June 1, 1937. R. H. SCHULTZ ET AL 2,082,031

CORE FOR AUTOMATIC REWINDING MACHINES

Original Filed June 21, 1929 3 Sheets-Sheet 1

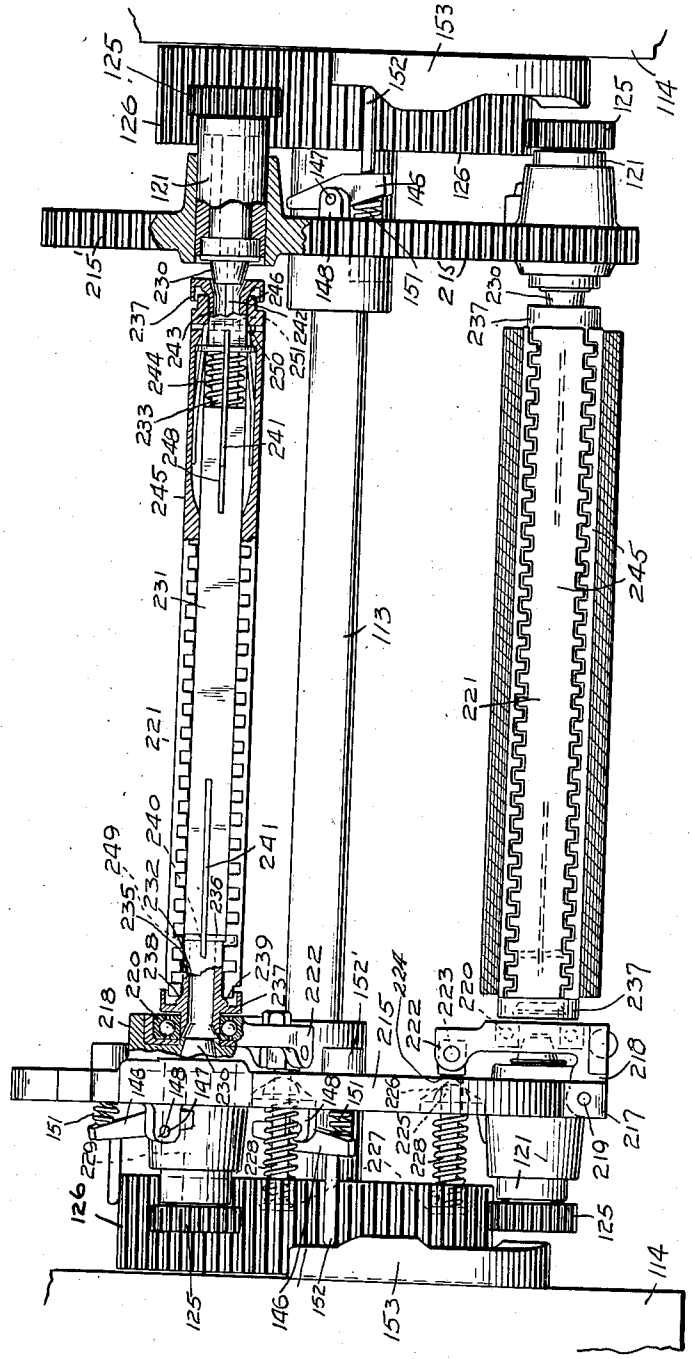


Fig. 1.

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Original Filed June 21, 1929 3 Sheets-Sheet 2

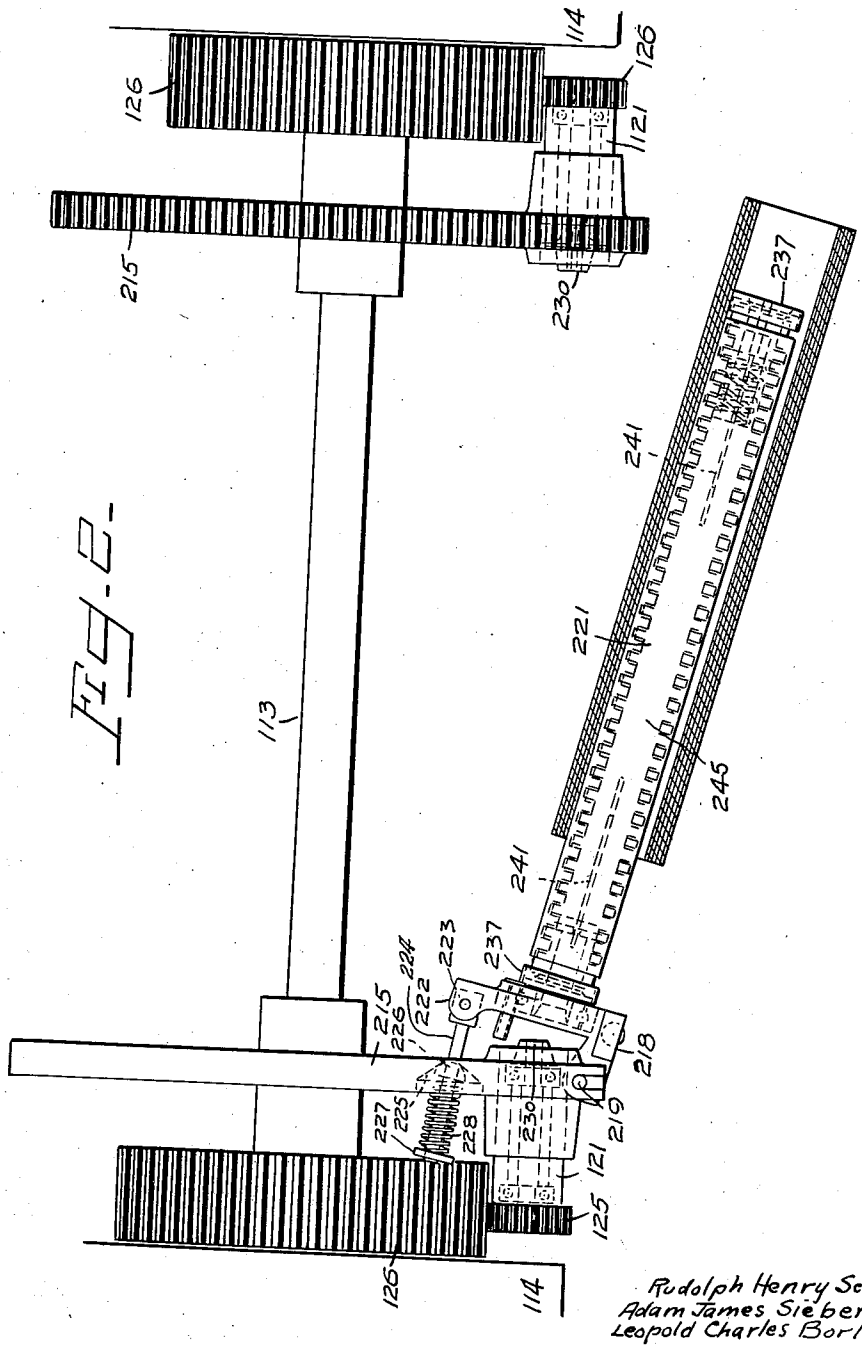


Fig. 2.

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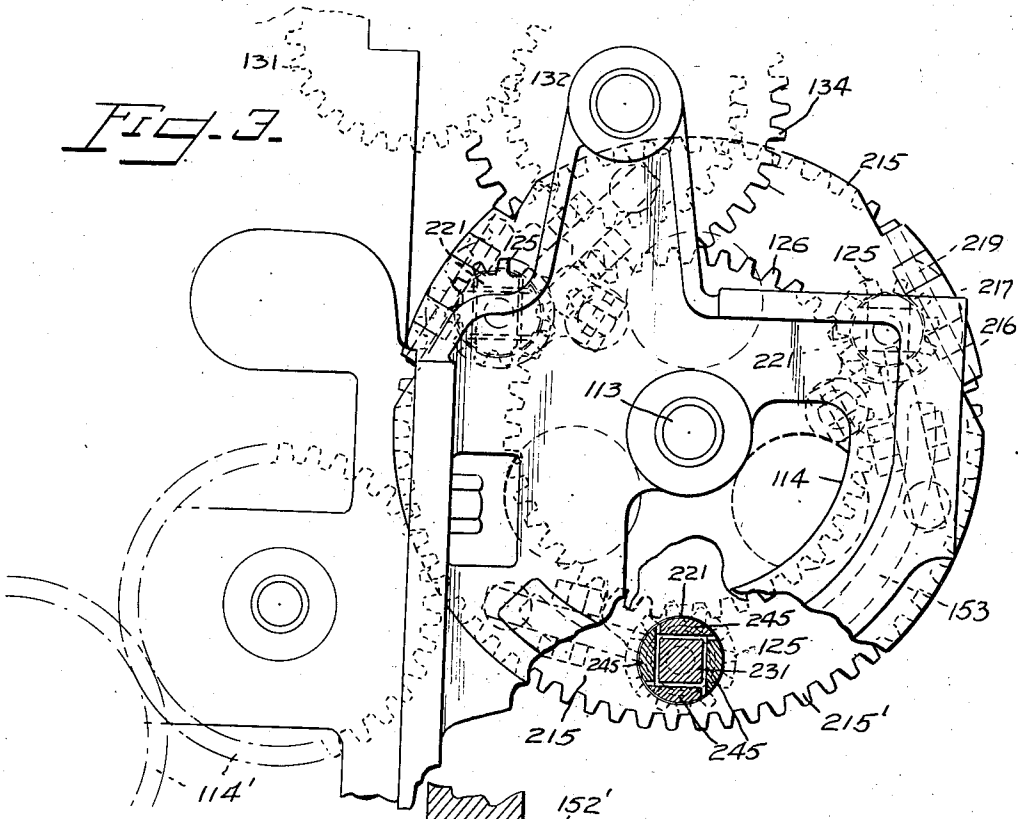
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Original Filed June 21, 1929 3 Sheets-Sheet 3

Fig. 3.



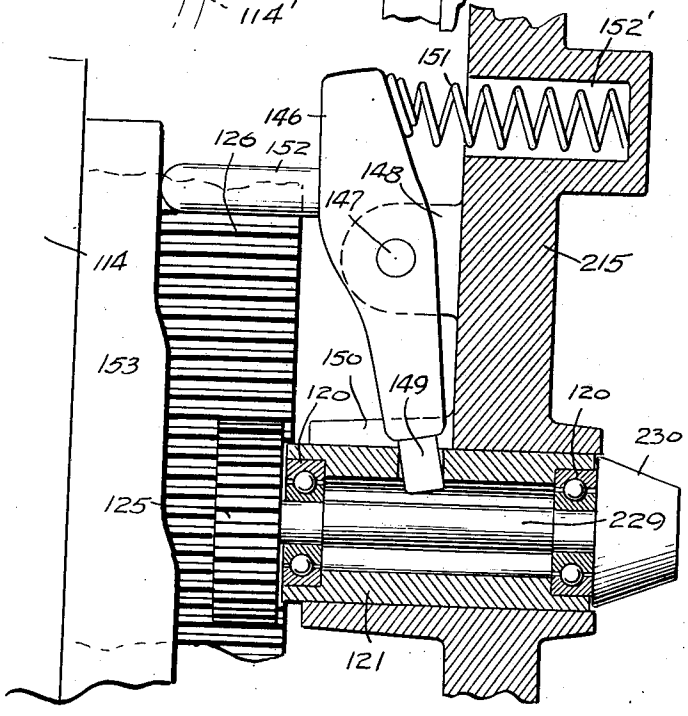


Fig. 4.

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UNITED STATES PATENT OFFICE

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CORE FOR AUTOMATIC REWINDING MACHINES

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Original application June 21, 1929, Serial No. 372,770, now Patent No. 1,966,525, dated July 17, 1934. Divided and this application June 4, 1934, Serial No. 728,963

8 Claims. (Cl. 242—72)

This invention relates to improvements in cores for automatic rewinding machines. The present is a divisional application of our application Serial No. 372,770, filed June 21, 1929 now Patent No. 1,966,525, dated July 17, 1934.

As described in said Patent No. 1,966,525 the automatic rewinding machine consists of a mechanism for continuously advancing a web cooperating with means for cutting off predetermined lengths thereof. In accordance with the present invention, instead of rewinding the web on paper cores, it is rewound on an improved collapsible core which, upon the completion of the rewinding operation, may be removed from the wound roll of paper and used again for the winding of another roll.

One embodiment of our invention is illustratively exemplified in the accompanying drawings, in which Figure 1 is a front elevational view of the reel carrier equipped with collapsible cores; Figure 2 is a similar view showing one of the collapsible cores in its collapsed position and with a roll being released; Figure 3, is an end elevational view of the frame supporting the carrier reel and means rotating the cores and expanding and contracting the same, one of the cores being shown in transverse section; and Figure 4 is a substantially longitudinal sectional view of the means to move the chuck axially.

A pair of cheek plates **215** are mounted on the reel shaft **113**. Each plate **215** carries its set of chucks and operating means associated therewith, of a construction similar to that described in our Patent No. 1,966,525 relating to the cardboard tube carrier reel and in addition thereto, the plate at the left side of the machine is provided with three equally spaced peripheral straight portions which are disposed coincident with cords of the circle forming the outer periphery of the plate. Each of the straight portions is bisected by a radial line projecting through the axis of a chuck and on opposite sides of the radial line, the material of the plate projects outwardly to the general curve of the periphery of the plate to form a boss **216** which is provided with cut-out portions on opposite sides of the radial line to form lugs **217** having a bore therethrough in a direction parallel with the straight peripheral portion of the plate. In the cut-outs of each boss **216**, the swinging bracket member **218** of a hinge connection is mounted to pivot about a pintle **219** disposed in the bore. The bracket **218** comprises an L-shaped block, the shorter arm being a yoke to hinge on the pintle **219** in the cuts, while the mid-portion of the longer arm is substantially disc-shaped and provided with a ball bearing **220** to carry one end of an expansible core **221**. The outer end of the longer arm beyond the bearing is offset in a direction opposite to the direction of rotation of the cheek plates **215** and is provided with a yoke **222** disposed in the direction of the adjacent cheek plate to accommodate a pin **223** upon which one end of a spindle **224** is pivoted, the mid-portion thereof projecting through an opening **225** which is reamed out on the outside face of the plate **215** to receive a hemispherical block **226** slidably mounted on the spindle **224**. The outer end of the spindle **224** carries a fixed collar **227** and between the latter and the block **226**, a spring **228** is coiled about the spindle to aid in returning the bracket **218** and core **221** to closed position after the discharge of a roll as hereinafter described.

Referring now to the chuck arrangement carried by the cheek plates **215**, the spindles **229** of said chucks are provided at their inner ends with the cone portions **230** of the clutch members adapted to be brought into engagement with the opposite ends of the core **221** for the purpose of rotating in the manner of the cardboard tubular cores, as described in our Patent No. 1,966,525, the opposite ends of the spindles **229** being provided with a planetary gear **125** meshing with a sun gear **126** loosely mounted on the reel shaft **113**.

Rotary movement is imparted to the sun gear **126** through a chain of gears **134**, **132** and **131**, the latter being the spur drive gear associated with the cutting device and other parts of the rewind machine proper.

The reel carrier, comprising the cheek plates **215**, is provided with teeth **215'** disposed peripherally of one of the plates, which teeth mesh with one of two intermediate gears **114'**, one of the latter being in mesh with a gear on the main cam shaft of the rewind machine not shown.

The bearing sleeve **121** in each chuck receives its axial movement by means of an arm **146** pivoted substantially midway of its length on a pin **147** supported between ears **148** projecting from the outside face of the carrier reel disc **215** as illustratively exemplified in Figures 1 and 4. One end of the arm **146** projects in the direction of the chuck and is provided with a pin projection **149**, which describes an arc during its movement and projects through a slot **150** cut in the side of the outside portion of the boss carrying the sleeve **121** and into an opening in the latter. The opposite end of the arm **146** is

normally forced outwardly from the face of the reel disc 215 by pressure exerted from a spring 151, the latter being seated at one end in a well 152' disposed in the disc 215 and at the other end against the under side of the arm itself. Each arm 146 during a certain arc of its travel with the reel disc 215 is rocked against the pressure of its spring 151 to withdraw the cylindrical bearing 121 and with it of course, the cone 230 from the inside face of the reel disc 215. Rocking movement of the arm 146 is effected by the engagement of a projecting pin follower 152 disposed outwardly from top of the arm at the spring end thereof, with a stopped cam 153, one thereof being carried on the inside face of each bracket 114. Each cam 153 is arcuate in shape and projects lengthwise and concentrically of the axis of the path traversed by the chuck spindles and associated parts from a point beyond the upright lower radius to another point above the horizontal radius projecting from the axis of the reel towards the front of the machine. In other words, with the reel rotating in a counterclockwise direction, each cam 153 is effective over a distance greater than and including the last quarter of one cycle.

The expanding core 221 comprises a center spindle 231 which is square in transverse section in its mid-portion and which terminates at opposite ends in cylindrical stud shafts 232 and 233.

Permanently mounted on the shaft 232 at the hinged end of the core is a sleeve 235 embracing the shaft throughout its length and having a portion projecting beyond the outer end of the shaft to be fixed in the inner ring of the bearing 220 in the bracket 218. The interior of the sleeve beyond the end of the shaft 232 is tapered outwardly to form the female section for the clutch cone 230 when the core is in closed position. The inner end of the sleeve 235 is provided with a flange 236 and the mid-portion inside the projection in the bearing is flanged and carries an annular ring 237 spaced from the periphery of the sleeve 235 and projecting toward the mid-portion of the core. At the base of the flange carrying the ring 237 and integral with the sleeve 235 is a square portion 238, the inside walls thereof being beveled to provide cam surfaces 239 which are, respectively, arranged to correspond in their positions to the four flat sides of the spindle 231. The sectors of the flange 236, which project beyond the sides of the spindle 231, are provided with orifices 240 for the accommodation of springs 241, as hereinafter described.

Referring now to the opposite end of the core 221, which is termed the free end, the stud shaft 233 is possibly somewhat longer than the shaft 232 and at its end it carries a coaxially disposed spindle 242. The sleeve arrangement 243 in this case, while it is identical with sleeve 235, is slidable longitudinally of the shaft 233; and further, the inner flange 236 instead of abutting the end of the square section of the spindle 231, the construction is changed to provide a space therebetween to accommodate a coiled spring 244 which tends normally to project the sleeve outwardly over the shaft. The result of this condition is to bring the conical end of the bore of the sleeve into frictional engagement with the conical end 230 of the spindle 229, when the core is in closed position, as illustratively exemplified in the drawings.

The portion of each core 221 coming into contact with the paper to be wound, comprises four sector plates 245, one thereof for each flat side of the spindle 231. The plates 245 are substantially the length between the flanges carrying the rings 237 when the core is in closed position and sleeve 243 is in retracted position on the shaft 233. Each plate comprises a straight length of material having a convex outside surface, which cooperates with the other plates to form a complete cylindrical surface, and a flat inner face to lie parallel and in contact, in retracted position, with one side of the square spindle. The longitudinal side edges of the plates 245 are provided with teeth which mesh with the teeth of the adjacent plates and the opposite ends 246 of the latter are reduced on the convex side and slightly beveled to ride inwardly and outwardly on the cam surfaces 239 by relative axial movement of the cone ends 230. The plates 245 are prevented from being extended too far beyond the spindle 231 by the rings 237 which, in any position of the plates, overlie the ends 246 thereof. The plates are normally and yieldably drawn towards the spindle 231 by means of spring members 241 which are fixed at their inner ends in slots 248 arranged longitudinally of each flat under surface and in the mid-portion thereof at opposite ends of the plate. The free ends of the springs 241 project loosely through the orifices 240 in the flanges 236. The flanges 236 are accommodated adjacent the ends of the plates 245 in transverse slots or grooves 249 which are substantially wider than the corresponding thickness of the flanges 236 themselves for the purpose of permitting the plates during expansion or contraction of the core to ride longitudinally of the flanges.

Sleeve 243 is held against detachment from the shaft 233 by a pin 250 which, fixed in the shaft, projects outwardly at opposite sides to engage in the slots 251 disposed in opposite sides of the sleeve 243.

The operation of the expansible core during one cycle thereof is as follows. The core 221 reaching the uppermost position in its revolution with the cheek plates 215, is in closed position, i. e., the opposite ends of the core are in frictional engagement with the cone ends 230 of the spindles 229. The sleeve 243 is projected to its innermost position with a consequent expansion of the sector plates 245. Approaching the position between the jaws of the cages as described in our Patent No. 1,966,525 and into proximity of the leading end of the paper web, the jaws close and the web is started on the rotating expanded core. In the present construction the retraction of the core end 230 releases the core at opposite ends and likewise permits the sector plates 245 to collapse under tension of the springs 241, thereby freeing the roll of paper from the core. The core, however, at this stage is still rotating at a relatively high speed and in order to cut down its momentum, the cone at the free end of the core still supports the end on the spindle 242. The more or less loose support at this end causes the speed of the core to rapidly decrease until it is safe to entirely withdraw the cone 230, whereupon the free end of the core drops or swings outwardly about its hinge connection 219 and against the cushion spring arrangement 228. The downward inclination of the core causes the rewound tube of paper web to slide off as the core passes in its revolution from the second third to the last. The last step is one along the rising third of the cycle

which permits the core of its own weight to swing backwardly to its initial position. The final steps of the cams **153** are then left behind and the rocker arms **146** under their respective springs again project the spindles **229** and cone ends **230** into frictional engagement with the sleeves **235** and **243**.

What we claim is:

1. A core for rewinding machines comprising a square spindle, a sector plate for each side of said spindle having a convex outside surface and a flat inner surface contacting with said spindle, and longitudinal sides provided with teeth, the teeth of the two sector plates being in mesh, an axially movable cam at one end of said core to move said sectors, and a spring normally drawing said sector plates together.

2. In a core for rewinding machines, a rotary carrier for a plurality of cores, means for rotating said cores to rewind a web, and means for expanding a core in one position of the carrier and contracting it in another position.

3. A core for rewinding machines according to claim 2 and in which said carrier comprises two cheek plates, hinged connections for said cores on one of said cheek plates, said core expanding and contracting means comprising chucks on the other cheek plate for supporting the other ends of said cores, and means operable in a certain position of said carrier for withdrawing a chuck.

4. In an expansible core for rewinding machines, the combination of a cylindical member comprising, a plurality of interlocking sectors, means to yieldably hold said sectors in a retracted position, a carrier having two axle-stubs projecting towards each other to a distance greater than the length of said cylindrical member, chucks arranged on said axle stubs and adapted to expand said member when moved axially into the latter, means for rotating one of said chucks and means urging one of said chucks into said member to spread said interlocking sectors and simultaneously transmit the rotary movement to the core.

5. A rewind core of the character described, comprising interlocking sectors, means for holding the sectors together in substantially cylindrical form, two axle-stubs projecting towards each other axially of said means to a distance greater than the length of said sectors, chucks for the holding means arranged on said axle stubs to expand the sectors and to rotate the same, and means for collapsing the sectors when the chucks release the holding means.

6. In an expansible core for rewinding machines, the combination of a carrier having two axle-stubs projecting towards each other, rotary chucks on said axle-stubs, a plurality of sectors forming a cylindrical member of a length smaller than the distance between the opposite ends of said axle-stubs, said member turning on said chucks and being expanded by movement of the latter towards the sectors, and means for retracting the sectors when the chucks move outwardly from the sectors.

7. In an expansible core for rewinding machines, the combination of a plurality of sectors to form a cylindrical core member, a pair of axle-stubs projecting towards each other to a distance greater than the length of said core member, and a pair of rotary and axially movable chucks disposed on said axle-stubs and cam means associated with the rewinding machine and operating the chucks whereby the latter enter the ends of said core member to expand the sectors and rotate the core and then withdraw from the latter to allow the collapse of the sectors.

8. In a rewinding machine the combination of a plurality of cylindrical expansible cores, each of which has a plurality of sectors, a rotary carrier comprising a pair of axle-stubs for each of said cores, the stubs of each pair being disposed opposite each other and at a distance greater than the length of said cores, and pairs of axially movable chucks on said axle-stubs, means to rotate said chucks about their axis and cam means associated with the rewinding machine and operating said chucks in dependence upon the position of the carrier, whereby the chucks enter the ends of said cores to expand the sectors and rotate the cores and then withdraw from the latter to allow the collapse of the sectors.

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