.

The switch back is of loose assembly with respect to the housing 44, in that it is small enough in diameter to loosely and easily pass within the member 44, so that it is in fact maintained in floating relation therein. Special provisions between the housing portion 44 and the switch back maintain a nonrotating relation, in that a deformation 85, in the wall of the housing has mating engagement with a peripheral notch 86 of the switch back, and the edge of the switch back is also notched at 87 to allow clearance for bayonet pins 88 in the housing member 44. The pins cooperate with bayonet slots in a housing cap 89 to retain the same thereon.

The cap member 89 of the housing is formed with an aperture 91 at the lowest point thereof that provides for passage of electrical leads from the various terminal members to remote points about the vehicle. The leads are secured to the terminals 78 through the opening of the apertures 78a thereof, and after electrical connections are made therewith the joints may be soldered.

When the structure is assembled it is obvious that electrical conductors passing through the aperture 91 will have connection with the terminal members 78 on the switch back 75, and it may be considered that the cap member 89, the leads and the switch back 75 form one sub-assembly. A second sub-assembly is provided by the bracket 32 with its attached housing member 40, within which is retained the contact actuator assembly by means of the tongues 48 as hereinbefore described. It is immaterial whether this second sub-assembly, that is the switch operating structure, is coupled first with the supporting assembly represented by the steering post casting 20, or with the cover and terminal assembly described.

In either event, connection is made without difficulty. One has only to insert the operating rod within the provision of the driving disc 45 and accomplish the telescopic engagement of the portions 30 and 31, and then drive the screw 35 home. In assembling the switch back with housing member 40 and contact actuator assembly, the switch back is passed within the large portion 44 of the housing, so that it will be guided by the formations 85 and 86, and then press the same inwardly with the cap 89, so that the bayonet slot and pin engagement will be made. This operation will press the switch back 75 against the contact plate 60 and slightly com-

press the spring 70, and the edge of the cap 89, engages the edge portion of the switch back 75 to operate as an end stop for the said switch back.

Irrespective of the method followed in assembling the ultimate result is that illustrated in Fig. 1, in which the contact actuator assembly is disposed against the member 41 of the cup 40 so that the bearing flange 46 is all that engages the same, and the contact member 60 will be maintained in floating engagement with respect to the inner surface of the switch back 75. The contact member 60 will be capable of riding over the switch back so that the contact points 61 may engage the depressions or recesses 76a of the contact 76, or the detent portions 83 of the said back. It will be noted that the switch actuating member 26 is disposed in end alignment with the contact member 78, and is capable of both rotary and longitudinal movement through the telescopic connection between the bracket and steering column end. Thus, the member 26 is rotatable for driving the plate 45 and is also longitudinally movable for engagement with the resilient contact 79.

This structure permits of a selection of a plurality of circuits, since the operator may rotate the switch structure by rotating the member 25 to make engagement with various ones of the contact members 76, or on the other hand the operator may depress the member 25 so that engagement will be made between the member 27 and the element 79 for completing still another circuit.

The structure as assembled, provides a storm-proof connection between the housing and the steering column structure, as well as between the cooperating portions of the housing member, which adds materially to the efficiency of switch and electrical circuit controllers that are subjected to such various extremes of weather conditions as is an automotive structure.

While the form of embodiment of the present invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. A lighting switch adapted to be mounted at the lower end of a steering column, comprising in combination, a housing, a bracket secured to said housing and providing a tubular extension, a tubular extension on the end of said column telescopically receiving said bracket extension, and means securing said bracket to the end of said column.

2. A lighting switch to be mounted at one end of a steering column, comprising in combination, a switch enclosure, a bracket secured to said enclosure providing a tubular extension, means provided by said steering

column for telescopically receiving said extension.

3. A lighting switch comprising in combination, a support providing a chambered extension, a switch enclosure supporting a terminal back and a contact actuator assembly, a shell like extension mating with said chambered extension, and means securing said extensions in mating engagement.

4. A switch comprising in combination, a housing providing terminals and contact actuator mechanism therewithin, a bracket provided by the housing and having a cylindrical coaxial extension with said contact actuator mechanism, said extension having telescoping connection with a portion of the steering column of an automotive vehicle, to provide a storm-proof joint, a controller having driving engagement with said mechanism and operable through said connection, and means securing said bracket to said steering column.

5. A lighting switch comprising in combination, a pair of casing members providing a switch housing and terminal enclosure, bayonet and slot provisions securing said housing members in assembled relation, a switch back and contact actuator assembly within the housing, said contact actuator assembly providing means for maintaining a contact element in cooperable relation with said terminal back, and for maintaining said housing members in assembled relation.

6. A lighting switch comprising in combination, a supporting cup providing a flat bottom apertured coaxially thereof, a contact actuator within the cup providing a driving washer having a peripheral flange for bearing engagement with the bottom of said cup, and tangs struck from the center of said driving washer providing a non-rounded aperture coaxial of said cup aperture, said tangs projecting outwardly of said cup aperture and bent over to loosely retain said driving washer within said cup.

7. The combination set forth in claim 6, said cup aperture being of non-rounded formation, said tangs cooperating therewith to provide stop members for said driving washer.

8. A lighting switch comprising in combination, a cup member adapted to be mounted at the lower end of the steering column, a contact actuator assembly within said cup member, said assembly including a driving disc having an axially extending flange for engagement with the bottom of said cup, and a plurality of driving tongues, a contact supporting plate loosely carried by said driving disc and notched to mate with said driving tongues, said driving tongues having terminating ears adapted for separation for the retention of said contact supporting plate thereon, a contact plate secured to said supporting plate, and means resiliently urging

said contact carrying plate toward the ears of said driving tongues, said driving washer providing a pair of centrally disposed tongues protruding through an aperture of said cup member and bent over to retain the assembly within said cup, and means engaging said driving washer between said tongues for operating the same.

9. A lighting switch comprising in combination, a housing member, a contact actuator assembly therewithin, said housing being apertured to receive a pair of oppositely disposed tongues of said driving assembly, said tongues being bent in separated relation to provide retaining engagement with respect to said housing, an attaching bracket secured to said housing providing a cylindrical portion coaxial of said housing aperture and retaining tongues, supporting means telescopically receiving said cylindrical portion to provide a storm-proof connection, and an attaching lug securing said bracket and supporting means so connected.

10. The combination set forth in claim 9, in which an actuating member is housed by said support and operable through said telescopic connection to control said actuator assembly.

11. A switch of the class described comprising in combination, a housing within which is loosely secured a contact actuator assembly, means for actuating the assembly from without the housing, a terminal member and switch back lineally movable within said housing, a cover for the housing telescopically engaging the same and having its end to form a stop for said terminal back, said actuator assembly including a contact urging spring which maintains the terminal back in engagement with said end stop for maintaining said housing and cover in assembled relation.

12. In a switch structure of the class described, the combination comprising; a housing providing a flat wall having an aperture; a contact actuator assembly rotatable within said housing, said assembly including a driving washer having a flange for engagement with the bottom of said wall and having projections extending from said driving washer and through said aperture to hold loosely said washer to said housing; means on said housing cooperating with said projections limiting a rotary movement of said actuator in either direction of rotation relative to said housing; and means engaging said driving washer to rotate same within said housing.

13. The combination comprising, a steering post; a switch structure mounted at the lower end thereof, and means uniting said switch and steering post to provide a storm-proof connection, said connection comprises a pair of telescoping portions of said switch structure and steering column.

14. The combination comprising, a steer-

ing post; a switch structure mounted at the lower end thereof; and means uniting said switch and steering post to provide a storm-proof connection, said connection comprises a cylindrical portion of said switch structure having telescopical engagement with said steering post and enclosing an operating member for the actuation of said switch structure.

10 In testimony whereof we hereto affix our signatures.

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VANCE ECOFF.

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