July 11, 1950 J. J. KLING 2,515,046

DISASSEMBLING APPARATUS

Filed March 23, 1946 2 Sheets-Sheet 1

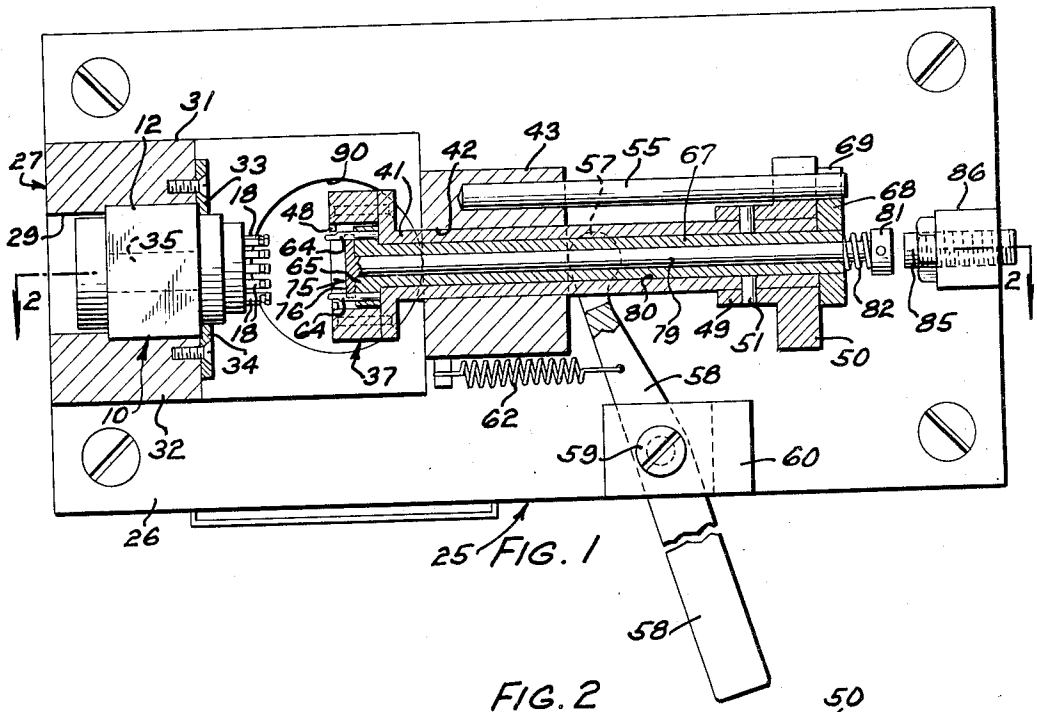



FIG. 1

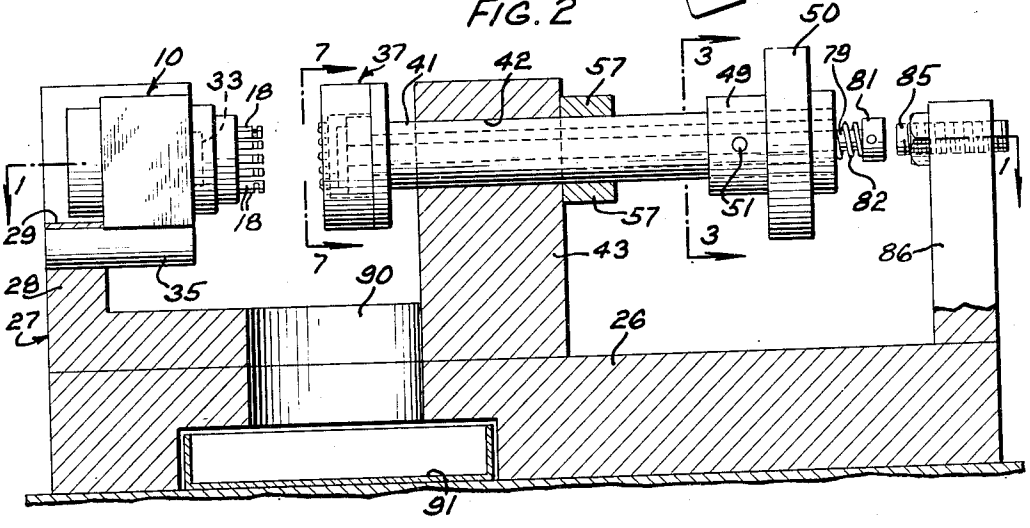



FIG. 2

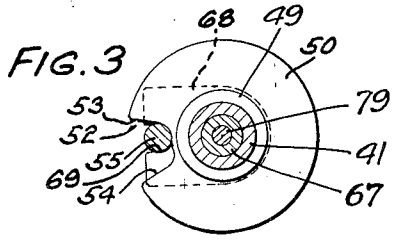



FIG. 3

INVENTOR
J. J. KLING
BY O. A. Kaul
ATTORNEY

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FIG. 4

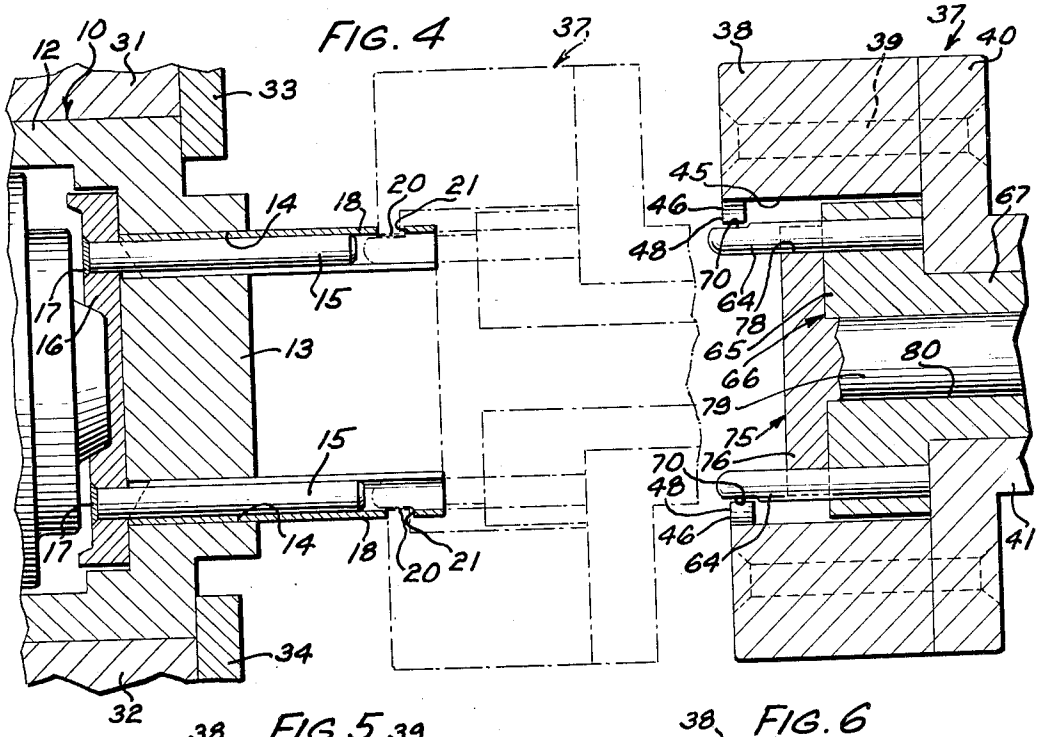



FIG. 5

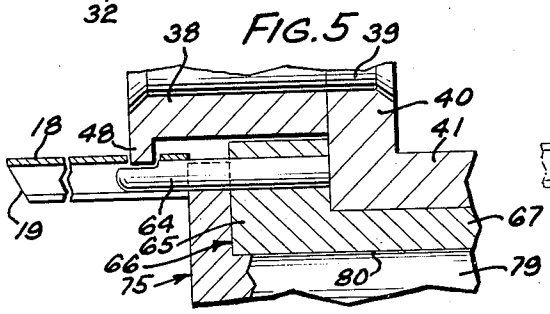



FIG. 6

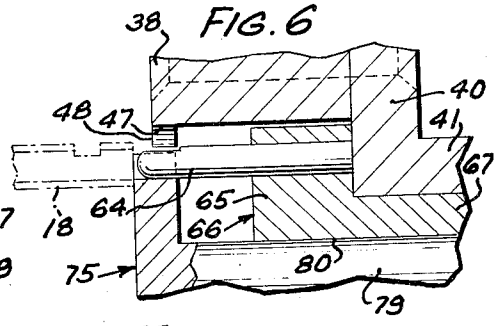



FIG. 7

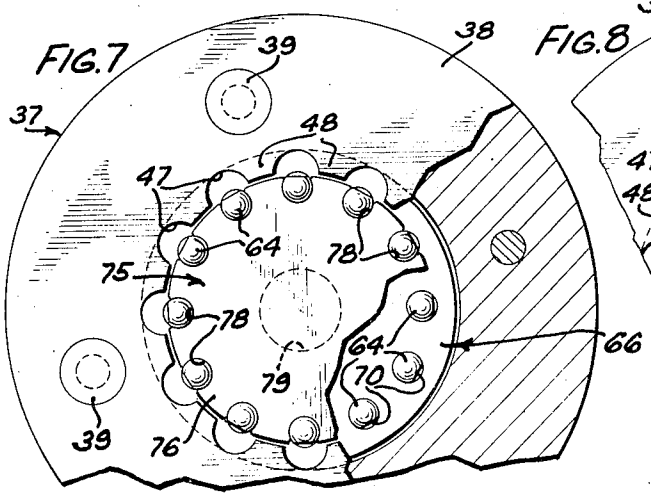
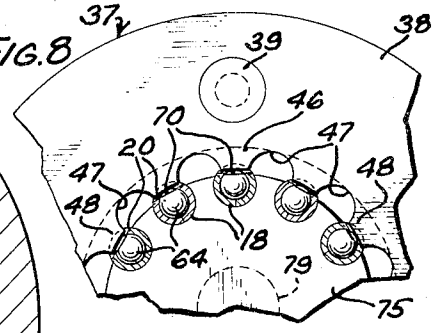



FIG. 8




INVENTOR
J. J. KLING
BY E. F. Kane
ATTORNEY

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# UNITED STATES PATENT OFFICE

2,515,046

## DISASSEMBLING APPARATUS

John J. Kling, Tuckahoe, N. Y., assignor to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York

Application March 23, 1946, Serial No. 656,589

10 Claims. (Cl. 29—25.19)

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This invention relates to disassembling apparatus and more particularly to an apparatus for simultaneously removing a plurality of spacing sleeves from an article.

In the assembling of certain electronic units, spacing sleeves are used to accurately space a plurality of pins in apertures in a shell member while the pins are brazed to a supporting member. Upon completion of the brazing of the pins to the supporting member, the spacing sleeves, which are rather tightly gripped by the contacting parts, must be removed.

It is an object of the present invention to provide a simple and effective device for rapidly disassembling parts.

In one embodiment of the invention, there is provided a member for supporting the article in a predetermined position with the parallel notched spacing sleeves projecting therefrom in alignment with a reciprocable head comprising a circular extractor member having a series of spaced teeth thereon movable between the sleeves to a position in lateral alignment with the notches therein and being rotatable to move the teeth into the notches of the sleeves, the extractor member having an operating lever engaging therewith for retracting the head and removing the notched sleeves from the article. A member reciprocable with the extractor member and having a series of pins for engaging the end portions of the sleeves is provided in the head for supporting the sleeves while they are being removed and an ejector member normally movable with the head and capable of movement relative thereto is provided and engages the ends of the sleeves for ejecting them from the supporting members after the sleeves have been removed from the article and the retracting member has been rotated to its normal starting position.

A more complete understanding of the invention will be had by reference to the following detailed description and the accompanying drawings illustrating a preferred embodiment of the invention, wherein

Fig. 1 is a plan sectional view taken on the line 1—1 of Fig. 2 and showing an article in position in the apparatus and an extractor head thereon in an intermediate position;

Fig. 2 is a vertical sectional view of the apparatus taken on the line 2—2 of Fig. 1 in the direction of the arrows;

Fig. 3 is a detailed sectional view taken on the line 3—3 of Fig. 2 in the direction of the arrows;

Fig. 4 is an enlarged horizontal sectional view

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of a portion of the apparatus showing the relation between parts thereof and the article and the spacing sleeves projecting therefrom;

Fig. 5 is a sectional view showing a spacing sleeve engaged by the extractor head after the spacing sleeve has been removed from the article;

Fig. 6 is a fragmentary sectional view of the extractor head showing the ejector member moved relative to the ejector head to eject the sleeves therefrom;

Fig. 7 is an elevational view of the ejector head with parts broken away and parts shown in section, taken on the line 7—7 of Fig. 2; and

Fig. 8 is a fragmentary view of the extractor head showing the spacing sleeves in position therein and the ejector member rotated to engage the sleeves.

Referring to the drawings, the article 10 referred to in the present application and shown in Figs. 1, 2 and 4 of the drawings, is a tuning head assembly used in electronic detection devices and comprises an outer hollow shell 12 and an end wall 13 provided with a plurality of parallel apertures 14 therein equally spaced and arranged in a circle. Coaxially disposed in the apertures 14 are movable pins 15, which are brazed to a movable disc 16. In order to accurately align the pins 15 within the apertures 14, spacing sleeves 18 are inserted between the pins 15 and the walls of the apertures 14 (Fig. 4) when the tuning head is being assembled. The sleeves each are formed with an oblique end 19 to facilitate the insertion of the sleeve into the apertures 14 and near the opposite end thereof each sleeve is provided with a notch or slot 20 extending transversely of the axis of the sleeve to form a shoulder 21 thereon. After the parts of the tuning head have been assembled, with the sleeves 18 interposed between the pins 15 and the walls of the apertures 14, and the notches 20 of the sleeves positioned radially outwardly, the unit 10 is subjected to a brazing temperature to fuse a strip of brazing material applied to the disc 16 to braze the pins 15 to the disc 16, as indicated at 17. After the tuning unit has cooled, the spacing sleeves 18, which are frictionally held therein, may be removed.

The apparatus 25, for disassembling or removing the sleeves from the tuning unit 10, comprises (Figs. 1 and 2) a base 26, at one end of which is mounted a supporting member 27 for supporting the article 10 in a predetermined position. The supporting member comprises a vertical wall 28 recessed at 29 and having two side walls 31 and 32 spaced apart to receive the article 10 there-

between and having plates 33 and 34 secured to the ends thereof to engage a portion of the article 10 and restrain it from movement to the right, as viewed in Figs. 1 and 2. Extending horizontally from the wall 26 is a member 35 (Fig. 2) for supporting the article 10 in a predetermined vertical position.

A head 37 is mounted for horizontal movement into engagement with the end portions of the spacing sleeves 18 and comprises an annular extractor member 38 (Figs. 4 and 7) secured, as by rivets 39, to a circular flange 40 of a hollow shaft 41. The shaft 41 is axially and rotatably mounted in a bearing aperture 42 of a supporting member 43 secured to the base plate 26. The annular member 38 has an inner cylindrical surface 45 and is provided at its forward end with an inwardly directed flange 46, which is formed with a plurality of evenly spaced circular notches 47 forming a series of inwardly projecting catch elements or teeth 48 therebetween. The teeth or shoulder elements 48 of the extractor member are arranged to fit between the spacing sleeves 18 when the extractor head 38 is moved to its forward position, as indicated in dot and dash lines in Fig. 4, where they are stopped in lateral alignment with the notches 20 in the sleeves 18. Upon a limited rotary movement being imparted to the extractor member 38, the teeth 48 thereon will engage in the notches 20 of the spacing sleeves 18 and, upon an axial movement to the right being imparted to the member 38, the teeth 48 thereof will engage the shoulders 21 of the spacing sleeves 18 and remove the sleeves from the article 10.

On the right hand end of the shaft 41, a collar member 49, having a hand wheel or flange 50, is secured by means of pins 51. The hand wheel 50 is provided with a notch 52, the shoulders 53 and 54 of which alternately engage a stationary horizontally disposed rod 55 secured to the support 43 to limit the angular or rotary movement of the extractor member 38 when the member 50 is turned in opposite directions. Engageable with the left hand end of the collar 49 are the furcated ends 57 of a bifurcated operating lever 58 fulcrumed at 59 in a support 60 mounted on the base 26. The furcated ends 57 straddle the hollow shaft 41 and, upon actuation of the operating lever 58, engage the member 49 to move the shaft 41 and the head 37 to the right during a sleeve extracting movement. When in the position shown in Fig. 1, where they engage the support 43, the furcations 57 act as a stop to engage the collar 49 and limit the movement of the head 37 to the left to stop the teeth 48 in lateral alignment with the notches 20 of the sleeve member 18.

The head 37 may be rotated by manually engaging the head 37 or the hand wheel 50 and applying a turning force thereto, it angular movement being limited by the engagement of the opposite shoulders 53 and 54 on the hand wheel 38 with the rod 55. The head 37 may be advanced into engagement with the sleeves 18 by manually engaging the head 37 or the hand wheel 50 and applying a force thereto and the extracting movement of the head 37 to the right is imparted thereto by the actuation of the operating lever 58 in a clockwise direction, as viewed in Fig. 1. A spring 62 is provided to return the operating lever 58 to the position shown in Fig. 1.

In order to prevent the ends of the spacing sleeves 18 from becoming distorted and deformed during the extracting operation, means are provided in the head 37 to support the ends thereof and comprise a series of pins 64 mounted on a disc 65 of a sleeve supporting member 66. The pins 64, arranged in a circle and in coaxial alignment with the sleeves 18, are adapted to fit into and support the end portions of the sleeves when the head 37 is moved to its forward or left hand position. The sleeve supporting member 66 is mounted for axial movement with the extractor member 38 and has a shank 67 mounted within the hollow shaft 41. An arm 68, secured to the end of the shank 67 to maintain the supporting member 66 in assembled relation with the shaft 41, is slotted at 69 to receive the rod 55 therein to prevent angular or rotary movement of the sleeve supporting member 66. The forward portions of the pins 64 are cut away at 70 to provide clearance for the teeth 48 when the pins 64 are in engagement with the sleeves 18 and the retractor member 38 has been rotated to bring the teeth 48 into engagement with the slots 20 of the sleeves 18.

After the sleeves 18 have been removed from the article 10, they remain in the head 37, being retained on the pins 64 by the teeth 48 of the extractor member 38. An ejecting member 75 is provided to eject the sleeves 18 from the head 37 after the extractor member 38 has been rotated to remove the teeth 48 from the slots 20 of the sleeves 18. The ejector 75 comprises a disc 76, which is engageable with the ends of the sleeves 18 and is notched at 78—78 to slidingly engage the pins 64. The disc 76 is formed on one end of a rod 79 mounted in a bore 80 of the shank 67 of the sleeve supporting member 66. The rod 79 projects beyond the shank 67 and has a collar 81 secured to its end in spaced relation to the end of the shank 67 and the ejector member 75 is urged to the right and maintained in its normal position relative to the member 66 by a coil spring 82 interposed between the collar 81 and of the shank 67 (Fig. 1). By relative movement between the ejector member and the sleeve supporting member, the sleeves may be ejected from the head 37.

A stop member 85, mounted in a post 86 on the base 26, is positioned in the path of movement of the rod 79 to stop it, after a predetermined movement thereof, in a position in which the sleeves 18 will have been removed from the article 10. By a further turning movement of the lever 58, the extractor member 38 and the sleeve supporting member 66 are moved relative to the ejector 75 to withdraw the pins 64 from the ends of the sleeves 18, which then fall through an aperture 90 in the base 26 into a receptacle 91 provided to receive them.

In the operation of the disassembling apparatus, the article 10 is seated in the supporting member 27, with the sleeves 18 projecting to the right, as viewed in Figs. 1 and 2. With the extractor rotated to the position shown in Fig. 7, the head 37 is moved to the left until stopped by the furcations 57 to advance the teeth 48 on the extractor member between the sleeves 18 to a position in lateral alignment with the notches 20 therein, after which the member 38 is rotated to move the teeth 48 into the notches 20 of the sleeves 18. With the head 37 in its forward position, the end portion of the sleeves 18 will snugly engage and be supported by the supporting pins 64 of the supporting member 66 and the end surface of the sleeves will abut against the ejecting member 75. The actuating lever 58 may

then be actuated in a clockwise direction to move the head 37 to the right, as viewed in Fig. 1, to remove the pins 18 from the article 10. When the rod 79 engages the stop 85, in which position of the head 37 the sleeves 18 are free of the pins 15, the rotation of the lever 58 may be halted momentarily and the extractor member 38 rotated to disengage the teeth 48 from the notches 20 of the sleeves, after which the lever 58 may be moved further in a clockwise direction to cause continued movement to the right of the extractor member 38 and the sleeve supporting member 66 to effect the ejection of the sleeves 18 from the head 37, as shown in Fig. 6, and permit the sleeves to drop into the receptacle 91.

What is claimed is:

1. A disassembling apparatus comprising a base, a holder for supporting in a predetermined position an article having a plurality of removable shouldered elements projecting therefrom in parallel relation, an extractor member having a plurality of teeth engageable with the shoulders of the elements of an article positioned in said holder, means on said base for supporting said extracting member for rotary movement about a predetermined axis and for reciprocatory movement along said axis toward and from the holder, means for stopping the movement of the extractor member toward the holder to position the extractor member with the teeth in a predetermined relation to the shoulders of the elements whereby the extractor member may be rotated to move the teeth behind and into longitudinal alignment with the shoulders of the elements, means for limiting the rotary movement of the extracting member whereby said member may be moved to and from positions where the teeth are in and out of longitudinal alignment with the removable elements, and lever means for retracting the extracting member to remove the elements from the article.

2. An apparatus for stripping spacer elements from a composite article comprising a base, a holder on said base for supporting in a predetermined fixed position thereon a composite article having a plurality of removable shouldered spacing elements projecting therefrom, an extractor member having a plurality of teeth engageable with the shoulders of the spacing elements of an article positioned in said holder, means mounting said extractor member on said base for oscillatory movement about an axis and for reciprocatory movement along said axis toward and away from said holder whereby said extractor member may be moved toward said holder and then oscillated about said axis to effect an operative connection for longitudinal movement between the teeth on said extractor member and the shouldered spacing elements on an article positioned in said holder, and means operable to move the extractor member away from said holder to effect the removal of the spacing elements from the article positioned in said holder.

3. An apparatus for stripping spacer elements from a composite article comprising a base, a holder on said base for supporting in a predetermined fixed position thereon a composite article having a plurality of removable shouldered spacing elements projecting therefrom, an extractor member having a plurality of teeth engageable with the shoulders of the spacing elements of an article positioned in said holder, means mounting said extractor member on said base for oscillatory movement about an axis and



for reciprocatory movement along said axis toward and away from said holder whereby said extractor member may be moved toward said holder and then oscillated about said axis to effect an operative connection for longitudinal movement between the teeth on said extractor member and the shouldered spacing elements on an article positioned in said holder, a supporting member mounted for axial movement with said extractor member and engageable with the spacer elements to hold said elements against transverse displacement and to guide said elements for axial movement, and means operable to move the extractor member away from said holder to effect the removal of the spacing elements from the article positioned in said holder.

4. An apparatus for stripping spacer elements from a composite article comprising a base, a holder on said base for supporting in a predetermined fixed position thereon a composite article having a plurality of removable shouldered spacing elements projecting therefrom, an extractor member having a plurality of teeth engageable with the shoulders of the spacing elements of an article positioned in said holder, means mounting said extractor member on said base for oscillatory movement about an axis and for reciprocatory movement along said axis toward and away from said holder whereby said extractor member may be moved toward said holder and then oscillated about said axis to effect an operative connection for longitudinal movement between the teeth on said extractor member and the shouldered spacing elements on an article positioned in said holder, a supporting member mounted for axial movement with said extractor member and engageable with the spacer elements to hold said elements against transverse displacement and to guide said elements for axial movement, means operable to move the extractor member away from said holder to effect the removal of the spacing elements from the article positioned in said holder, and an ejector member mounted for axial movement relative to said supporting member and engageable with the ends of said spacing elements, said ejector member being operable to eject the elements from said supporting member after the spacing elements have been withdrawn from said article and the teeth have been disconnected from the spacing elements.

5. An apparatus for stripping spacer members from a composite article comprising a base, a holder on said base for supporting in a predetermined fixed position said composite article having removable shouldered spacer members extending therefrom, a supporting member mounted on said base for longitudinal reciprocatory movement towards and away from said holder for engaging the spacer members on said composite article positioned in said holder and supporting said spacers for longitudinal movement and against transverse movement, a connector member mounted on said supporting member for reciprocatory movement therewith and for oscillatory movement thereon to and from an operative position about an axis parallel to the direction of the reciprocatory movement and having a plurality of connector elements thereon arranged in a pattern similar to the arrangement of the spacer members on the article being stripped whereby said supporting and said connector members may be moved toward said holder to bring the supporting member into engagement with the spacers of the article positioned in said holder and the connector member in pre-

determined transverse alignment with the spacers where said connector member may be oscillated to said operative position to effect a connection for longitudinal movement between the connector elements and the shouldered spacers, and means for moving the connector and the supporting members away from the holder to effect the removal of the spacers from the article.

6. A disassembling apparatus comprising a base, a holder on said base for supporting in a predetermined position an article with a removable transversely notched spacing sleeve extending therefrom, a connector member having an integral connector element engageable in the notch of a spacing sleeve of an article positioned in said holder, means on said base for guiding the connector member for longitudinal reciprocatory movement toward and away from said holder and in a path parallel to the axis of the sleeve of said article positioned in said holder and for oscillatory movement about an axis parallel to said path of reciprocatory movement, stop means for arresting the movement of the extractor member toward said holder in a predetermined position to align the connector element thereon transversely with the notch in the sleeve of said article positioned in the holder whereby said connector member be oscillated to move the connector element transversely into the notch and establish an operative connection therewith for longitudinal movement, a supporting member mounted for longitudinal reciprocatory movement toward and away from said holder with said connector member and having a pin engageable in the end of the spacing sleeve of an article mounted in said holder for holding said sleeve against transverse movement and for guiding said sleeve for longitudinal movement, a lever means operatively connected to said connector member for moving the connector member away from the holder to effect the removal of the spacing sleeve from the article.

7. An apparatus for simultaneously removing a plurality of removable transversely notched spacing sleeves from a composite article comprising a base, a holder on said base for supporting in a predetermined fixed position said article having a plurality of removable notched spacing sleeves projecting therefrom in parallel relation, a connector member having a plurality of shoulder elements engageable in the notches in the sleeves of an article positioned in said holder, means on said base for guiding the connector member for reciprocatory movement toward and away from the holder in a path parallel to the axis of the sleeves of an article positioned in said holder, means for stopping the movement of the extractor member toward said holder in a predetermined position whereby the shoulder elements are in transverse alignment with the notches in the sleeves of the article positioned in said holder, means operable to move the connector member and cause the shoulder elements to move transversely whereby the shoulder elements may be moved into the notches of the sleeves of the article positioned in the holder to establish an operative connection with the sleeves for longitudinal movement, a supporting member mounted for reciprocatory movement with said connector member toward and away from said holder and having pins engageable in the ends of the sleeves of an article positioned in said holder for holding said sleeves against transverse movement and for guiding said sleeves for longitudinal movement relative to the holder, and lever means



mounted on said base and operatively connected to said connector member for moving said connector member away from said holder to effect the removal of the sleeves from the article supported in said holder.

8. An apparatus for simultaneously removing a plurality of spacing sleeves from an article comprising a base, a holder on said base for supporting in a predetermined fixed position said article having a plurality of removable transversely notched spacing sleeves projecting therefrom in parallel relation, an extractor member provided with an annular head having a plurality of radially extending teeth thereon engageable in the notches of the sleeves of an article positioned in the holder, a support on said base for mounting said extractor member for longitudinal reciprocatory movement toward and away from said holder and for rotary movement about an axis parallel to the path of reciprocatory movement and to the axis of the sleeves of the article positioned in said holder, whereby the extractor may be moved axially toward the holder to position the teeth in transverse alignment with the notches in the sleeves of an article positioned in said holder, and then rotated to move the teeth into the notches to effect an operative connection therewith for longitudinal movement, a supporting member mounted for longitudinal reciprocatory movement with said extractor member and having portions thereof engageable with the sleeves of an article positioned in said holder for supporting the sleeves for longitudinal movement and against transverse displacement, lever means on said base operatively connected to said extractor member for moving the extractor member away from said holder to effect the removal of the sleeves from the article, an ejecting member engageable with the ends of said sleeves and mounted on said supporting member for axial movement relative thereto and operable to eject the sleeves from the supporting member after the sleeves have been removed from said article.

9. An apparatus for stripping spacer members from a composite article comprising a base, a holder on said base for supporting the article in a predetermined fixed position with removable transversely notched spacer sleeves extending therefrom, an extracting member having a head provided with a plurality of radially extending teeth adapted to be moved into engagement with the notches in the sleeves of an article positioned in said holder, said extracting member having a tubular shank portion mounted on said base for reciprocatory movement toward and away from said holder, means for limiting the forward movement of said extractor member to position the teeth thereon in transverse alignment with the notches in the sleeves of an article positioned in said holder, means for limiting the oscillating movement of said head whereby the teeth may be moved to and from a position of axial alignment in the notches of the spacer sleeves to effect a connection therewith for longitudinal movement, a tubular member telescopingly mounted for axial movement with said extractor member and having a portion engageable with the sleeves to hold said sleeves against transverse displacement and to guide said sleeves for longitudinal movement, lever means on said base operable for moving said extractor member away from said holder to effect the removal of the sleeves from the article, an ejector member telescopingly mounted within said supporting mem-

ber and having a portion engageable with the end of said sleeves, said ejecting member having a normal retracted position on said supporting member and being axially movable relative thereto to eject the sleeves from the supporting member after the sleeves have been removed from said assembly and after the teeth have been moved from the notches in the sleeves, and spring means on said ejecting member for yieldingly holding said ejecting member in its normal position on said supporting member.

10. An apparatus for stripping spacer members from a composite article comprising a base, a holder on said base for supporting in a predetermined fixed position, said composite article having removable shouldered spacer members extending therefrom, a supporting member mounted on said base for longitudinal reciprocatory movement towards and away from said holder for engaging the spacer members on said composite article positioned in said holder and supporting said spacers for longitudinal movement and against transverse movement, a connector member mounted on said supporting member for reciprocatory movement therewith and for oscillatory movement thereon to and from an operative position about an axis parallel to the direction of the reciprocatory movement and having a plurality of connector elements thereon arranged in a pattern similar to the arrangement of the spacer members on the article being stripped whereby said supporting and said connector members may be moved toward said holder to bring the supporting member into engagement with the spacers of the article positioned in said holder and the connector member in predetermined transverse alignment with the spacers where said connector member may be oscillated to said operative position to effect a connection for longitudinal movement between the connector elements and the shouldered spacers, means for moving the connector and the supporting members away from the holder to effect the removal of the spacers from the article, an ejector member engageable with the ends of said spacing members and mounted for reciprocatory movement with said supporting member and capable of axial movement relative thereto, spring means for yieldingly holding said ejector in a normal retracted position on said supporting member, and a member on the base engageable with said ejector member at a predetermined point in the rearward movement of said supporting member to effect an axial movement of said ejector relative to said supporting member and the ejection of said spacing members from said supporting member.



JOHN J. KLING.


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