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CORE BOX SEAL STRIP

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This invention relates to core box sealing means in the form of a resilient strip providing an effective barrier counteracting fluid passage between surface areas of coating mating core box parts.

The general environment and basic application of a sealing strip of the character herein described and disclosed is well expressed in a copending application, Serial No. 17,999, filed March 28, 1960, directed to a Core Box Sealing Strip and Method of Attachment, of which the instant application comprises a continuation-in-part.

An object of the present invention is to provide a seal strip for attachment with a core box part by cemented retention in a groove that is initially cut into a matching surface of such a part to carry the strip in an effective sealing position subject to direct physical engagement with a matching surface area of a complementary core box part.

Another object is to provide duplicate matching and coating seal strips that are oriented along mating core box surface areas for compressive sealing contact, seal to seal, to prevent blowby or leakage of core box fluid and/or core forming materials from within the cavity of the core box assembly.

A still further object is to provide a resilient seal strip having a predetermined cross sectional contour to accommodate change in shape of the strip under operative sealing conditions while fixedly secured in an orientation and accommodation groove in a core box part. Such strip shape or contour includes certain rounded clearance corners at the lateral terminal edges of the strip whereby to prevent possible interference by the strip material between box parts which might tend to hold the matching surfaces apart or out of contact, thus eliminating an objectionable condition in the core blowing art while using a strip of the nature herein disclosed.

Other objects and advantages of the seal strip of the present invention shall hereinafter appear in or become apparent from the following detailed description having reference to the accompanying drawing forming a part of this specification.

In the drawings:

FIG. 1 is an end view of a sealing strip of the present invention which is preferably fashioned as an extrusion of resilient material of any suitable length or lengths that may be applied end to end or cut to selected lengths;

FIG. 2 is a fragmentary perspective view of a core box part incorporating a sealing strip in the manner in which it is normally carried and employed as a sealing instrumentality between mating surfaces of core box parts;

FIG. 3 is a vertical sectional view of a pair of coating matching core box parts with a sealing strip shown in elevation in operative relation between such parts, this view including a diagrammatic illustration of one kind of orientation means in the form of a pin and hole arrangement;

FIG. 4 is a fragmentary detail sectional view of adjacent sealing strip and box slot elements to show a modified variation of means to counteract possible box part separation under certain conditions of assembly of said sealing arrangement; and

FIG. 5 illustrates, in vertical cross section, a fragmentary core box section employing a modified combination of sealing strip means.

Referring to FIG. 1, the seal strip 1 is substantially the same as the strip defined and described in the copending application Serial No. 17,999 with certain contour varia-

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tions to be hereinafter explained. In general, strip 1 comprises a tubular member having a crown 2 as the sealing head disposed to the upper side of the diametral line A—B, with the major portion of the strip having a half-round retention body 3 lying to the lower or opposite side of line A—B. An opening 4 of general half-moon shape in cross section is provided longitudinally of the strip, this opening being located eccentrically or offset downwardly from the center point C, from which point a radius R generates and defines the half circle exterior surface of the retention body portion of strip 1.

The opening 4, by its placement in the cross sectional face of the strip, establishes a heavy wall 5 forming a bridge including the crown 2 and extending between the lateral limits 6 and 7 of the strip at its maximum width. The rest of the wall portion of the strip provides the curved half round wall 8 providing the retention contour portion of this seal strip 1 in the form of a thin midsection 9 and heavier side wall sections 10 and 11 joining the bridge wall 5. In addition, the lateral edges of the strip 1 at the limits 6 and 7, include curved or rounded corners 12 and 13 for purposes to be described.

While the sealing strip in the copending application Serial No. 17,999 was attached to one matching surface of mating core box parts through the crown 2 for sealing entry into a half round recess or groove, the present concept secures the greater body portion of the strip 1 into an accommodation groove formed into one of the core box parts. As shown in FIG. 2, box part 14 is provided in any suitable way with a slot or groove 15 of half-circular cross sectional shape so that the diametral portion of the groove is coincident with the coplanar surface portions 16 and 17 of the parting surface of part 14.

To assemble the strip 1 in the box part 14, after groove 15 is supplied, a suitable cement or adhesive 18 is applied to the slot or groove wall area, and a length of strip is layed or depressed into the groove for retention to occupy the position illustrated in FIG. 2. This assembly of the strip with box part 14 will dispose the crown 2 upwardly of the surfaces 16 and 17 to establish a raised seal means above the surface of the box part 14. The crown 2 is supported by the upwardly curved bridge 5.

By assembling a matching core box part 18 with its part 14 as in FIG. 3, oriented by pin and hole means such as pin 19 and hole or bore 20, the crown of strip 1 is contacted by the flat undersurface 21 of part 18 and depressed or deformed inwardly into a shape such as diagrammatically shown in FIG. 3. Under closed box condition, the bridge 5 is straightened out to establish a pressure contact of the crown of seal strip 1 on surface 21, simultaneously inducing internal lateral strip distortion tending to spread or pressure activate the wall sections 10 and 11 into greater sealing action toward the sides of groove 15 in the direction of the arrows shown in FIG. 3. Dot and dash lines in FIG. 3 show initial core box part contact with the strip prior to face to face surface contact of the matching surface areas 16—17 and 21.

The box parts are clamped face to face when in seated and sealed positions prior to core blowing. Since the crown of the seal strip will at all times tend to return to its undeformed shape, removal of the core box clamps to permit part separation will allow the seal member to aid in box part separation by its inherent faculty of returning to its expanded or extended undeformed shape as illustrated in FIGS. 1 and 2. In this respect the strip not only seals the contacted parting surfaces of the core box parts, but the strip also provides a means for urging box parts apart at the parting surfaces after core blowing and box clamp removal, or at any time that separation is desired.

The strip 1 is made half round with a diameter D and having the radius R. Slot or groove 15 is milled half round to match and receive the strip in cemented relation as explained. Obviously, a certain amount of tolerance is possible regarding the true depth of groove 15. The ideal and easily obtained cut of groove is normally readily and accurately possible with a little care. The crown, however, is well adapted to function in its designed capacity even if the groove should be cut a few thousandths deeper than needed.

Should a somewhat shallower groove result with a lighter cut by a few thousandths, the strip body will be raised accordingly to cause a slight elevation of the strip. Under the latter conditions, pressure upon crown 2, acting in the usual manner, will tend to expand the bridge 5 laterally. With a strip having sharp corners at 12 and 13, as does the strip in the copending application Serial No. 17,999, it has been found that such corners tend to creep or feather laterally between opposing faces of the core box parts resulting in some face to face separation even under clamped conditions. This will affect the dimensional accuracy of the cores developed.

This same condition may result under conditions wherein the strip has been slightly tilted in cementing it into the groove. This may occur over a short length or over a greater length, although this condition need not normally happen under careful attachment.

To remedy such situations that tend to prevent good face to face contact of the core box parts, the extreme lateral corners of the strip are broken or rounded a predetermined amount as at 12 and 13. This removes the strip material that would normally tend to feather or expand laterally away from the vertical strip groove walls to move over or upon the adjacent surfaces 16 or 17 of core box part 14. Under uncompressed conditions, slight clearances will flank the strip sides, but with core part pressure applied to crown 2, the bridge 5 expands laterally and tends to fill such clearance areas somewhat as indicated in FIG. 3.

The simple, ideal and cheapest way to take care of the discussed eventuality is to extrude strip 1 as described and having the rounded corners along its lateral edges. Another way to prevent core box part separation by strip material interference is shown in FIG. 4. Here strip 22 has sharp corners such as 23, and box part 24 carries the groove 25 to accommodate the strip. The groove 25 is rounded at 26, along both edges only one of which is shown, so as to create a clearance area adjacent the top parting line surface 27 of part 24. Any forced lateral expansion of the material of strip 22 will be accommodated in the clearance area of the box part. The latter arrangement, however, entails added work on the slot or groove corners involving a further operation adding to the overall cost of the seal assembly.

By securing the seal strip in housed and nested relation below the core box surface, the strip does not tend to provide a projection in the form of a surface obstruction. Danger of strip damage by contact with another core box part, or from some other shop tool or the like, is reduced to a minimum. While the crown is raised as described, the surface contour thereof blends into the core box surface to readily ward off any direct part contact. In addition, the resiliency of the strip plus its hollow center will permit crown depression upon any severe part or tool contact, thus further warding off damage to the strip and deflecting the contacting in strumentality away from the strip location.

With the recessed strip of this character it is a simple matter to employ a dryer in connection with core transfer from the core box to the dryer for oven drying, a practice well known to those skilled in the art. The dryer can be used with either core half or box part which is not the case with the use of a seal strip such as shown in the copending application Serial No. 17,999.

As a further advantage in connection with the use of a dryer, the crown of the present strip provides a given raised projection in uncompressed condition. Dryers are normally made deeper in their cavity areas to prevent crushing or any tendency to change the shape of the core per se upon application. Turning the core box part to transfer the core into the dryer will let the core move into place from core box part to dryer over the slight excess clearance provided without damage.

Dryers employed with core boxes having the seal strip herein described can be made to the exact dimensions of the core since placing the dryer upon the box part having the core will hold the dryer slightly raised upon the seal strip crown. In this way the necessary clearances are automatically supplied by the strip and upon turning the part and dryer over, the core will readily settle or move into the dryer for transfer to a drying oven.

The foregoing explanation of the seal strip of this invention indicates the efficiency and versatility of the seal assembly. One other contemplated application of the strip is illustrated in FIG. 5 to provide a dual seal means by attaching identical seal strips in opposing relation on coating mating core box surfaces. Box parts 28 and 29 oriented by pin means 30 carry strips 31 and 32 respectively in box grooves 33 and 34. Since the opposing crowns 35 and 36 each add to normal box part separation under uncompressed condition, the normal gap 37 between the parts is doubled in size. Also, the resilient reactive pressure of the two seals, under box closure conditions, will contribute greater power tending toward box part separation after core blowing and box clamp removal.

The seal means in FIG. 5 is, therefore, a seal having great latitude of accommodation to correct many variations or inaccuracies in the core box members, while at all times providing an effective and efficient fluid seal for such members.

The foregoing description relates to some preferred seal structures illustrative of the concept of the present invention. Certain changes in the individual elements or in their combinations are contemplated without departing from the fundamental inventive concept herein disclosed. The extent of such modifications shall, however, be governed by the breadth and scope of the language appearing in the following claimed subject matter relating to the core box seal strip of this invention.

What I claim is:

1. A sealing structure for a pair of mating core box sections comprising, in combination, a first core box section having a parting line surface thereon, a second core box section having a matching parting line surface thereon for abutting surface to surface contact with the corresponding surface of said first section, one of said sections having a groove formed into its parting line surface to provide a cavity located entirely to one side of said parting line division between said sections with the parting line surface of the other section providing the closure means for the groove along the common parting plane of said core box sections, and a resilient deformable seal strip tightly secured into said groove comprising a hollow base portion normally filling said groove under undeformed conditions provided with an exterior surface shaped to follow the contour of said groove, said strip having a convex crown portion normally extending beyond said groove over the entire width of said groove under undeformed conditions, for direct surface contact with the outer parting line surface of the matching section to induce groove body deformation by the exposed bowed face thereof and across the groove width by said matching section, said groove having a cross sectional area at least as great as that of said seal strip and the edge of the convex crown portion of said seal extending in the same plane as the parting line surface of the core box sections with said edge of said strip being substantially colinear with the edge of said groove.

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2. In the combination set forth and defined in claim 1, wherein a bonding material secures the seal strip in fixed relation upon groove walls to confine the compressive action on said strip to the crown portion thereof and toward a central portion of said strip that lies remote from the wall portions of the groove.

3. In the structure defined in claim 1, wherein edge portions of the seal strip and adjacent edge portions of the groove walls are disposed substantially in a common plane lying coincident with the parting line surfaces of the core box sections, and wherein at least one set of said edge portions are rounded off to establish clearance areas flanking the edge portions of the strip whereby to accommodate any possible laterally outward feathering of said strip while under deformation.

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4. In the apparatus of claim 1, wherein the hollow seal strip provides a heavier bridge portion adjacent the parting line and a thinner wall portion adjacent the bottom of said groove.

5. In the combination set forth and defined in claim 1 wherein said core box sections containing similar aligned grooves receive similar abutting seal strips.

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