

[54] **APPARATUS FOR DRILLING DRIVE
PIN HOLES IN REWIND ROLL CORES**

[72] Inventors: **Gerrit DeGelleke**, Parsippany; **Robert E. Bush**, Morris Plains, both of N.J.

[73] Assignee: **Cameron Machine Company**, Dover, N.J.

[22] Filed: **June 1, 1970**

[21] Appl. No.: **41,836**

[52] U.S. Cl. **408/43, 408/53, 408/79, 408/113, 408/128**

[51] Int. Cl. **B23b 39/16, B23b 47/16**

[58] Field of Search **408/42, 43, 46, 51, 53, 79, 408/80, 84, 113, 114, 115, 128**

[56] **References Cited**

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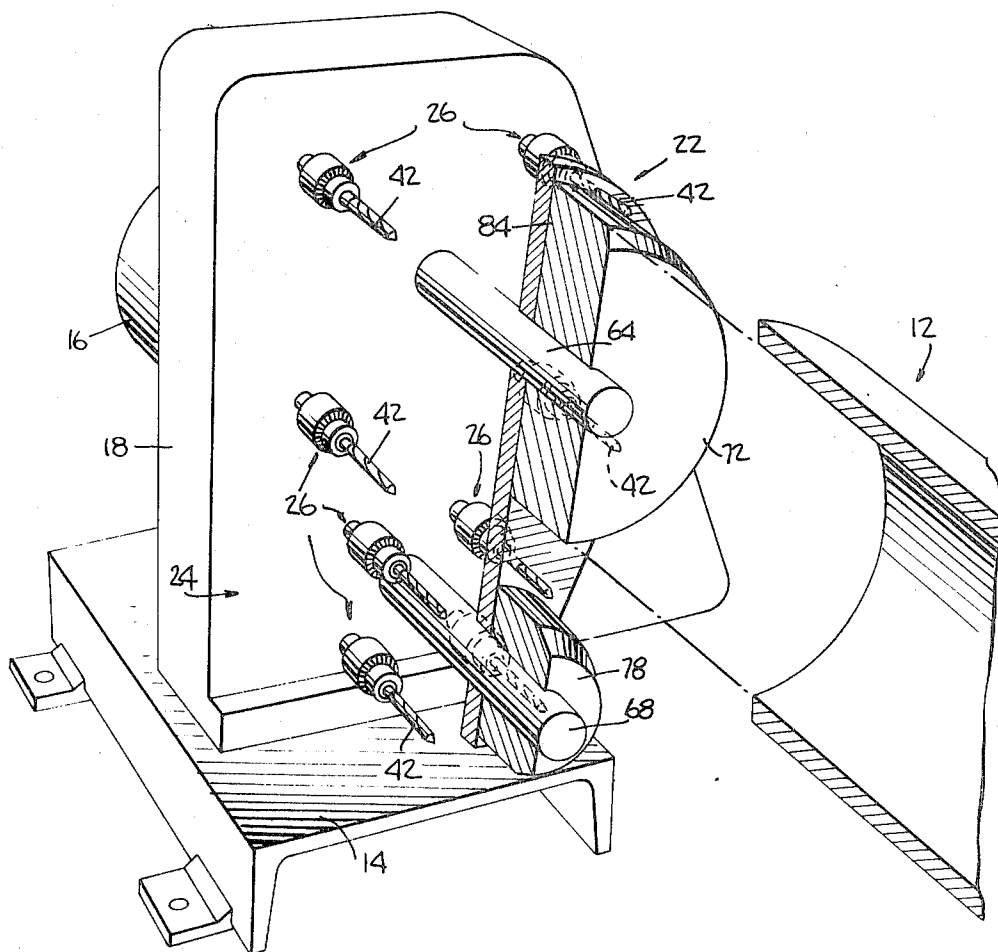
Primary Examiner—Francis S. Husar

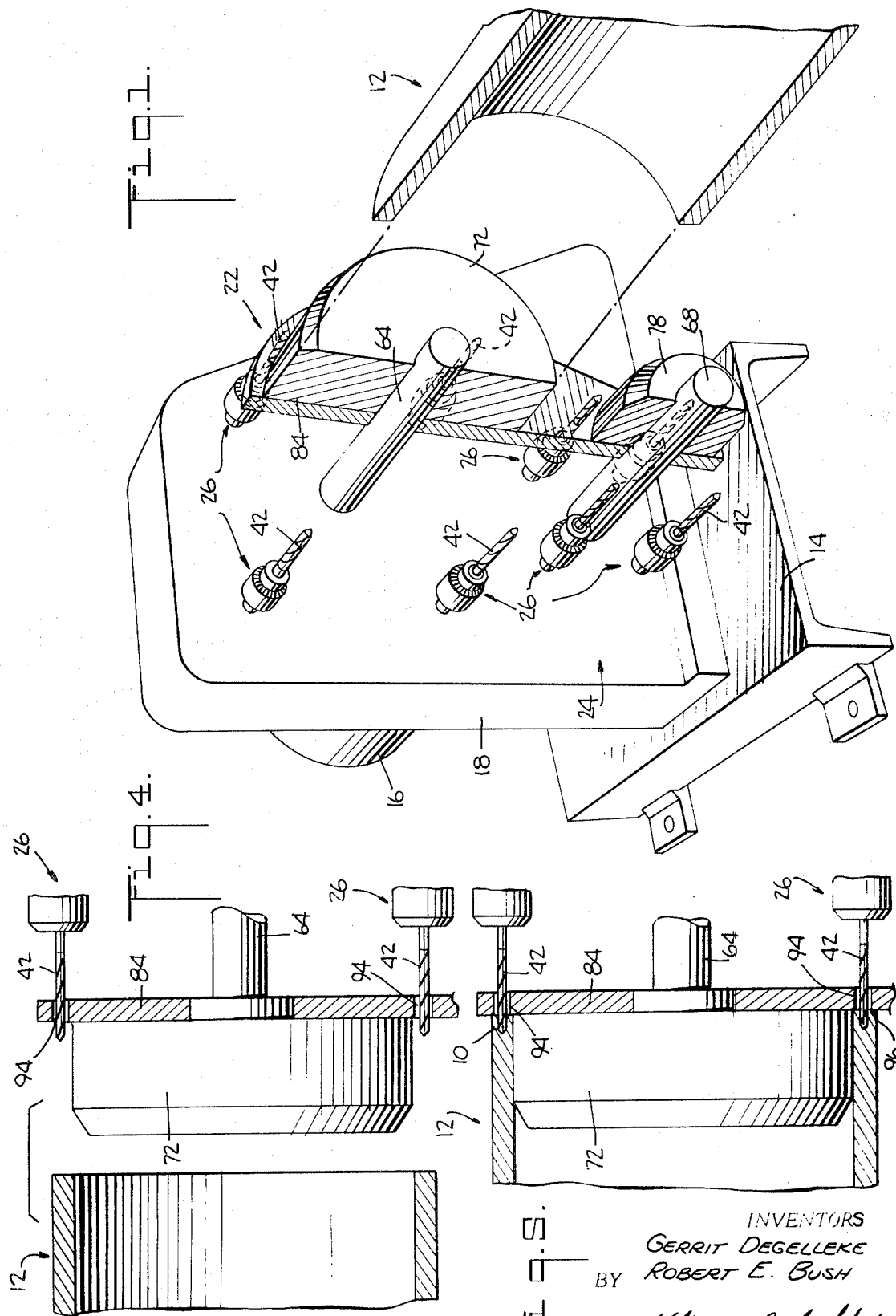
Attorney—Ward, McElhannon, Brooks and Fitzpatrick

[57] **ABSTRACT**

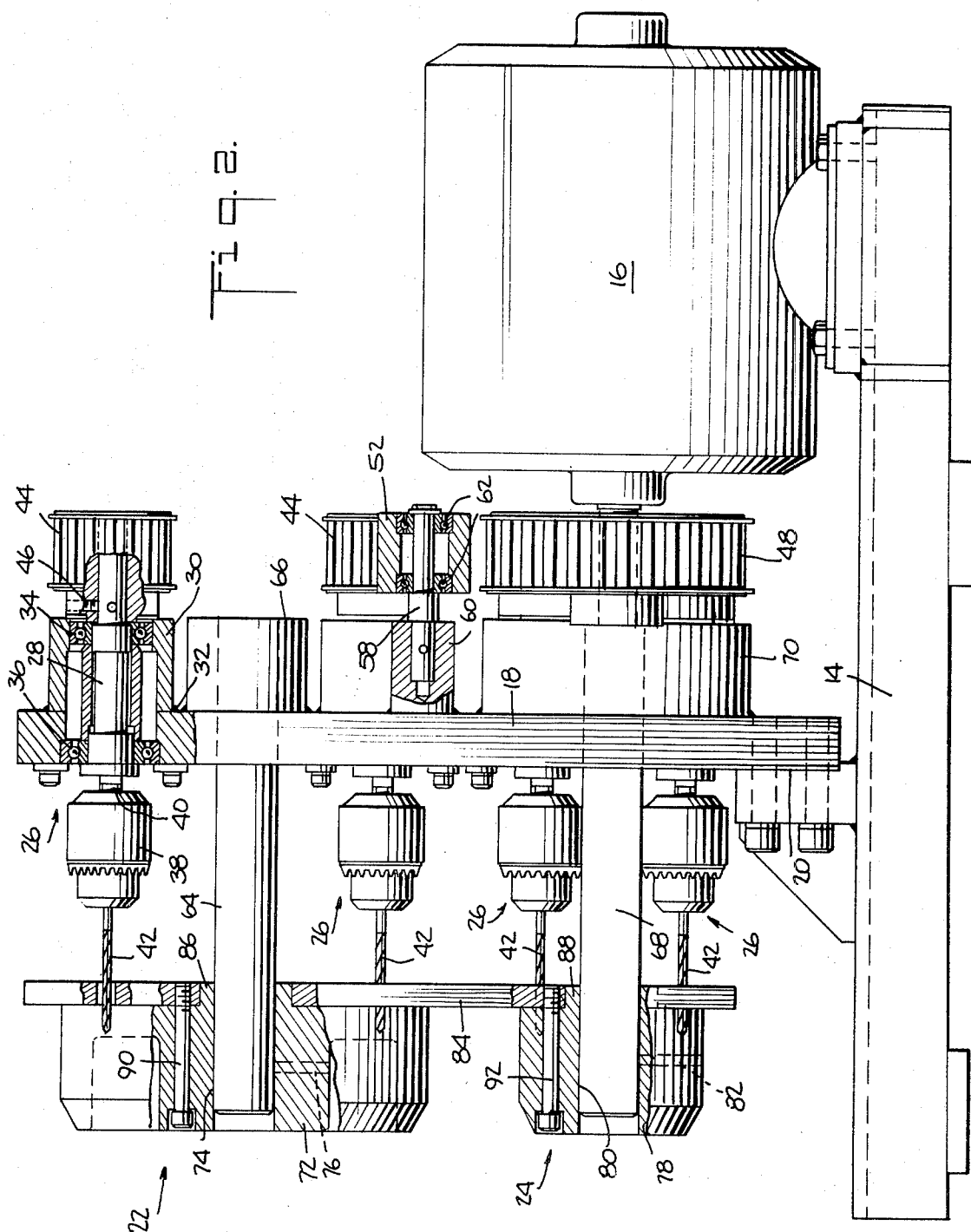
This invention relates to a nonadjustable multispindle drilling assembly for drilling holes in rewind roll cores for receiving drive pins for a first standard diameter rewind roll core and for a second standard diameter rewind roll core, the combination including a first group of a preselected number of spindle assemblies mounted to correspond to the first standard diameter core and a second group of a preselected number of spindle assemblies mounted to correspond to the second standard diameter cores, each of the spindle assemblies being driven by a drive pulley mounted thereon which is driven by an endless timing belt, all of the spindle assemblies being driven in the same direction and at the same rotational speed.

10 Claims, 6 Drawing Figures



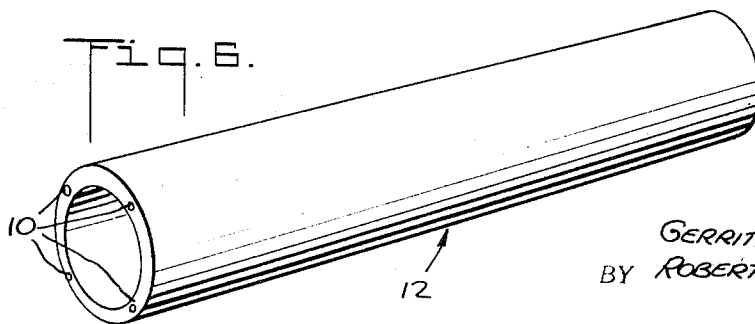
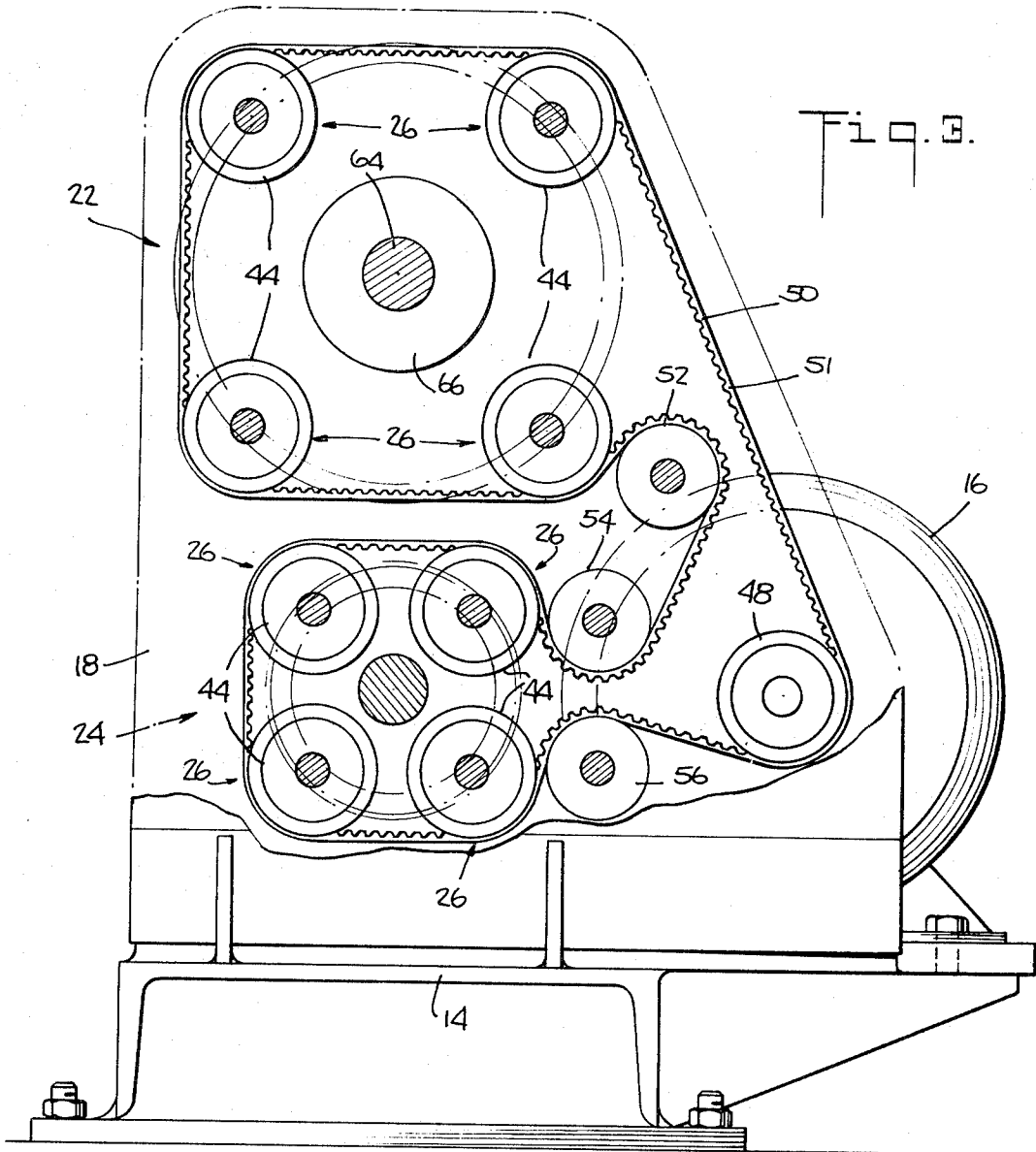


INVENTORS
 GERRIT DEGELEKE
 BY ROBERT E. BUSH
 West McAllister Brothers & Patrick
 ATTORNEYS



INVENTORS
GERRIT DEGELEKE
BY ROBERT E. BUSH

Ward McManis Brooks & Little
ATTORNEYS



INVENTORS
GERRIT DEGELLEKE
BY ROBERT E. BUSH

ATTORNEYS

APPARATUS FOR DRILLING DRIVE PIN HOLES IN REWIND ROLL CORE

This invention has to do with rewind machines and more particularly to apparatus for drilling drive pinholes in the ends of rewind roll cores.

Rewind machines are adapted to receive a relatively wide mill supply roll to divide the web into longitudinally extending subwebs and to rewind each subweb into a separate rewind roll. These rewind rolls are wound on an elongated tubular core. It is conventional to mount these cores on rewind roll shafts or between a pair of chucks and to drive or rotate them by means of longitudinally extending drive pins which are inserted into corresponding longitudinally extending holes in the end of the core member itself. A relatively large quantity of such cores are used by each manufacturer in the business, and hence it becomes a problem to accurately drill such holes in quantity. Heretofore, these holes were located and drilled individually, but this was time-consuming and expensive. Also, commercially available, adjustable multispindle drill heads were used, but these machines were designed for use in many different operations, and therefore they were large, complicated and expensive.

The present invention involves a novel combination of features combined in such a way as to afford a very efficient solution to the difficulties encountered with the prior art, as will become apparent as the description proceeds.

In order to accomplish the desired results, we provide a new and improved nonadjustable multispindle drilling assembly for drilling holes in rewind roll cores for receiving drive pins characterized by a main frame, a first group of spindle assemblies mounted on said main frame in spaced relationship, one with respect to the next adjacent one, around a circle corresponding to a first standard diameter rewind roll core. A second group of spindle assemblies is mounted on the main frame in spaced relationship one with respect to the next adjacent one around a circle corresponding to a second standard diameter rewind roll core. Each of the spindle assemblies includes a spindle rotatably mounted on the main frame in parallel relationship one with respect to the others. A drill chuck for carrying a drill bit is mounted on one end of the spindle and a drive pulley is mounted on the other end thereof. A single endless timing belt passes partially around the outer surface of the pulleys and is driven by a motor so that all of the spindles are rotated in the same direction and at the same rotational speed. A first mandrel is mounted concentrically with respect to the first group of spindle assemblies and a second mandrel is mounted concentrically with respect to the second group of spindle assemblies. The outside diameters of the mandrels correspond to the inside diameters of the cores respectively for purposes of centering the core while it is being drilled.

According to one feature of the invention, a guide plate is longitudinally adjustably mounted perpendicular to the drill bits to determine the depth of the holes drilled in the cores.

In one form of our invention we provide a nonadjustable multispindle drilling assembly having a single endless timing belt which passes sequentially from a motor pulley partially around each in succession of the drive pulleys of the first group of spindle assemblies and then partially around a first idler pulley positioned to maintain the belt in driving engagement with the last pulley of said first group, and then partially around a second idler pulley positioned to maintain the belt in driving engagement with the first pulley of the second group. After passing around the two idler pulleys, the same timing belt passes sequentially partially around the drive pulleys of the second group of spindle assemblies, and thence around a third idler pulley positioned to maintain the belt in driving engagement with the last pulley of the second group. Then, the belt passes back to the motor pulley.

According to a feature of our invention all of the pulleys are in the same vertical plane on one side of a platelike main frame, and all of the drill bits are on the other side thereof.

There has thus been outlined rather broadly the more important features of the invention in order that the detailed description thereof that follows may be better understood, and in order that the present contribution to the art may be better appreciated. There are, of course, additional features of the invention that will be described hereinafter which will form the subject of the claims appended hereto. Those skilled in the art will appreciate that the conception on which this disclosure is based may readily be utilized as the basis for the designing of other structures for carrying out the several purposes of the invention. It is important, therefore, that this disclosure be regarded as including such equivalent constructions as do not depart from the spirit and scope of the invention. One embodiment of the invention has been chosen for purposes of illustration and description, and is shown in the accompanying drawings, forming a part of the specification, wherein:

FIG. 1 is a perspective view of a nonadjustable multispindle drilling assembly for drilling holes in rewind roll cores constructed according to this concept of our invention;

FIG. 2 is a side elevation, partially in section, of the apparatus of FIG. 1;

FIG. 3 is an end view of the assembly of FIG. 1, partially broken away to reveal details of the driving arrangement of said apparatus;

FIG. 4 is an enlarged fragmentary sectional view showing the drill tips, a guide plate and a mandrel;

FIG. 5 is a view similar to FIG. 4, but showing a rewind roll core mounted on the apparatus in drilling position; and

FIG. 6 is a perspective view of a standard rewind roll core after completion of the drilling operation.

Referring first to FIG. 6, apparatus, according to the present invention, serves to drill longitudinally extending holes 10, in cylindrically shaped cardboard rewind roll cores, indicated generally at 12, for receiving drive pins, not shown, for purposes of rotating the rewind roll cores during a conventional rewind cycle. It has now become conventional in the industry to employ two standard diameter cores, i.e., a 6-inch diameter core and a 3-inch diameter core.

In the illustrated embodiment of the invention, a nonadjustable multispindle drilling assembly for drilling holes in rewind roll cores includes a base plate 14, FIGS. 1-3, and a motor 16 mounted thereon. A vertically extending platelike main frame 18 is mounted on the base plate, as at 20, FIG. 2. For use with the standard 6-inch diameter rewind roll cores, a first group of four spindle assemblies, indicated generally at 22, is mounted on the main frame 18. These spindle assemblies are equally spaced one from the next adjacent one around a 6-inch diameter circle and, as best seen in FIG. 3, the centerlines of the four spindle assemblies form four corners of a square having two horizontally disposed sides and two vertically disposed sides.

For use with the standard 3-inch diameter rewind roll core, a second group of four spindle assemblies, indicated generally at 24, is mounted on the main frame 18. These spindle assemblies are equally spaced one from the next adjacent one around a 3-inch diameter circle, and, as been seen in FIG. 3, the centerlines of the four spindle assemblies also form four corners of a square having two horizontally disposed sides and two vertically disposed sides. It will be appreciated that the centerline of the second group of spindle assemblies 24 is in vertical alignment with the centerline of the first group of spindle assemblies 22, as seen in FIG. 3.

Each spindle assembly, indicated generally at 26, is identical with all of the other spindle assemblies, including the spindle assemblies of the first group as well as the spindle assemblies of the second group. Each spindle assembly, as best seen in FIG. 2, comprises a substantially horizontally disposed spindle 28. A bearing housing 30 is welded onto the main frame 18 as at 32, and bearings 34 and 36 serve to mount the spindle 28 for rotation with respect to the main frame. Chucking means 38 are mounted on the spindle 28 as at 40, and a drill 42 is mounted thereon. A drive pulley 44 is fixedly mounted on the other end of the spindle 28, as by means of a setscrew 46, pro-

vided for the purpose. It will be appreciated that all of the pulleys 44 are mounted in a single plane on one side of the main frame 18, and all of the bits 42 are mounted in another common plane on the opposite side of the main frame.

As best seen in FIG. 3, a motor pulley 48 is mounted on the motor 16, and a timing belt 50 is mounted on the outside surfaces of the pulleys to drive all of the spindle assemblies 26 in the same direction and at the same rotational speed. That is, the timing belt 50, having teeth 51 to prevent slippage, passes sequentially from the motor pulley 48 partially around each in succession of said four drive pulleys 44 of the first group 22 of spindle assemblies. A first idler pulley 52 is mounted on the main frame 18 in a position so that the timing belt makes driving engagement with the last pulley in the first group of spindle assemblies. A second idler pulley 54 is mounted on the main frame 18 in such a position that the timing belt makes driving engagement with the first pulley in the second group 24 of the spindle assembly. After the timing belt passes partially around the idler pulleys it passes partially around each, in succession, of the four drive pulleys 44 of the second group 24 of spindle assemblies. A third idler pulley 56 is mounted on the main frame 18 in such a position that the timing belt 50 makes driving engagement with the last pulley in the second group 24 of spindle assemblies. It will be appreciated that all of the idler pulleys are rotatably mounted on the main frame in the same manner, and hence only the mounting means for the idler pulley 52 is illustrated. As best seen in FIG. 2, an idler shaft 58 is fixedly mounted on the main frame 18 as by means of a boss 60 welded thereto, and bearing means 62 serving to rotatably mount the idler pulley 52 on the shaft 58. It will thus be seen that one single endless timing belt drives all of the spindle assemblies of both groups in the same direction and at the same rotational speed.

As best seen in FIG. 2, a first horizontally disposed guide shaft 64 is fixedly mounted on the main frame 18 as by means of a boss 66 welded to the pulley side of the main frame. This guide shaft is centrally disposed with respect to the first group 22 of four spindle assemblies. A second horizontally disposed guide shaft 68 is fixedly mounted on the main frame 18 as by means of a boss 70 welded to the pulley side of the main frame. The second guide shaft is centrally disposed with respect to the second group 24 of four spindle assemblies.

Still referring to FIG. 2, a first mandrel 72 is adjustably mounted on said first guide shaft 64 as at 74, the mandrel being locked in its preselected longitudinal position by means of a setscrew 76 provided for the purpose. The outside diameter of the mandrel is substantially equal to the inside diameter of the 6-inch diameter core so that the core may be slipped thereover for centering purposes during the drilling operation. A second mandrel 78 is adjustably mounted on the second guide shaft 68 as at 80, this mandrel being locked in its preselected longitudinal position by means of a setscrew 82. The outside diameter of the mandrel 78 is substantially equal to the inside diameter of the 3-inch diameter core so that the core may be slipped thereover for centering purposes during the drilling operation. A guide plate 84 is mounted on the collar 86 of the first mandrel 72 and collar 88 of the second mandrel 78, and it is secured in position as by means of bolts 90 passing through the first mandrel and bolts 92 passing through the second mandrel.

It will be appreciated that the relationship between the end of the drill bits 42, the mandrels and the guide plate is identical for both groups of spindle assemblies, and hence only the arrangement of the first group is illustrated in detail in FIGS. 4 and 5. As seen in FIGS. 4 and 5, the outer ends of the drill bits 42, pass through apertures 94 in the guide plate 84. The mandrel 72 and the guide plate 84 are horizontally adjusted along the guide shaft 64 until the distance that the drill bit 42 extends beyond the guide plate 84 corresponds to the desired depth of hole 10 to be drilled in the core, and then the mandrel and the guide plate are locked in position.

In operation, after the guide plate 84 has been adjusted to give the desired depth of hole and the motor has been set in

operation, the core 12 is moved horizontally from its position as seen in FIG. 4 to its position as seen in FIG. 5. That is, the core is slid over the mandrel for purposes of centering the core with respect to the drill bits 42. As the core is moved horizontally, the drill bits drill the core holes 10 centrally in the core walls. When the end 96 of the core engages the face of the guide plate 84 the holes 10 have been drilled to their preselected depth. The core 12 is then horizontally slide off the mandrel without stopping the machine, and the apparatus is ready to receive the next core to be drilled. It will be appreciated that 6-inch diameter cores and 3-inch diameter cores can be handled alternatively or simultaneously, as desired, without necessity of the usual setup procedures.

It will thus be seen that the present invention does indeed provide an improved apparatus for drilling holes in rewind roll cores which is superior in simplicity, economy and efficiency as compared to prior art such apparatus.

Although a particular embodiment of the invention is herein disclosed for purposes of explanation, various modifications thereof, after study of this specification, will be apparent to those skilled in the art to which the invention pertains.

What is claimed and desired to be secured by letters patent is:

1. A nonadjustable multispindle drilling assembly for drilling holes in rewind roll cores for receiving drive pins for a first standard diameter rewind roll core and for a second standard diameter rewind roll core, the combination comprising a main frame, a first group of a preselected number of spindle assemblies mounted on said main frame, said spindle assemblies being spaced one from the next adjacent one around a circle corresponding to said first standard diameter rewind roll core, a second group of a preselected number of spindle assemblies mounted on said main frame, said second group of spindle assemblies being spaced one from the next adjacent one around a circle having a diameter corresponding to said second standard diameter rewind roll core, each of said spindle assemblies including a spindle, bearing means for rotatably mounting said spindle on said main frame in parallel relationship one with respect to the others, chucking means mounted on one end of said spindle, a drill bit mounted in said chucking means, a drive pulley fixedly mounted on the other end of said spindle, a motor, a motor pulley mounted for rotation on said motor, means mounting an endless timing belt on the outer surface of said pulleys to drive all of said spindles in the same direction and at the same rotational speed, a first mandrel, means mounting said mandrel in concentric relationship with respect to said first group of spindle assemblies, said mandrel having an outside diameter substantially equal to the inside diameter of said first standard core, a second mandrel, means mounting said second mandrel in concentric relationship with respect to said second group of spindle assemblies, said second mandrel having an outside diameter substantially equal to the inside diameter of said second standard core.

2. A nonadjustable multispindle drilling assembly for drilling holes in rewind roll cores according to claim 1 wherein said means mounting said endless timing belt comprises a timing belt which passes sequentially from said motor pulley partially around each in succession of said drive pulleys of said first group of spindle assemblies and then partially around a first idler pulley, means mounting said first idler pulley with respect to the last pulley of said first group to maintain the belt in driving engagement with said last pulley, a second idler pulley, means mounting said second idler pulley with respect to the first pulley of said second group to maintain the belt in driving engagement with said first pulley, and thence partially around each in succession of said drive pulleys of said second group of spindle assemblies, and thence around a third idler pulley, means mounting said third idler pulley with respect to the last pulley of said second group to maintain the belt in driving engagement with said last pulley of the second group, and thence back to said motor pulley.

3. A nonadjustable multispindle drilling assembly for drilling holes in rewind roll cores according to claim 1 wherein all of said pulleys are in substantially the same vertical plane.

4. A nonadjustable multispindle drilling assembly for drilling holes in rewind roll cores according to claim 1 wherein said main frame is a vertically disposed platelike member.

5. A nonadjustable multispindle drilling assembly for drilling holes in rewind roll cores according to claim 4 wherein all of said pulleys are on the same side of said platelike member and wherein all of said drill bits are on the opposite side of said main frame with respect to said pulleys.

6. A nonadjustable multispindle drilling assembly for drilling holes in rewind roll cores for receiving drive pins for a first standard diameter rewind roll core and for a second standard diameter rewind roll core, the combination comprising a main frame, a first group of a preselected number of spindle assemblies mounted on said main frame, said spindle assemblies being spaced one from the next adjacent one around a circle corresponding to said first standard diameter rewind roll core, a second group of a preselected number of spindle assemblies mounted on said main frame, said second group of spindle assemblies being equally spaced one from the next adjacent one around a circle having a diameter corresponding to said second standard diameter rewind roll core, each of said spindle assemblies including a spindle, bearing means for rotatably mounting said spindle on said main frame in parallel relationship one with respect to the others, chucking means mounted on one end of said spindle, a drill bit mounted in said chucking means, a drive pulley fixedly mounted on the other end of said spindle, a motor, a motor pulley mounted on said motor, means mounting a single endless timing belt on the outer surface of said pulleys to drive all of said spindles in the same direction and at the same rotational speed, a first mandrel, means mounting said mandrel in concentric relationship with respect to said first group of spindle assemblies and having an outside diameter substantially equal to the inside diameter of said first standard core, a second mandrel, means mounting said second mandrel in concentric relationship with respect to said second group of spindle assemblies and having an outside diameter substantially equal to the inside diameter of said second standard core, a guide plate mounted on said mandrels substantially perpendicular to said drill bits, said guide plate having apertures and said drill bits passing partially through said apertures, means for adjusting the position of said guide plate with respect to the tips of said drill bits to determine the depth of penetration of the holes drilled in said core.

7. A nonadjustable multispindle drilling assembly for drilling holes in rewind roll cores according to claim 6 wherein the center of the circle corresponding to said first group of spindle assemblies and the center of the circle corresponding to said second group of spindle assemblies are in substantial vertical alignment.

8. A nonadjustable multispindle drilling assembly for drilling holes in rewind roll cores according to claim 6 wherein said first group comprises four spindle assemblies and said second group comprises four spindle assemblies.

9. A nonadjustable multispindle drilling assembly for drilling holes in rewind roll cores according to claim 8 wherein the centers of the four spindle assemblies of said first group of spindle assemblies form four corners of a square and two sides of the square are horizontally disposed and two sides are vertically disposed, and the centers of the four spindle assemblies of said second group of spindle assemblies form four corners of a square and two sides of the square are horizontally disposed and two sides are vertically disposed.

10. A nonadjustable multispindle drilling assembly for drilling holes in rewind roll cores for receiving drive pins for standard 6-inch diameter rewind roll cores and for standard 3-inch diameter rewind roll cores, the combination comprising a base plate, a motor mounted on said base plate, a vertically extending platelike main frame mounted on said base plate adjacent said motor, a first group of four spindle assemblies mounted on said main frame, said spindle assemblies being equally spaced one with respect to the next adjacent one around a 6-inch diameter circle, a second group of four spindle assemblies mounted on said main frame, said second group of spindle assemblies being equally spaced one from the next adjacent one around a 3-inch diameter circle, each of said spindle assemblies including a substantially horizontally disposed spindle, bearing means for rotatably mounting said spindle on said main frame in parallel relationship one with respect to the others, chucking means mounted on one end of said spindle, a drill bit mounted in said chucking means, a drive pulley fixedly mounted on the other end of said spindle, all of said pulleys being in substantially the same vertical plane, and all of said pulleys being located on the same side of said platelike member, all of said drill bits being on the opposite side of said main frame with respect to said pulleys, a motor pulley mounted on said motor, means mounting a single endless timing belt on the outer surfaces of said pulleys to drive all of said pulleys in the same direction and at the same rotational speed, said means mounting said endless timing belt comprising a timing belt which passes sequentially from said motor pulley partially around each in succession of said drive pulleys of said first group of spindle assemblies and then partially around a first idler pulley, means mounting said first idler pulley with respect to the last pulley of said first group to maintain the belt in driving engagement with said last pulley, a second idler pulley, means mounting said second idler pulley with respect to the first pulley of said second group to maintain the belt in driving engagement with said first pulley, and thence partially around each in succession of said drive pulleys of said second group of spindle assemblies, and thence around a third idler pulley, means mounting said third idler pulley with respect to the last pulley of said second group to maintain the belt in driving engagement with said last pulley of the second group, and thence back to said motor pulley; a first horizontally disposed guide shaft, means fixedly mounting said guide shaft on said main frame centrally with respect to said first group of four spindle assemblies, a second horizontally disposed guide shaft, means fixedly mounting said second guide shaft on said main frame centrally with respect to said second group of four spindle assemblies, a first mandrel, means mounting said first mandrel on said first guide shaft in concentric relationship with respect to said first group of spindle assemblies, said first mandrel having an outside diameter substantially equal to the inside diameter of said 6-inch rewind roll core, a second mandrel, means mounting said second mandrel and said second guide shaft in concentric relationship with respect to said second group of spindle assemblies, said second mandrel having an outside diameter substantially equal to the inside diameter of said standard 3-inch diameter rewind roll core, a guide plate mounted on said mandrels substantially perpendicular to said drill bits, said guide plate having apertures and said drill bits passing partially through said apertures, means for horizontally adjusting the position of said guide plate with respect to the tips of said drill bits to determine the depth of penetration of the holes drilled in said cores.

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