United States Patent

Hillberg

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[45] **Mar. 28, 1972**

[54] **SHOTGUN BARREL CONSTRUCTION**

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[21] Appl. No.: **870,858**

Related U.S. Application Data

[62] Division of Ser. No. 699,476, Jan. 22, 1968, Pat. No. 3,546,417.

[52] **U.S. Cl.** ....**42/76 R**
[51] **Int. Cl.** **F41c 21/08,** F41c 21/06
[58] **Field of Search** ....42/76 R, 76 A, 79; 219/93, 219/102

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Assistant Examiner—C. T. Jordan
Attorney—Delio and Montgomery

[57] **ABSTRACT**

A double-barrel assembly for a double-barrel shotgun wherein the barrels are joined at the muzzle ends thereof by a member which spaces and rigidly holds the barrels in fixed relation. A rib of molded nonmetallic is so formed as to be locked to the barrel assembly.

5 Claims, 17 Drawing Figures

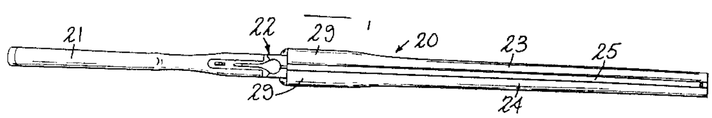

Fig. 1.

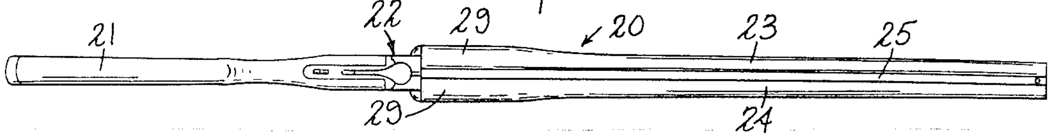

Fig. 2.

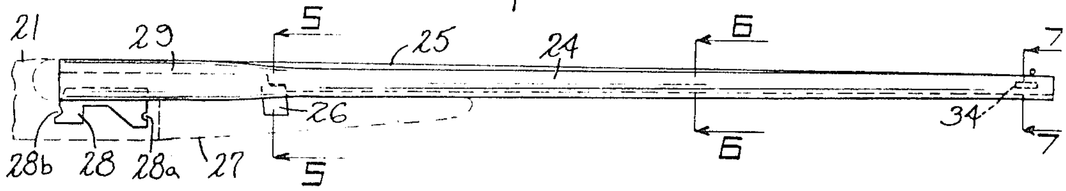

Fig. 3.

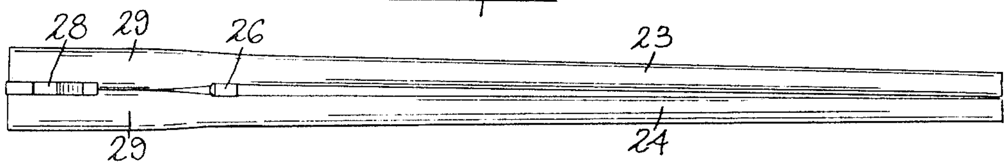

Fig. 4.

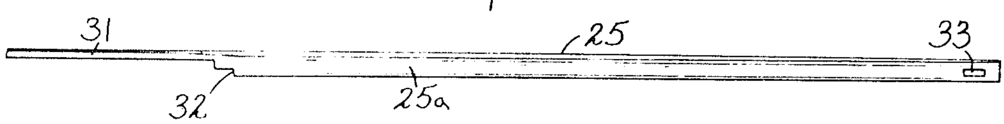

Fig. 6.

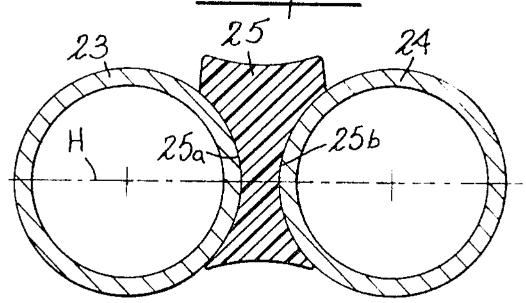

Fig. 5.

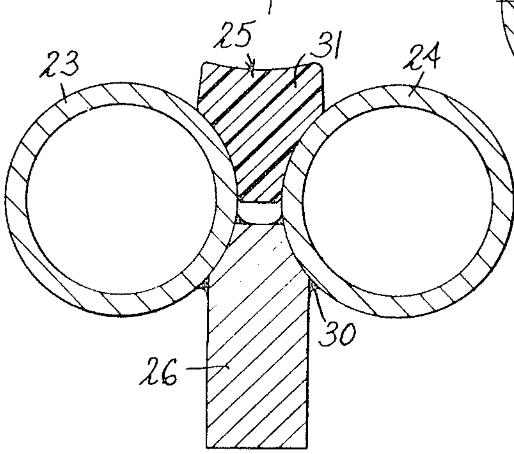

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Fig. 7

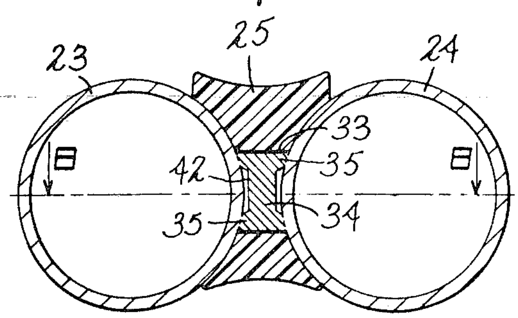

Fig. 9

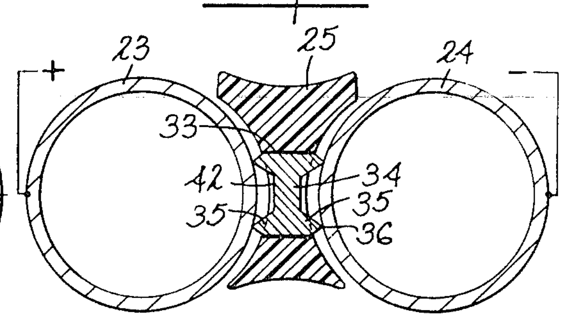

Fig. 8

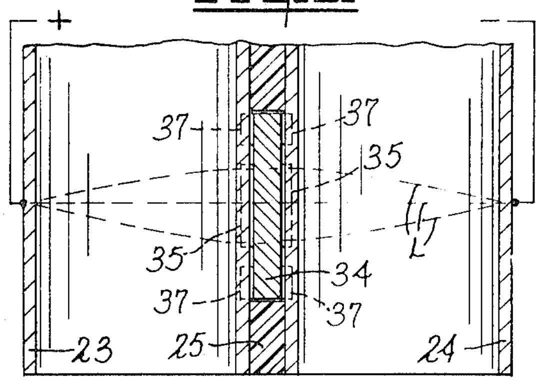

Fig. 10

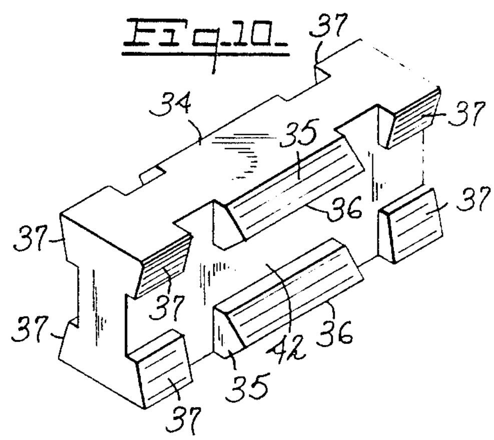

Fig. 11

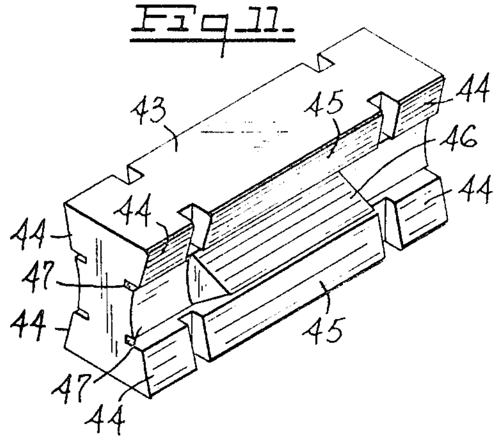

Fig. 12

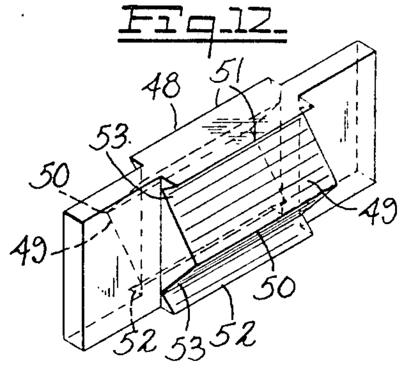

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Fig.13.

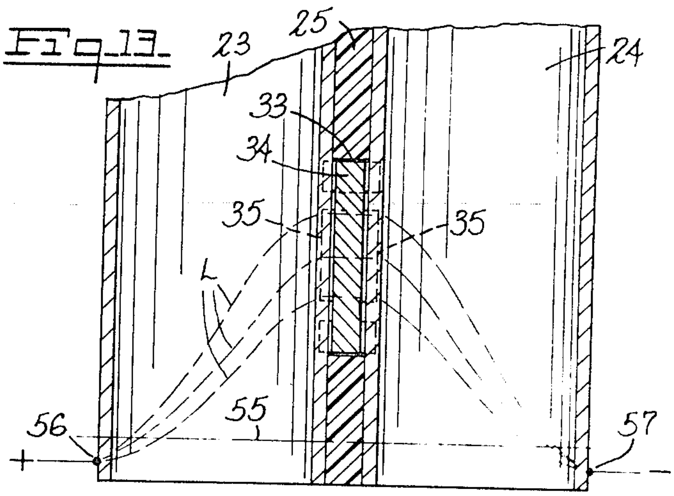


Fig.14.

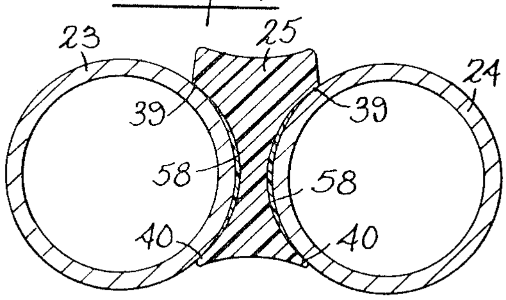


Fig.15.

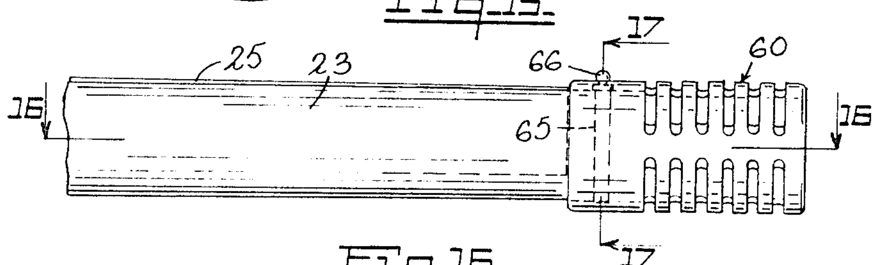


Fig.16.

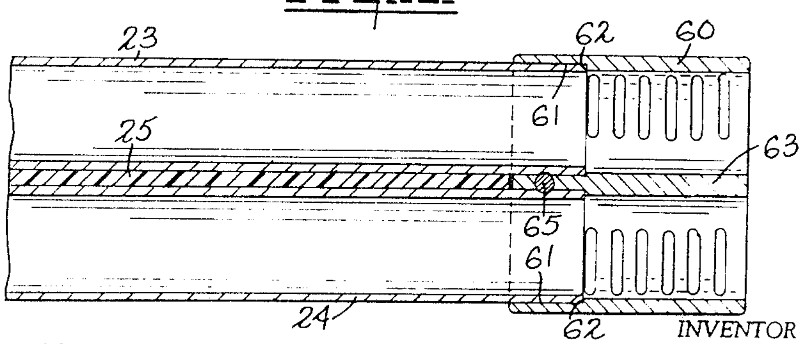
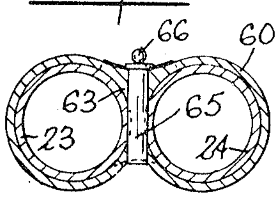


Fig.17.



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SHOTGUN BARREL CONSTRUCTION

This is a divisional application of U.S. Pat. application Ser. No. 699,476, filed Jan. 22, 1968, now U.S. Pat. No. 3,546,417.

This invention relates to the joining in fixed relation of a pair of cylindrical objects, and more particularly relates to such method and the resulting article as it applies to double-barrel shotguns.

It is the present and conventional practice to join a pair of barrels for a double-barrel shotgun by spacing the individual barrels in predetermined relation by placing upper and lower joining and spacing elements therebetween running substantially the length of the barrel and then brazing or soldering the individual barrels to both of the joining and spacing elements which are termed "ribs."

This method of making double-barrel shotgun barrels and the resulting article is expensive in that it requires accurate jigs, brazing of the entire length of the barrels to the ribs, accurate machining of the ribs and placement thereof. All of these operations require skilled labor and consume substantial time.

In this conventional method of making double-barrel shotguns after the barrels have been assembled and brazed to the ribs, the entire assembly is then blued for protection against oxidation and to give the assembly an acceptable appearance. After blueing, the assembled barrels may be mounted to the stock and operating mechanism thereon.

In view of the expense involved in the present and conventional techniques of making double-barrel shotgun barrels and the resulting articles, the present invention provides a new and improved process of making double-barrel shotgun barrels and the resulting double-barrel assembly. The present invention eliminates the necessity of spacing the double-barrels with a pair of ribs and joining, as by brazing or soldering, both barrels to the ribs along the length thereof.

The present invention utilizes a single non-metallic organic plastic or resin rib which may be molded with concavities along either side thereof to provide seats for the barrels. The barrels may be joined rigidly together by bonding to the rib or through the provision of an element which holds the muzzle ends of the barrels in fixed spaced relation. In one form of the invention, a member is fused to each barrel through projection welding and which permits the simultaneous placing of the barrels in the concavities of the rib while integrally joining the barrels together. This method is simple and sure of positively joining the barrels in desired spaced relation without the use of long lengths of brazing and machined metallic ribs. Further, this invention utilizes and permits the use of a single rib of cast or molded plastic.

Accordingly, an object of this invention is to provide a new and improved double-barrel assembly for a shotgun and a method of making the same.

Another object of this invention is to provide a new and improved method for making double-barrel shotgun barrels which eliminates the requirement for metallic ribs.

Another object of this invention is to provide a new and improved method for making double-barrel shotgun barrels which does not require the brazing or soldering of ribs along the length of both barrels.

Another object of this invention is to provide a double-barrel assembly of the type described wherein both barrels are integrally joined at one or more points along the length thereof and a non-metallic rib used to provide a pleasing finished appearance.

A still further object of this invention is to provide a new and improved method of simultaneously joining together and spacing the two barrels of a double-barrel shotgun.

The features of the invention which are believed to be novel are set forth with particularity and distinctly claimed in the concluding portion of this specification. However, the invention both as to organization and method of assembly, and resulting article, together with further objects and advantages thereof may best be appreciated by reference to the following detailed description taken in conjunction with the drawings, wherein:

FIG. **1** is a top plan view of a double-barrel shotgun;

FIG. **2** is an elevation of the barrel assembly of the shotgun of FIG. **1**;

FIG. **3** is an enlarged top plan view of the barrel assembly of FIG. **2** with the rib removed from between the barrels;

FIG. **4** is a view of a rib designed to fit between the two barrels of a double-barrel shotgun;

FIG. **5** is a sectional view seen in the plane of lines **5—5** of FIG. **2**;

FIG. **6** is a sectional view seen in the plane of lines **6—6** of FIG. **2**;

FIG. **7** is a sectional view seen in the plane of lines **7—7** of FIG. **2**;

FIG. **8** is a sectional view seen in the plane of lines **8—8** of FIG. **7**;

FIG. **9** is a view in cross-section of two barrels, a joining element and a spacing rib prior to assembly thereof;

FIGS. **10**, **11** and **12** are respective views of elements utilized in joining a pair of shotgun barrels;

FIG. **13** is a view similar to FIG. **8** but showing another preferred method of joining the shotgun barrels;

FIG. **14** is a sectional view showing an assembly made in accordance with another embodiment of the invention;

FIG. **15** is a side elevation of the muzzle end of a double-barrel shotgun barrel with an attachment thereto;

FIG. **16** is a sectional view seen in the plane of lines **16—16** of FIG. **15**;

FIG. **17** is a sectional view seen in the plane of lines **17—17** of FIG. **15**.

A shotgun generally represented by the reference numeral **20** comprises a stock **21** having mounted thereto a firing mechanism generally indicated at **22**, and double barrels **23** and **24** separated by a rib **25**. The barrel assembly generally comprises the two barrels and ribs, plus a lug **26** adapted to lock the barrel assembly to a forestock **27** shown in broken line. The breech end of the barrel is joined to a hinge and locking plate **28**. Plate **28** has a pivot detent **28*a*** defined therein to receive a hinge pin (not shown) carried by stock **21** and allow the barrel assembly and forestock **27** to pivot when the gun is broken for loading or unloading fired shells. Plate **28** also has a latching detent **28*b*** adapted to receive a latch (not shown) therein to rigidly lock the barrel assembly and forestock to the stock **21** and firing mechanisms **22**. The breech end of the barrel is enlarged as indicated at **29** to define a chamber for receiving shells.

In initial assembly, the barrels **23** and **24** are joined as by brazing plate **28** to both barrels. Lug **26** is also joined as by brazing to both barrels as shown at **30**, FIG. **5**.

It will be noted that the lines and surfaces along which plate **28** and lug **26** are joined are eventually hidden by stock **21** and forestock **27**. Thus, as hereinafter made apparent, the barrels may be finished and blued before assembly.

Rib **25** is molded or cast with concavities **25*a*** and **25*b*** on either side thereof, as shown more clearly in FIG. **6**, adapted to receive both of barrels **23** and **24** therein. At the breech end, the rib is formed as at **31** with a step. Portion **31** of rib **25** overlies the valley between barrels **23** and **24**, as shown in FIG. **5**. Rib **25** may also be formed as shown at **32** to abut against lug **26**, and properly space itself with respect to the barrels. Rib **25** is further formed with an aperture **33** towards the muzzle end thereof to receive a joining or insert member **34** which integrally joins the two barrels **23** and **24** together. The joining member **34** is initially of the configuration shown in FIG. **10** and as seen in cross-section in FIG. **9**.

The member **34** is a plug or insert arranged to permit a projection weld of each of the barrels **23** and **24** thereto. The insert **34** is formed with projections **35** defining edges **36** which in initial assembly make only line contact with barrels **23** and **24**. The insert is preferably of a steel and provides an electric current path directly across the barrels. The insert may be formed in any convenient manner such as machining or sintering. The barrels **23** and **24** are arranged to taper or incline toward each other as shown in FIG. **3**. Therefore, the rib **25** is molded to have a decreasing web thickness as it extends toward the muzzle ends of the barrels.

In practice of the process of the invention, the barrels 23 and 24, the rib 25 and member 34 are assembled as shown in FIG. 9 and an electric welding potential is then applied across the barrels as shown in FIGS. 8, 9 and 13 at points in close proximity to the position of the insert along the length of the barrels.

Simultaneous with the application of a welding potential pressure is applied to the barrels 23 and 24 to move them both towards the complimentary concavities 25*a* and 25*b* in rib 25, at points 56 and 57. Intense heat is produced by the electric current through the barrels and member 34, indicated by broken lines L due to the I^2R (current squared times resistance) at the line contacts of edges 36 on the barrels. This intense heat along edges 36 melts the projecting edges of projections 35 and also the metal of the barrels in contact therewith. This allows the barrels to be moved inwardly into the concavities of rib 25 and simultaneously the metal of the member 34 and the barrels fuse. As the fusion commences, the resistance R decreases slightly and the current I increases to maintain sufficient heat for fusion. As the barrels are moved into contact with the complementary concavities in the rib 25, they abut surfaces 37, and also rib 25.

If desired, the concavity of the ribs 25 may be formed on a slightly smaller radius than the exterior surface of the barrels, as shown in FIG. 14. In this case, the rib 25 will only contact the barrels at upper and lower portions 39 and 40, respectively. The rib is thus effectively locked between the barrels against all degrees of movement. The rib is formed with concave portions defining an angle in cross-section such that when the barrels are finally positioned, the barrels lock the rib therebetween. As most clearly seen in FIG. 6 the web portion of rib 25 has its smallest dimension substantially along the horizontal center lines H of barrels 23 and 24.

It is important that the insert 34 be formed with valleys 42 between the welding projections to provide a space or hollow for the flow of molten metal during the projection welding operation. The insert 34 is carefully dimensioned so that when the barrels come into engagement with surfaces 37 the barrels are properly spaced. Alternatively, the final positioning of the barrels is accomplished when the barrels are seated in the concavities in the rib. This technique ensures that the rib is immovably locked between the barrels.

The projection welding insert may take various forms. It is only required that it have certain characteristics. For example, the insert 43 shown in FIG. 11 is provided on each side with four abutment surfaces 44, upper and lower abutment surfaces 45 and a projection 46 between the surfaces 45 which define valleys or hollows 47 therewith. These valleys or hollows 47 provide spaces for molten metal to flow during the welding operation. When using insert 43, the edge of projection 46 becomes molten and fuses to the barrels, and the surfaces 44 and 45 or the rib properly space the barrels.

Still another insert 48 is shown in FIG. 12. The insert 48 includes a central body portion having a main projection 49 defining contact edge or line 50 and upper and lower spacing or abutment elements 51 and 52. The triangular cross-sectional shape or projection 49 defines valleys or hollows 53 with the abutment members 51 and 52 and allows the metal when molten to flow therein. Additionally, in the insert 48 shown in FIG. 12, the projection 49 as it melts may flow lengthwise and sufficient clearance is provided between the barrels for such lengthwise flow or movement. A joining member which provides two spaced apart contact lines against each barrel is preferred. Such an arrangement is followed in member 34 and guards against cocking of the barrels as they are urged towards each other during the welding operation.

The potential should be applied across the barrels in fairly close proximity to the point of contact of the welding member 34 thereon. This is required so that the electrical resistance seen across the barrels between the points at which the welding potential is applied is substantially less than the resistance of a path along the length of one barrel across plate 28 and lug 26 and then along the length of the other barrel to the other terminal. It has been found that the point at which the electrical welding potential is applied across the barrels may cause some discoloration if the barrels have been previously blued. Accordingly, the points to which the welding potential is applied across the barrels may be displaced lengthwise of the welding member 34 toward the muzzle end of the barrels as shown in FIG. 13. Then, upon completion of the welding and joining operation, the ends of the barrel are cut off at a line 55. This will eliminate any marks on the barrels at the points 56 and 57 where the welding electrodes are applied.

With this method of construction a new and improved double-barrel assembly is provided which is joined only at its ends by the plate 28 and lug 26 at one end thereof and by the fusion member 34 at the other end thereof. These points of joining are completely hidden by the rib 25, the stock and forestock.

The rib 25 is a single member as opposed to the conventional double rib construction. The rib 25 is molded of a high impact, high tensile strength plastic such as those known by the trademarks "Lexan" and "Delrin." The rib may be formed of formaldehyde base or phenolic base resins. The rib is further molded with a finish and color such that will be complimentary to the appearance of the barrel assembly. If desired, a bead of plastic or rubber filler material may be spread along the inside of the rib concavities to provide a seal against moisture, dirt, etc., as exemplified in FIG. 14.

The disclosed method provides a double barrel assembly in which the barrels are rigidly and permanently joined at only the two ends thereof, and the single molded rib provides a pleasing contribution to the overall appearance. Additionally, the barrels may be finished and blued prior to assembly.

In another embodiment of the invention, the barrels are bonded directly to the rib in the concavities as shown in FIG. 14. The bonding agent 58 may be any suitable bonding material, such as an epoxy resin. In such an assembly, the concavities of the ribs may be formed on a smaller radius than the exterior periphery of the barrels so that the barrels are more positively positioned against the rib 25. Then the cross-sectional area between the rib concavities and the barrel surfaces are filled with the bonding agent.

In such a construction an adaptor or barrel extension member 60, as shown in FIGS. 15–17, may be utilized to anchor the muzzle end of the barrels 23 and 24. The extension 60 is undercut as at 61 to provide seating shoulders 62 against which the ends of the barrels abut. The adaptor 60 is then fitted over the ends of barrels 23 and 24 until the ends thereof abut surface 62. At the same time the web portion 63 of member 60 will substantially abut the rib 25. At this time, an aperture is drilled centrally through member 60 and a portion of the exterior surfaces of barrels 23 and 24 tangential thereto. Then a locking pin 65 is inserted in the drilled aperture preferably with a slight interference fit. This arrangement will lock the adaptor or extension member 60 to both barrels and the barrels to each other through member 60. The pin 65 is preferably formed with a sighting bead 66 thereon.

It is to be understood that the adaptor may first be formed with the hole for pin 65 drilled therethrough. Then after the member 60 is assembled to the end of barrels 23 and 24, the barrels are drilled tangentially therethrough. In this mode of assembly the preformed hole in member 60 locates the passage between barrels 23 and 24.

It may thus be seen that the objects of the invention set forth as well as those made apparent from the preceding description are efficiently attained. While preferred embodiments of the invention have been set forth for purposes of disclosure further embodiments of the invention as well as modifications to the disclosed embodiments which do not depart from the spirit and scope of the invention may occur to others skilled in the art. Accordingly, the appended claims are intended to cover all embodiments and modifications and modes of practicing the invention which do not depart from the spirit and scope of the invention.

What is claimed is:

1. A double-barrel assembly for a shotgun comprising a pair of barrels having breech and muzzle ends, means joining said

barrels together adjacent the breech ends thereof, a rib having concavities on opposite sides thereof extending along the length of said barrels therebetween and receiving adjacent sides of said barrels in said concavities, said rib being molded of a non-metallic material, means adjacent the muzzle ends of said barrels joining said barrels in predetermined spaced relation, said joining means comprising a member adapted to receive muzzle end portions of both barrels therein and hold said barrels in predetermined spaced relation, and a pin extending through said member between said barrels and partially through the material of said barrels, said pin having a cross-sectional dimension greater than the smallest dimension between said barrels.

2. A double-barrel assembly for a shotgun comprising a pair of cylindrical barrels having breech and muzzle ends, means joining said barrels together adjacent the breech end thereof, a rib having concavities on opposite sides thereof extending along the length of said barrels therebetween and receiving adjacent sides of said barrels in said concavities, said rib being molded of a non-metallic material, said rib acting to position and space said barrels in predetermined relation, adhesive means bonding both of said barrels to said rib in said concavities, a member adapted to receive muzzle end portions of both barrels therein and hold said barrels in predetermined spaced relation, a pin extending through said member between said barrels and partially through the material of said barrels, said pin having a cross-sectional dimension greater than the smallest dimension between said barrels.

3. The assembly of claim **2** wherein said pin is provided with a sighting bead thereon.

4. A double-barrel assembly for a shotgun comprising a pair of barrels having breech and muzzle ends, means joining said barrels together adjacent said breech ends, a welding insert between said barrels adjacent said muzzle ends and fused to both of said barrels to join said barrels, wherein said insert is formed with projections adapted to make line contact with said barrels, and surfaces adapted to abut and space said barrels when said projections are fused to said barrels.

5. The assembly of claim **4** further including a rib having concavities on either side thereof adapted to receive said barrels therein, said rib being positioned between said barrels, an aperture defined in said rib, said insert being received in said aperture.

* * * * *