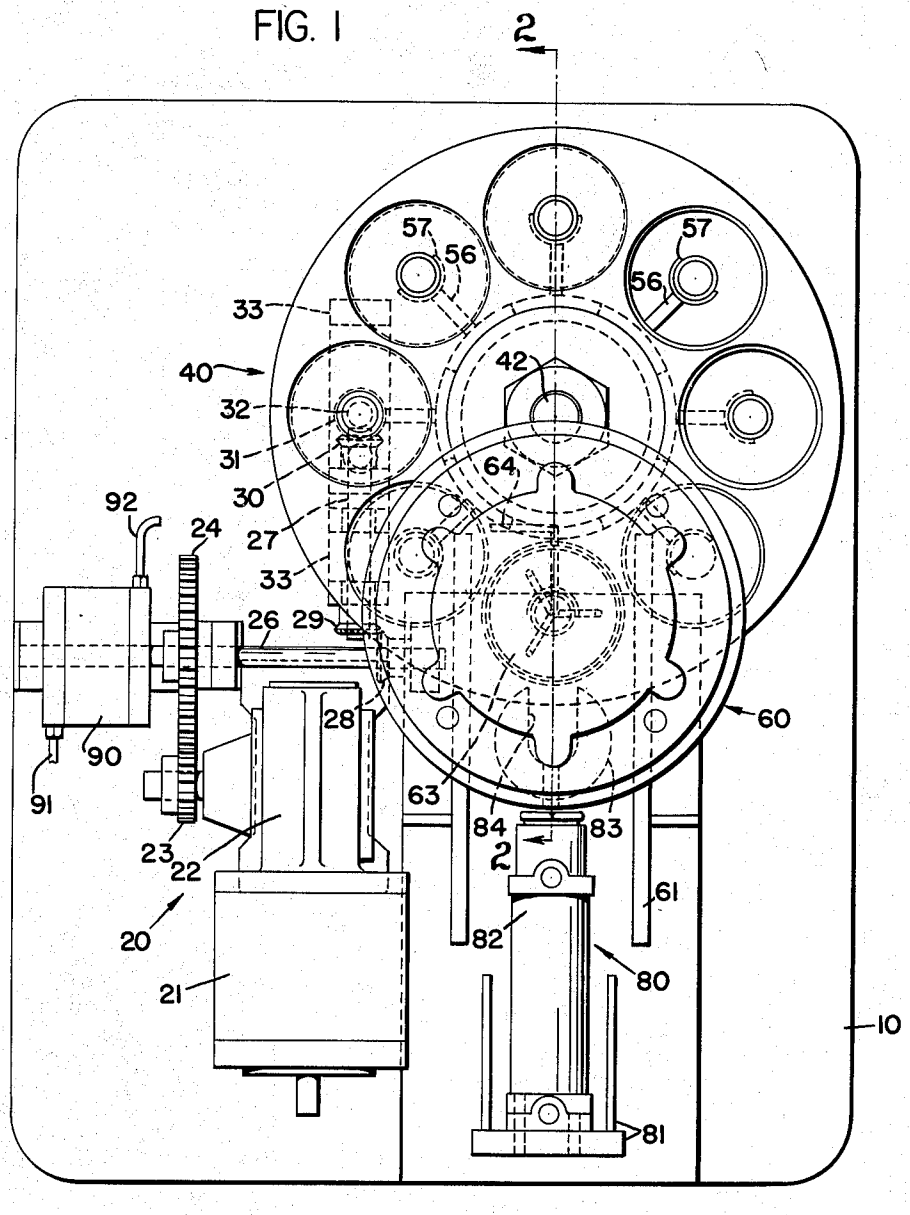
May 22, 1956 W. E. WOEHLERT ET AL 2,746,359

PAPER SPOOL FABRICATING MACHINE

Filed June 8, 1953 4 Sheets-Sheet 1

FIG. 1



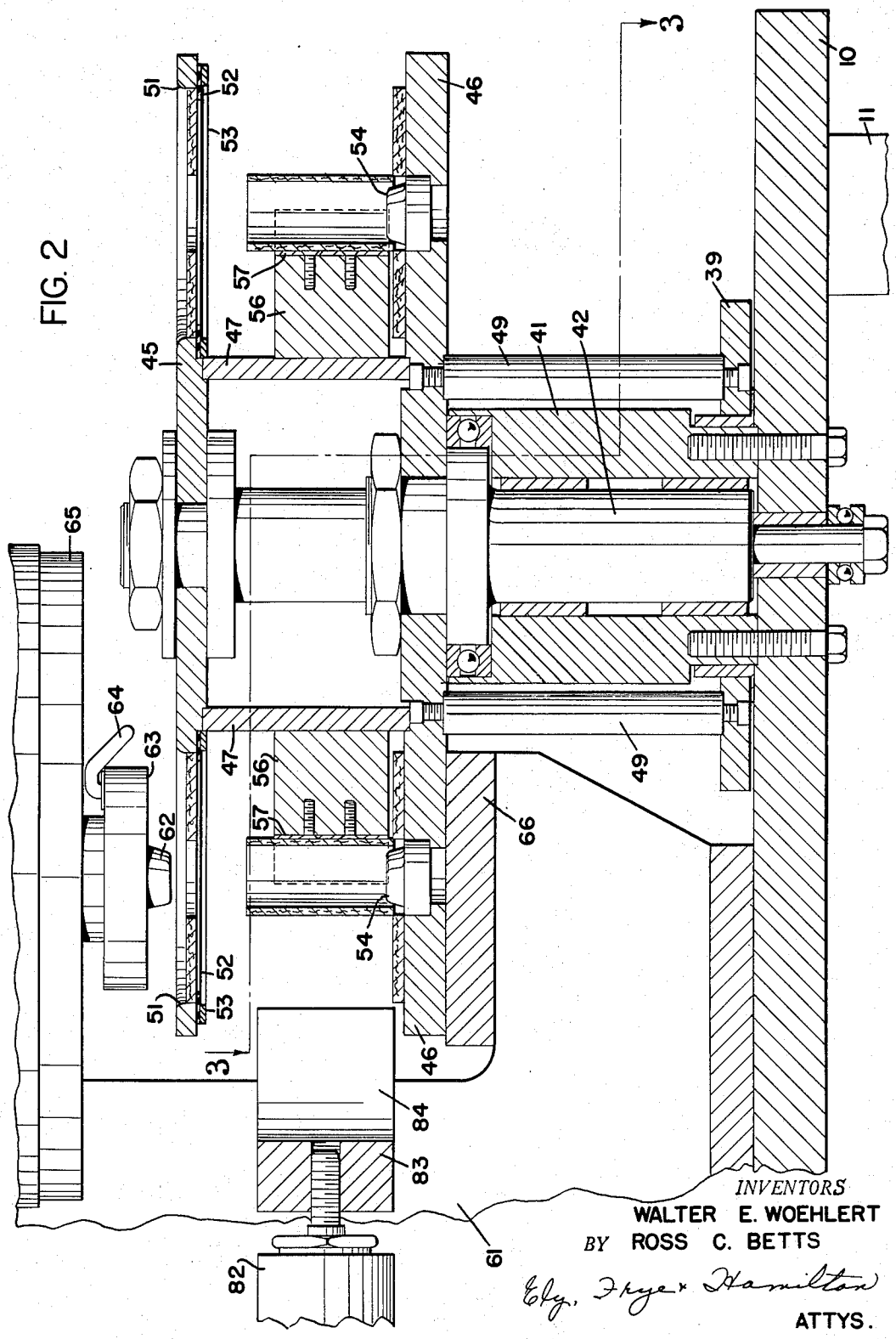
INVENTORS
WALTER E. WOEHLERT
BY ROSS C. BETTS
Ely, Pkye & Hamilton
ATTYS.

May 22, 1956 W. E. WOEHLERT ET AL 2,746,359

PAPER SPOOL FABRICATING MACHINE

Filed June 8, 1953 4 Sheets-Sheet 2

FIG. 2



INVENTORS
WALTER E. WOEHLERT
BY ROSS C. BETTS
Ely, Frye & Hamilton
ATTYS.

May 22, 1956 W. E. WOEHLERT ET AL 2,746,359

PAPER SPOOL FABRICATING MACHINE

Filed June 8, 1953 4 Sheets-Sheet 3

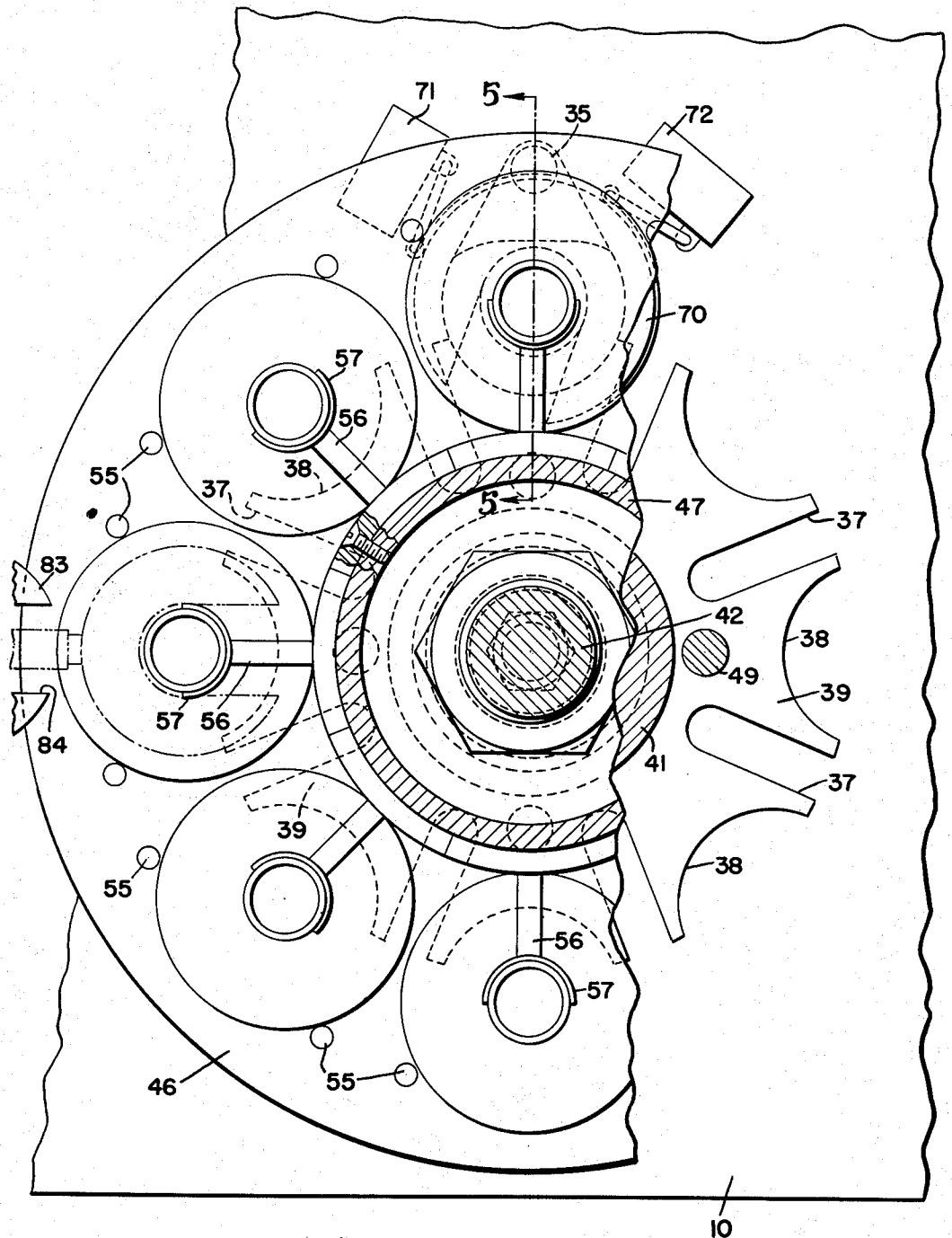


FIG. 3

INVENTORS
WALTER E. WOEHLERT
BY ROSS C. BETTS

Eby, Pryor & Hamilton
ATTYS.

May 22, 1956 W. E. WOEHLERT ET AL 2,746,359

PAPER SPOOL FABRICATING MACHINE

Filed June 8, 1953 4 Sheets-Sheet 4

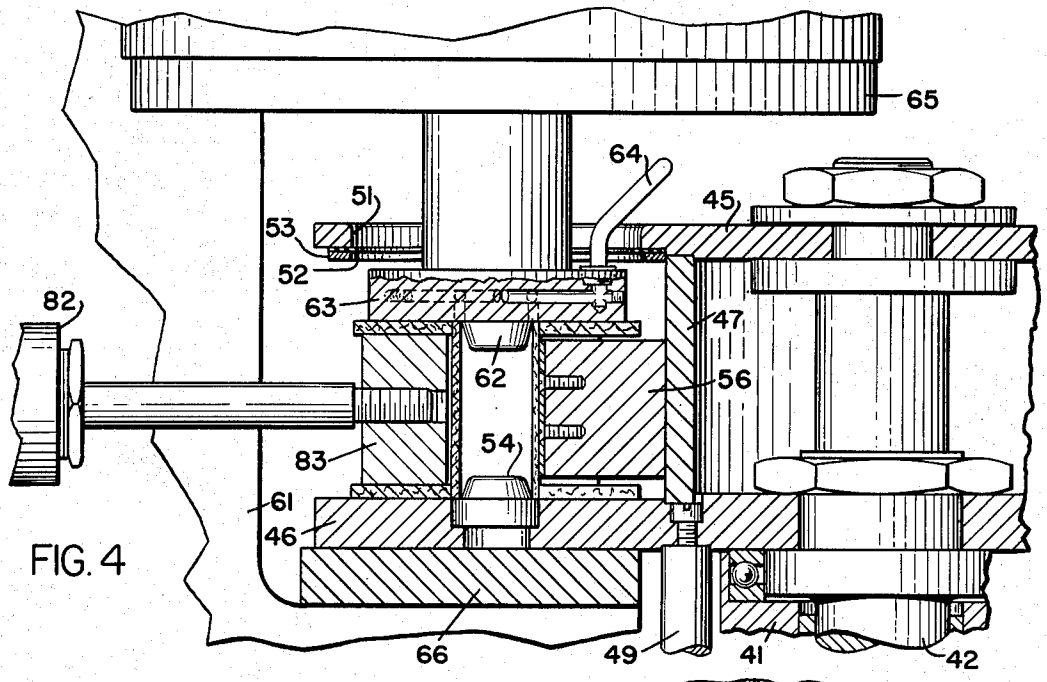


FIG. 4

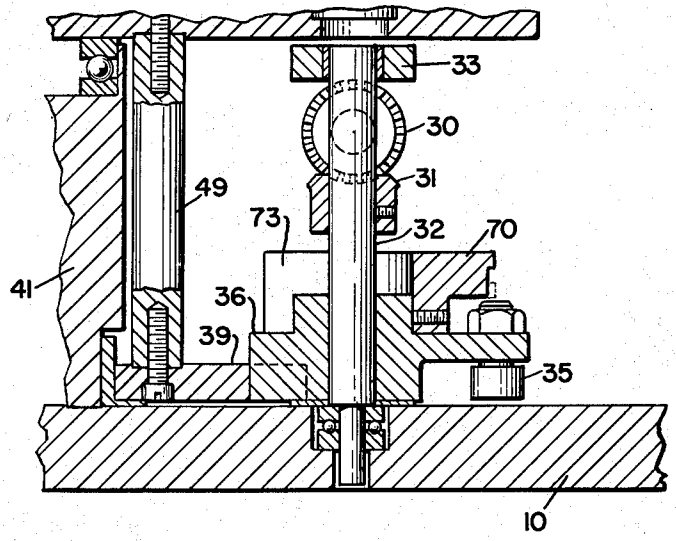


FIG. 5

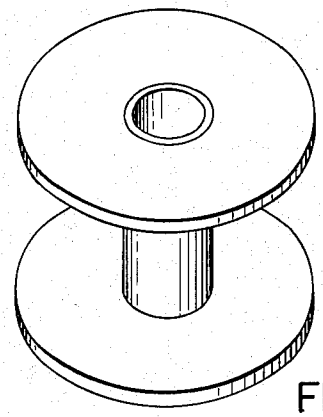


FIG. 6

INVENTORS
WALTER E. WOEHLERT
BY ROSS C. BETTS

Ely, Dreyer & Hamilton
ATTYS.

United States Patent Office 2,746,359 Patented May 22, 1956

2,746,359

PAPER SPOOL FABRICATING MACHINE

Walter E. Woehlert, South Euclid, and Ross C. Betts, Rocky River, Ohio, assignors to The Dobeckmun Company, Cleveland, Ohio, a corporation of Ohio

Application June 8, 1953, Serial No. 360,156

18 Claims. (Cl. 93—1)

This invention relates to means for producing a paper spool which has dimensional accuracy and is suitable for use in widespread industrial applications, the advantages of the provision of such a spool being fully set forth in our copending application Serial No. 350,038 filed April 21, 1953.

In the copending application referred to, we describe our discovery that a paper spool having an interference range between the core and flange, which range is within specified limits, constitutes a dimensionally accurate and durable spool, the tight fit within the intereference range specified being unaccompanied by buckling or weakening of any portion of the web structure despite the considerable degree of intereference employed.

In the fabrication of such spools it is important that cores and flanges be accurately fitted together. Initial misalignment during the fitting operation results in burring of the core or flange and consequent damage to the spool assembly. In performance of this fitting operation it is therefore necessary to provide for a definite pre-positioning of the core and the flanges with respect to each other and for the maintenance of an accurate coaxial relationship between them during the actual bringing together of the spool parts. Furthermore, the parts must be firmly pressed together while maintaining an accurate longitudinal spacing between the inner faces of the side flanges. At the same time the spools must not be subjected to heavy handling which would disrupt the fine dimensional accuracy which it is necessary to attain; without such handling they must be pre-positioned, then released from their pre-positioned relationship and brought together into the final assembly in such a way as to maintain their accurate coaxial relationship and attain proper flange spacing.

We have provided a compact machine which meets all the foregoing requirements, which is not complex in structure, which performs the spool fabricating operation very effectively and which is adapted to high volume operations. The advantages of our invention will become more fully apparent from an understanding of the following specification and the accompanying drawings in which:

Figure 1 is a plan view of a machine in which our invention is embodied.

Figure 2 is a sectional view taken on line 2—2 in Figure 1.

Figure 3 is a sectional view taken on line 3—3 in Figure 2.

Figure 4 is a view similar to the upper half portion of Figure 2, but showing the parts in another operative position.

Figure 5 is a sectional view taken on line 5—5 in Figure 3.

Figure 6 is a perspective view of a spool produced according to the invention.

The illustrated mechanism is supported upon a base-plate 10 which is mounted upon legs 11. The principal sub-assemblies of the mechanism include the power drive assembly 20, the turntable assembly 40, the press-head assembly 60 and the retracting spacer assembly 80.

Mounted on the base-plate 10 is a motor 21 connected through a speed reducer 22 and the spur gears 23 and 24 to a shaft 26 which is in turn drivingly engaged with the shaft 27 through bevel gears 28 and 29. Mounted on the opposite end of the shaft 27 from the bevel gear 29 is a bevel gear 30 which meshes with a bevel gear 31 affixed to the vertical shaft 32. The shaft 27 and the upper end of the vertical shaft 32 are rotatively supported in suitable bearings mounted in an arbor or support structure 33 which is affixed to the base-plate 10.

As mostly clearly seen in Figure 5, the lower end of the vertical power shaft 32 has mounted thereon the drive assembly of a Geneva gear linkage including a driving pin 35 and a holding shoulder 36 designed to interact, respectively, with the slots 37 and saddles 38 of the Geneva gear 39 in the conventional manner, thus providing for intermittent advance and dwell of the turntable assembly.

As best seen in Figure 2, the Geneva gear 39 is mounted for rotation about the fixed turntable column 41 in which is rotatably mounted a turntable shaft 42. Upper turntable 45 and lower turntable 46 are supported by washers and nuts against suitable shoulders on the shaft 42 and are also held in accurately spaced relationship by the spacing ring 47. A plurality of posts 49 link the Geneva gear 39 and the turntables 45 and 46 together so that these parts all rotate as one unit.

Formed in the upper turntable 45 are a plurality of bores 51 having resilient annular lips 52 made of rubber or other suitable material and held in place by retaining rings 53 which are screwed or otherwise fastened to the underside of the upper turntable 45. Mounted on the lower turntable 46 are a series of central stakes 54 and centering pins 55 (see Figure 3). Mounted on the spacer ring 47 are a series of brackets 56, supporting on their outside ends the core saddles 57.

The press-head assembly 60 is supported on a standard 61 which is affixed on the base-plate 10. The press-head proper comprises a stake 62 and a flange member 63 having passages (not shown) drilled therein and communicating between the vacuum line 64 and the lower face of the member 63. Members 62 and 63 are press-actuated by an actuating cylinder of suitable type (not shown) contained within the housing 65. On the standard 61 and immediately below the press-head is a fixed support pad 66 over which the underside of the lower turntable 46 slides as the turntable assembly 40 is indexed from position to position.

The retracting spacer assembly 80 is supported on a standard 81 which is affixed on the base-plate 10 (see Figure 1). This assembly comprises an actuating cylinder 82, and a spacer 83 (see Figures 2 and 3) which is coupled to the cylinder 82 to be actuated thereby. The spacer 83 has a cutout center 84 adapted to fit around spool cores supported in the core saddles 57.

As may be seen in Figure 5 a cam member 70 is mounted on the drive member of the Geneva linkage, the cam member 70 thus rotating with the vertical shaft 32. A pair of microswitches 71 and 72 are each adapted to be actuated by one of a pair of cam ridges on the cam member 70. The microswitches are suitably mounted on the base-plate 10, switches and mounting being omitted from Figure 5 for purposes of clarity. The cam member 70 has a cut-out 73 formed therein to enable independent insertion and removal of this member from the assembly.

It will be understood that the press-head actuating cylinder and the spacer actuating cylinder 82 are each controlled by electrically actuated valves adapted in turn to be controlled by the microswitches, as is conventional

in connection with similar actuating cylinder control systems. Depression of microswitch **71** causes extension of the press-head; release of this microswitch results in retraction of the press-head. Depression and release of microswitch **72** correspond respectively with extension and retraction of the spacer **83**.

Mounted at one end of the shaft **26** (see Figure 1) is a vacuum valve **90**. The line **91** of this valve is connected with a vacuum source (not shown). The line **92** of this valve is connected with line **64** (see Figures 2 and 4). As is conventional in such valves, the interior of valve **90** comprises a porting member (not shown) which rotates with the shaft **26** and which at certain angular positions couples the lines **91** and **92** together, while at remaining angular positions the line **92** is vented to atmosphere. Drive ratios throughout the power drive linkage are so maintained that the valve **90** completes one cycle of operation for each indexing of the turntable assembly. The porting member within the valve **90** is so formed that vacuum is maintained at the press-head member **63** during the downward stroke of the press head but is released shortly thereafter and prior to release of the microswitch **71** and corresponding retraction of the press-head.

Operation

At convenient loading stations spool flanges are placed within the bores **51** in the upper turntable and are placed against guide posts **55** in the lower turntable. At the station following that at which flanges are placed on the lower turntable, spool cores are seated firmly against the saddles **57**. As the unassembled spool parts are advanced they come into position below the press-head, as seen at the left side of Figures 2. As the assembly comes to rest, the rotating cam **70** engages the microswitch **72** to cause extension of the spacer **82**. Shortly thereafter the microswitch **71** is engaged to cause extension of the press-head. At this moment the relative position of the porting member within the vacuum valve **90** is such that vacuum is supplied at the line **64** and the press-head member **63**. The press-head passes through the bore **51** carrying with it the upper spool flange which deflects the lip **52** and which, being now adhered to the press head by vacuum, is carried downwardly in accurately centered position into contact with the upper end of the spool core. As downward travel continues, the upper flange is forced onto the spool core, and the press member **63** coming into contact with the core presses the core into the lower spool flange. During this operation the turntable assembly is rigidly supported on the pad **66**. Accurate final flange-to-flange spacing is assured by the spacer **83**. As the press-head reaches its lowermost position the vacuum in member **63** is released by the vacuum valve **90**. The press-head is retracted, the spacer **83** is retracted and the turntable assembly is then indexed to its next position. The assembled spool is thereupon removed from the lower turntable and the portion of the turntable with which the spool was associated is subsequently advanced to the loading station or stations to repeat the cycle.

It will be apparent that many of the details of the press mechanism we have disclosed may be varied without departing from our invention. While the invention has been illustrated as embodied in a semi-automatic machine, it may be adapted to fully automatic production in which manual loading is eliminated, or conversely it may be embodied in a hand-operated press in which spools are assembled on a non-continuous basis. Accordingly, the scope of our invention is not limited to the specific illustrated embodiment but is to be defined by the following claims.

What is claimed is:

1. A machine for fabricating paper spools comprising a turntable mounted for advancement past a given station and having an upper flange and a lower flange, a plurality of bores through said upper flange, a plurality of positioning abutments on said lower flange, each of said abutments being associated with one of said bores, a side of each of said positioning abutments lying on the axial projection of the periphery of the bore with which it is associated, press means at said given station reciprocable along a path from a first press position above said upper flange to a second press position below said upper flange, said press means comprising a press-head having passages therein opening out on the work engaging surface of said head, a plurality of arcuate saddles between said upper and lower flanges and fixed relative thereto, each of said saddles having an axial center of radius in alignment with the axis of one of said bores, annular resilient members extending radially partially inwardly from the periphery of each of said bores below the top thereof, drive means to intermittently advance said turntable to successively position said bores in alignment with said path of reciprocation of said press means, spacer means at said given station reciprocable between a first retracted spacer position and a second spacer position in surrounding relationship with the one of said arcuate saddles which is appositely position thereto, means to move said press means from said first press position to said second press position and back to said first press poition between intermittent advances of said turntable, means to move said spacer means from said first spacer position to said second spacer position and back to said first spacer position between intermittent advances of said turntable, means to apply vacuum to said passages during movement of said press means from said first press position to said second press position and to relieve said vacuum before initiation of return movement of said press means to said first press position.

2. A machine as defined in claim 1, said spacer means comprising a spacer body having a flat top, a flat bottom and a notch extending down one side thereof, said one arcuate saddle which is appositely positioned to said spacer means being received in said notch when said spacer means is positioned in said second spacer position.

3. A machine for fabricating paper spools comprising a turntable having an upper flange and a lower flange, a plurality of bores through said upper flange, a plurality of positioning abutments on said lower flange, each of said abutments being associated with one of said bores, a side of each of said positioning abutments lying on the axial projection of the periphery of the bore with which it is associated, a plurality of arcuate saddles between said upper and lower flanges and fixed relative thereto, each of said saddles having an axial center of radius in alignment with the axis of one of said bores, an annular resilient ring extending radially partially inwardly from the periphery of each of said bores below the top thereof, press means reciprocable along a path from a first position above said upper flange to a second position below said upper flange, drive means to intermittently advance said turntable to successively position said bores in alignment with said path of reciprocation of said press means, and means to depress and raise said press means between intermittent advances of said turntable.

4. A machine as defined in claim 3, each of said annular resilient rings being supported at points outside the projection of the periphery of the bore with which it is associated but remaining unsupported at points on and within the projection of the periphery of the bore with which it is associated.

5. A machine for fabricating paper spools comprising a turntable mounted for advancement past a given station and having an upper flange and a lower flange, a plurality of bores through said upper flange, a plurality of positioning abutments on said lower flange, each of said abutments being associated with one of said bores, a side of each of said positioning abutments lying on the axial projection of the periphery of the bore with which it is associated, press means at said given station reciprocable along a path from a first press position above said upper

flange to a second press position below said upper flange, said press means comprising a press-head having passages therein opening out on the work engaging surface of said head, a plurality of arcuate saddles between said upper and lower flanges and fixed relative thereto, each of said saddles having an axial center of radius in alignment with the axis of one of said bores, each of said bores being substantially equal in diameter to spool flanges forming part of the spools being fabricated, a resilient ring around the periphery of each of said bores below the top thereof, said rings extending partially radially inwardly into their associated bores, the bottom sides of said rings being unsupported at points immediately below the peripheries of their associated bores, drive means to intermittently advance said turntable to successively position said bores in alignment with said path of reciprocation of said press means, spacer means at said given station reciprocable between a first retracted spacer position and a second spacer position in surrounding relationship with the one of said arcuate saddles which is appositely positioned thereto, means to move said press means from said first press position to said second press position and back to said first press position between intermittent advances of said turntable, means to move said spacer means from said first spacer position to said second spacer position and back to said first spacer position between intermittent advances of said turntable means, means to apply vacuum to said passages during movement of said press means from said first press position to said second press position and to relieve said vacuum before initiation of return movement of said press means to said first press position.

6. A machine as defined in claim 5, said spacer means comprising a spacer body having a flat top, a flat bottom and a notch extending down one side thereof, said one arcuate saddle which is appositely positioned to said spacer means being received in said notch when said spacer means is positioned in said second spacer position.

7. A paper spool assembling device comprising an upper plate having a bore therethrough adapted to receive a first paper spool flange, an annular resilient ring extending radially partially into said bore below the top thereof and adapted to retain said first paper spool flange within said bore and to be deflected by said first spool flange when said flange is positively pressed downwardly, a lower plate positioned parallel to and in spaced relationship below said upper plate, positioning abutments on said lower plate to position a second paper spool flange in axial alignment with said first paper spool flange, an arcuate saddle between said upper and lower plates and positioned in fixed relationship thereto, the center of radius of said arcuate saddle being in axial alignment with said bore in said upper plate, a press member normally above said upper plate and reciprocable through said bore along the direction of said axial alignment to press said first paper flange downwardly past said resilient ring and to force said spool flanges and said core together in assembled relationship, and a spacer member reciprocable between a first retracted position and a second position in surrounding relationship with said arcuate saddle.

8. A device as defined in claim 7, said press member having vacuum passages therein communicating with the lower face thereof, means to apply vacuum within said vacuum passages upon downward movement of said press member past said resilient ring.

9. A device for assembling paper spools comprising an upper member having an opening therethrough adapted to receive a first paper spool flange, resilient means extending transversely partially into said opening below the top thereof and adapted to retain said first paper spool flange within said opening and to be deflected by said first paper spool flange when said flange is positively pressed downwardly, a lower member positioned in spaced relationship below said upper member, positioning means on said lower member to position a second paper spool flange in axial alignment with said first paper spool flange, intermediate positioning means between said first and second members to position a spool core in axial alignment with said spool flanges, and extensible press means above said first member, said press means reciprocable along the direction of said axial alignment to press said first paper flange downwardly past said resilient means and to force said spool flanges and said core together into assembled relationship.

10. A device as defined in claim 9, said resilient means comprising a resilient ring supported at points outside the vertical projection of said opening.

11. A paper spool assembling device comprising an upper plate having a bore therethrough adapted to receive a first paper spool flange, an annular resilient ring extending radially partially into said bore below the top thereof and adapted to retain said first paper spool flange within said bore and to be deflected by said first paper spool flange when said flange is positively pressed downwardly, a lower plate positioned parallel to and in spaced relationship below said upper plate, positioning abutments on said lower plate to position a second paper spool flange in axial alignment with said first paper spool flange, an arcuate saddle between said upper and lower plates and positioned in fixed relationship thereto, the center of radius of said arcuate saddle being in axial alignment with said bore in said upper plate, and a press member normally above said upper plate and reciprocable through said bore along the direction of said axial alignment to press said first paper flange downwardly past said resilient ring and to force said spool flanges and said core together into assembled relationship.

12. A device as defined in claim 11, said press member having vacuum passages therein communicating with the lower face thereof, means to apply vacuum within said vacuum passages upon downward movement of said press member past said resilient ring.

13. A device for assembling paper spools comprising an upper member having an opening therethrough adapted to receive a first paper spool flange, resilient means extending transversely partially into said opening below the top thereof and adapted to retain said first paper spool flange within said opening and to be deflected by said first paper spool flange when said flange is positively pressed downwardly, a lower member positioned in spaced relationship below said upper member, positioning means on said lower member to position a second paper spool flange in axial alignment with said first paper spool flange, intermediate positioning means between said first and second members to position a spool core in axial alignment with said spool flanges, extensible press means above said first member, said press means being reciprocable along the direction of said axial alignment to press said first paper flange downwardly past said resilient means and to force said spool flanges and said core together into assembled relationship, and reciprocable spacer means movable from a first retracted position to a second position between said first and second members and in surrounding relationship with said spool core which is positioned against said intermediate positioning means.

14. A device as defined in claim 13, said resilient means comprising a resilient ring supported at points outside the vertical projection of said opening.

15. In a machine for fabricating paper spools, means to accurately and releasably position spool flanges for pickup by a descending press member, said means comprising a member having a bore therethrough substantially equal in diameter to spool flanges to be releasably positioned, a resilient ring around the periphery of said bore below the top thereof, said ring extending partially radially inwardly into said bore, the bottom side of said ring being unsupported at points immediately below the periphery of said bore whereby a spool flange positioned in said bore and retained by said ring may be

forced downwardly from above by said press member to deflect said ring and pass downwardly therethrough.

16. A machine component as defined in claim 15, said resilient ring being seated in a counterbore centered on the same axis as said bore, said resilient ring being anchored by an open-centered retaining ring fixed to said counterbore, the diameter of said open center of said retaining ring being greater than the diameter of said bore.

17. In a paper spool fabricating machine, a turntable mounted for advancement past a given station and comprising upper and lower turntable flanges, a plurality of spool flange positioning openings on said upper flange, spool flange positioning means on said lower flange associated with each of said positioning openings on said upper flange, spool core positioning means associated with each of said positioning openings on said upper flange and fixed to said turntable between said upper and lower flanges, each of said spool core positioning means comprising a saddle adapted to seat the cylindrical side of a spool core, a spacer at said given station and reciprocable between a withdrawn and extended position, said spacer being in surrounding relationship with the saddle which is at said station when said spacer is in said extended position.

18. A machine as defined in claim 17, said spacer comprising a body having a flat top, a flat bottom and a notch extending down one side thereof, said saddle which is at said station being received in said notch when said spacer is in said extended position.

References Cited in the file of this patent

UNITED STATES PATENTS

1,523,405	Curry	Jan. 20, 1925
2,104,224	Fisher	Jan. 4, 1938
2,218,293	Muller	Oct. 15, 1940
2,228,930	Robinson	Jan. 14, 1941
2,612,084	Keith	Sept. 30, 1952