April 25, 1933. H. H. TALBOT 1,905,192

REEL

Filed July 11, 1929 6 Sheets-Sheet 1

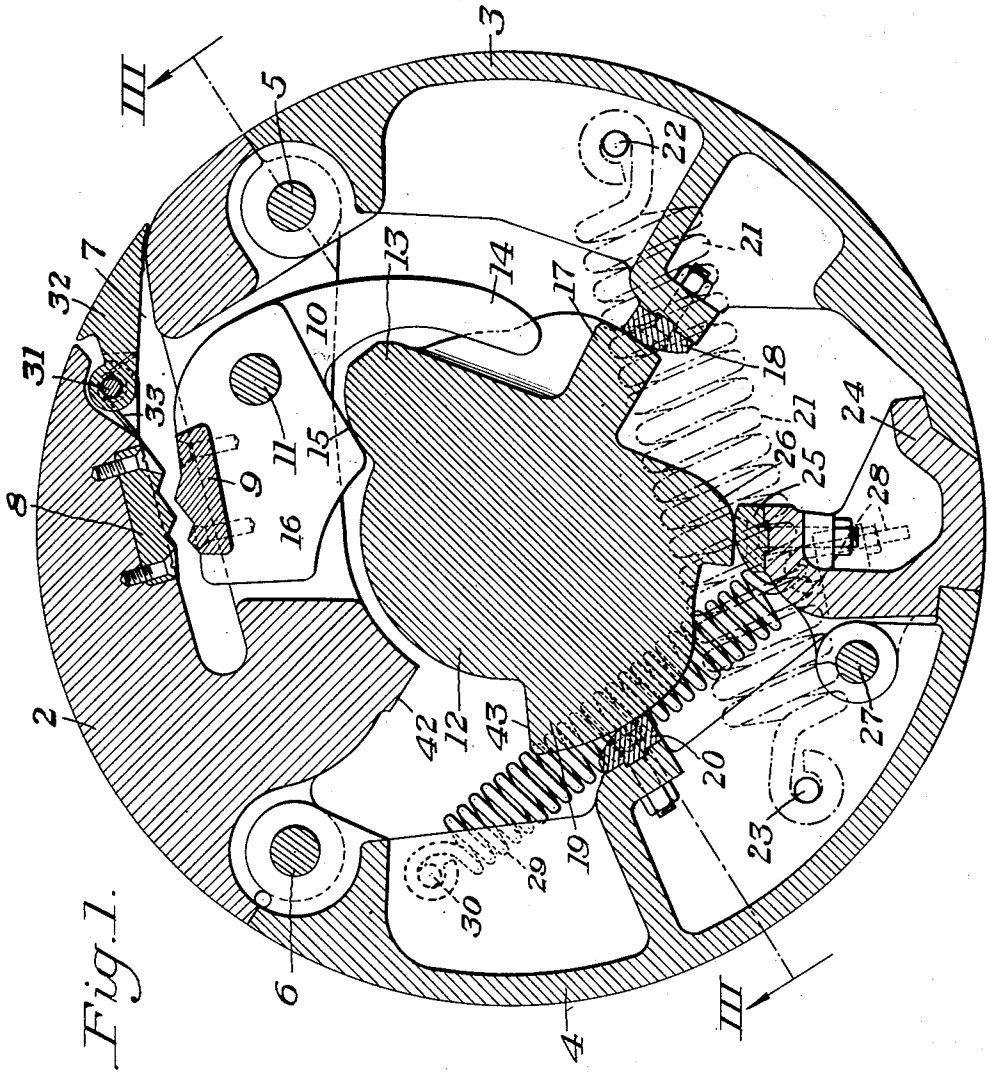


Fig. 1.

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REEL

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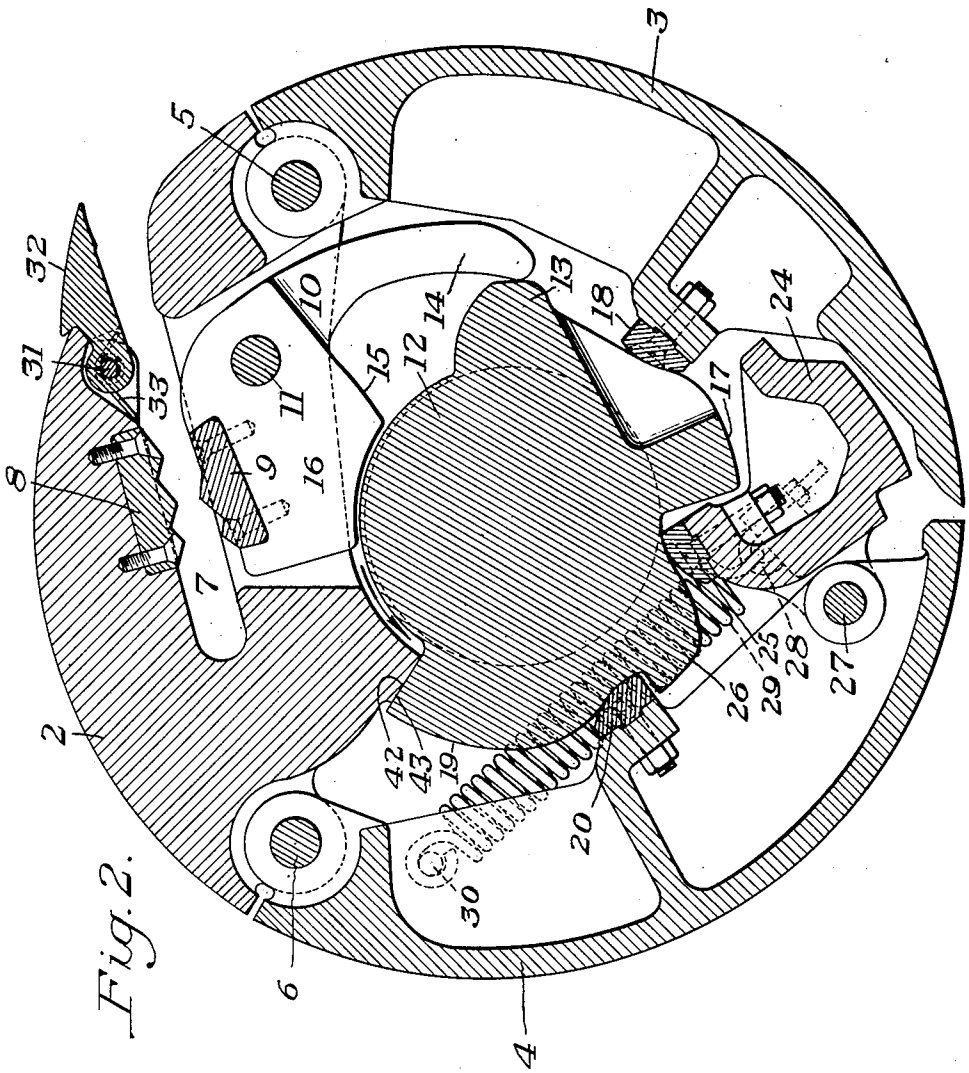


Fig. 2.

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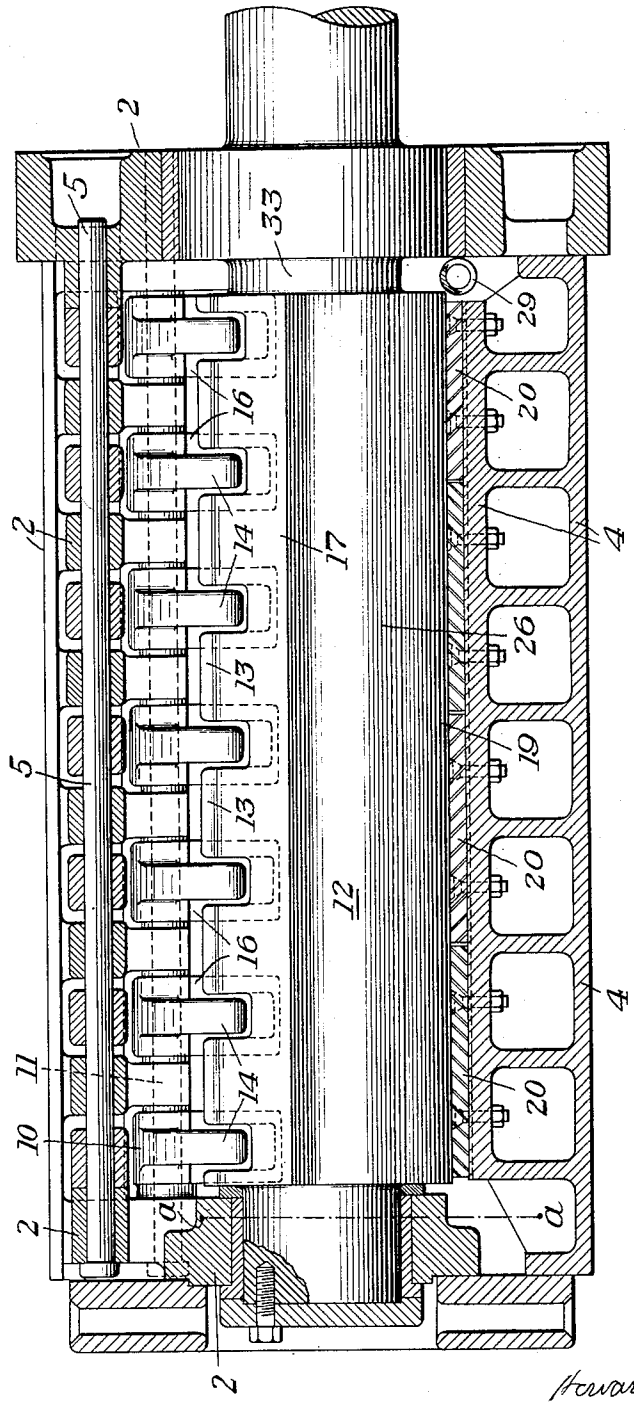
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April 25, 1933. H. H. TALBOT 1,905,192

REEL

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Fig. 3.



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April 25, 1933. H. H. TALBOT 1,905,192

REEL

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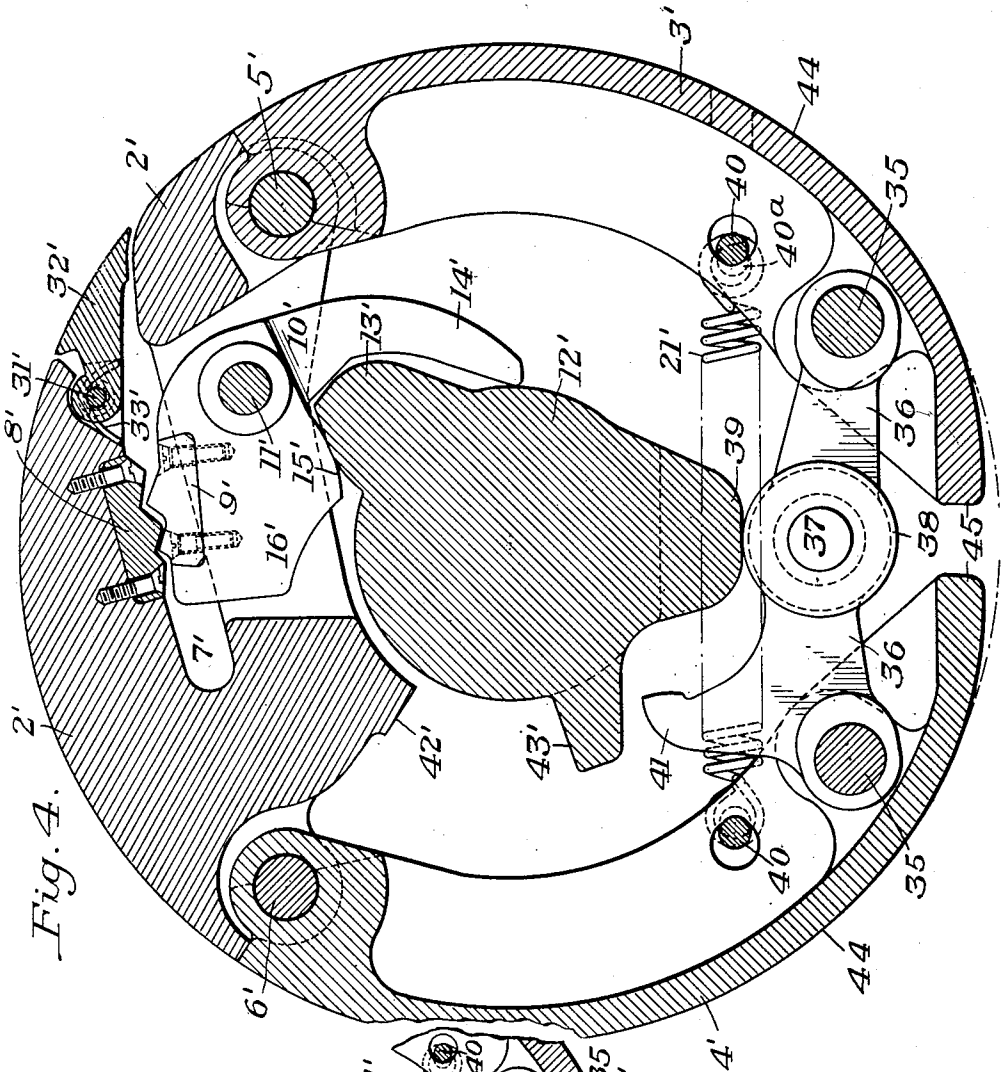


Fig. 4.

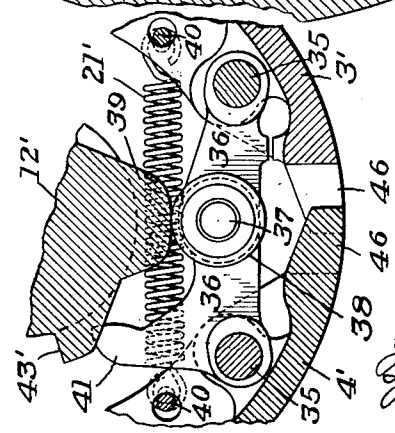


Fig. 6.

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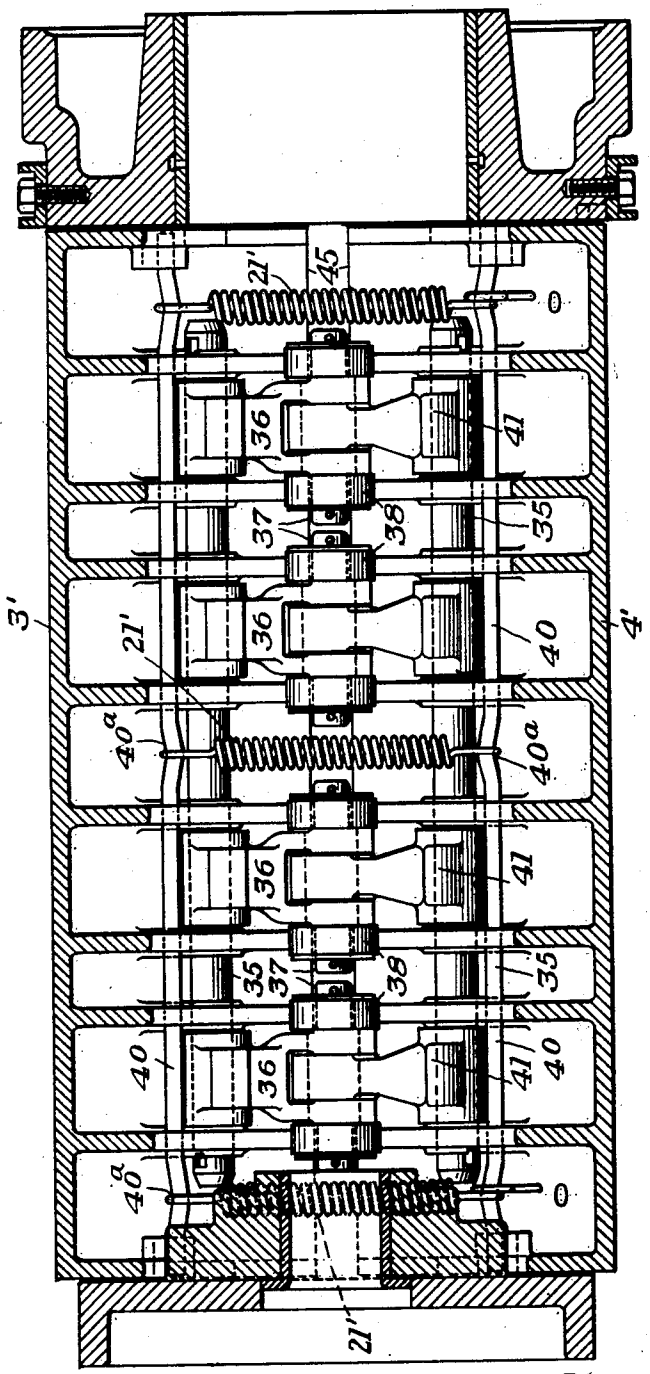
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April 25, 1933. H. H. TALBOT 1,905,192

REEL

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Fig. 5.



INVENTOR

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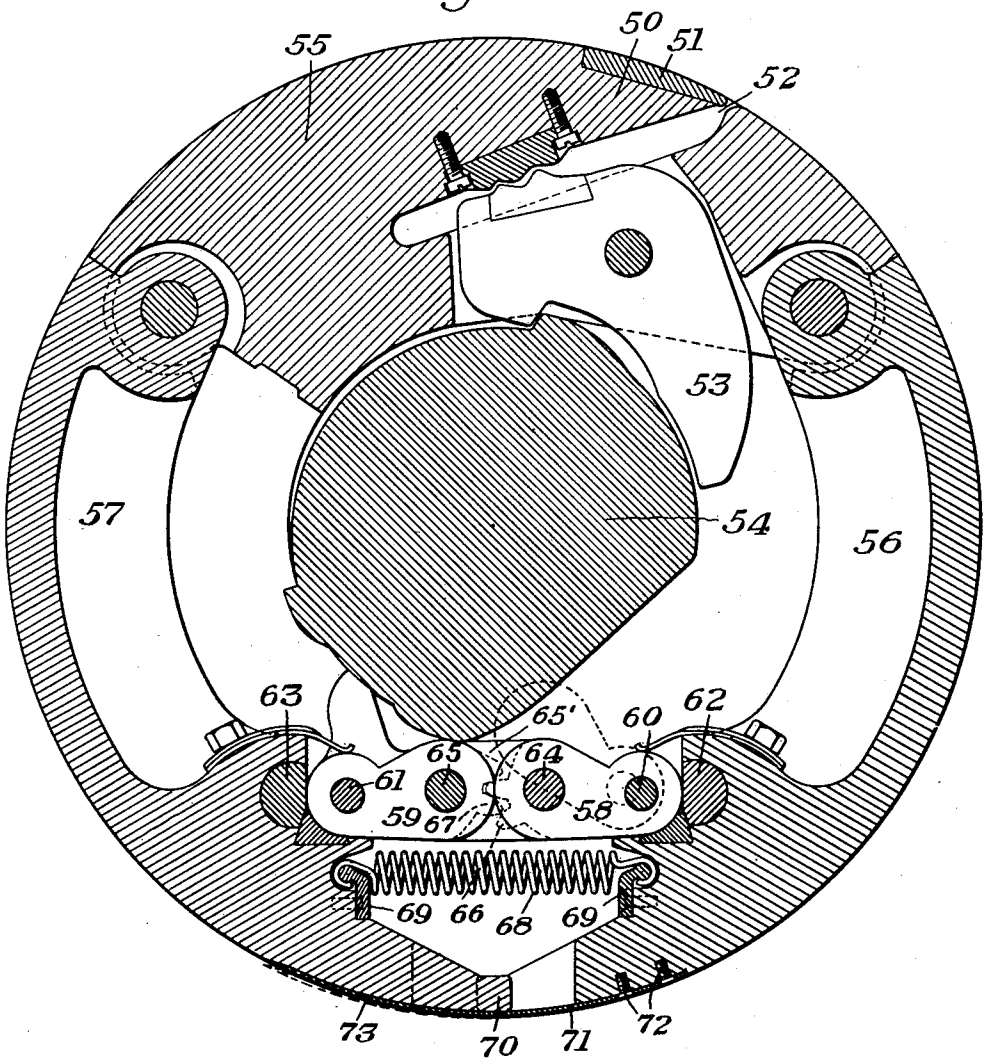
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April 25, 1933. H. H. TALBOT 1,905,192

REEL

Filed July 11, 1929 6 Sheets-Sheet 6

Fig. 7.



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Patented Apr. 25, 1933 1,905,192

UNITED STATES PATENT OFFICE

HOWARD H. TALBOT, OF PITTSBURGH, PENNSYLVANIA, ASSIGNOR TO UNITED ENGINEERING & FOUNDRY COMPANY, OF PITTSBURGH, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA

REEL

Application filed July 11, 1929. Serial No. 377,382.

The present invention relates broadly to the art of metal working, and more particularly to an improved reeling apparatus adapted for the effective coiling of strip material.

At the present time it is customary in the art to which this invention relates to deliver strip material from the last stand of rolls of a suitable rolling mill to coiling or reeling mechanism by means of which the material is coiled preparatory to storage thereof or the performance of other operations thereon.

Much of the strip material as delivered by rolling mills is provided with extremely smooth and finely finished surfaces adapted for the production of automobile bodies and the like. Unless such material is carefully handled, its surface is marred or broken to such an extent that the value thereof is materially reduced. With reels as heretofore constructed, it has been extremely difficult to provide a winding surface such as to effectively receive the material without marring or bending thereof.

The reels being principally of the collapsible type, in order to permit the release and removal of a finished coil, are usually constructed in sections adapted to be expanded or contracted. With such sectional reels, it not infrequently happens that their relationship is such as to provide portions of changing or discontinuous contour which so act upon the material being coiled as to produce distinct lines or ridges therein.

In accordance with the present invention, there is provided a collapsible reel of improved construction, adapted to effectively grip the end of a strip and substantially uniformly coil the same in such manner that the finished characteristics of the strip or sheet surfaces are retained.

In the accompanying drawings I have shown for purposes of illustration only, certain preferred embodiments of the invention.

In the drawings:—

Figure 1 is a transverse sectional view through one form of reel embodying the present invention, certain of the parts being illustrated in elevation;

Figure 2 is a view similar to Figure 1, showing the parts of the reel in collapsed condition preparatory to the commencement of a fresh coiling operation and subsequent to the discharge of a previously formed coil;

Figure 3 is a longitudinal sectional view on the line III—III of Figure 1, looking in the direction of the arrows, certain of the parts being broken away and other of the parts being shown in elevation;

Figure 4 is a cross sectional view of a modified form of reel embodying certain features of the present invention;

Figure 5 is a longitudinal sectional view on the line V—V of Figure 4, certain of the parts being shown in elevation;

Figure 6 is a detailed view, similar to Figure 4, illustrating another embodiment of the invention; and

Figure 7 is a view, similar to Figure 6, illustrating still another embodiment of the invention.

In carrying out the present invention, as illustrated more particularly in Figures 1 to 3 of the drawings, there is provided a rotatable drum, comprising a relatively fixed section 2, carrying at one edge thereof a pivotally mounted section 3 and at the opposite edge a similarly pivotally mounted section 4. The section 3 may be suitably supported by means of a pivot 5, journaled in the relatively stationary section and extending in a direction parallel to the longitudinal axis of the drum. The section 4 is in turn carried by a similar pivot 6.

Formed in the relatively stationary section 2, is a throat 7, on one side of which is provided a fixed gripper 8. Cooperating with the fixed gripper, and positioned on the opposite side of the throat, is a series of grippers 9, carried by gripping fingers 10, of substantially bell crank shape, mounted in axial alignment on a pivot shaft 11. This pivot shaft, like the shafts 5 and 6, is carried in the relatively fixed section 2.

Centrally mounted within the drum is a cam shaft 12, provided with a gripper actu-

ating projection 13, adapted to alternately cooperate with the arms 14 of the fingers 10, and with the cam surfaces 15 on the arms 16.

Adjacent the gripper operating cam 13 is a second cam 17, adapted to cooperate with wear plates 18, preferably detachably secured to the movable sections 3.

On the opposite side of the cam shaft there is provided an actuating cam 19, adapted to cooperate with similar wear plates 20 on the movable section 4.

Extending between the sections 3 and 4, and preferably located adjacent one end thereof, is a coil spring 21, one end of which is secured to a pin 22 in the section 3, while the opposite end is secured to a similar pin 23 in the section 4. This spring is effective for normally urging the sections 3 and 4 toward each other from the position illustrated in Figure 1 to the position illustrated in Figure 2 at such times as there is produced a relative rotation between the cam shaft 12 and the drum in the proper direction to release the parts, as will be hereinafter more fully referred to.

Pivotally carried by the movable section 4, is a filler block 24 having a wear plate 25 adapted to cooperate with the cam 26 on the cam shaft 12, the entire filler block being mounted on a suitable pivot shaft 27, extending axially of the section 4.

Attached at one end to a suitable hook 28 in the filler block is a tension spring 29, the opposite end of this spring being secured to a fixed pin 30 in the section 4. This filler block spring is effective for normally urging the filler block from its full line position of Figure 1 into its full line position of Figure 2 upon relative rotation between the cam shaft 12 and the drum, as before referred to.

Pivotally mounted on a suitable pivot shaft 31 on the relatively fixed section 2 is a throat piece 32. Cooperating with this throat piece is a coil spring 33, effective for normally holding the throat piece in its outwardly projected position of Figure 2.

Assuming the parts to be in the position illustrated in Figure 2, the end of a strip to be coiled is inserted into the throat 7, below the throat piece 32 to an extent sufficient to project between the grippers 8 and 9. At this time, the cam shaft 12 is rotated in a counter-clockwise direction, as viewed in Figure 2, whereby the cams 17 and 19 in engagement with the wear plates 18 and 20, respectively, immediately actuate the movable sections 3 and 4 outwardly about their pivotal supports 5 and 6 toward their operative positions to constitute continuations of the fixed section 2. These positions are reached when the wear plates 18 and 20 are in contact with the cam portions of greatest radius, which, as will be observed, is considerably prior to the completion of their relative angular movement.

During the movement described above, the cam 26 actuates the wear plate 25 and the filler block 24 to move the latter outwardly into a position between the spaced ends of the sections 3 and 4 to constitute a continuation thereof, as shown in Fig. 1.

During the expansion of the drum as described above, the cam 13 has moved out of engagement with the arms 14 of the gripper fingers 10 and has approached the surfaces 15 on the arms 16. Subsequent relative movement of the cam shaft 12 actuates the arms 16 about their pivots 11 and the grippers cooperate with the grippers 8 to effectively grip the material to be coiled.

The latter angular movement to grip the material without affecting the positions of the sections 3 and 4 is permitted by the contours of the cams 17 and 19 because portions of uniform radius are in engagement with their respective wear plates during such latter relative movement.

The foregoing sequence of movements is important because the complete expansion of the drum should be assured regardless of variations in thickness or position of the end of the strip of material to be engaged by the grippers. Such complete expansion might not be possible in every case if the operations were simultaneous because variations in the final positions of the grippers would, of course, cause unequal degrees of expansion of the drum.

Upon the completion of the rotation of the cam shaft 12 relatively to the drum, the relatively movable parts have all been forced into their final positions such that further movement thereof relatively to the section 2 is prevented. Thereupon, the drum, as a whole is caused to rotate in a counter-clockwise direction, as viewed in Figure 1, in such manner that the gripped material is wound upon the periphery thereof. After the winding has continued for a sufficient time to substantially complete one revolution of the drum, the material engages the throat piece 32 and forces it from its position of Figure 2 into its position of Figure 1, in which it closes the throat and provides a substantially continuous surface upon which the material may be coiled. This rotation of the cam shaft 12, with its accompanying rotation of the coiling drum, continues until such time as the coiling operation of a particular strip has been completed, at which time a suitable brake, not shown, is applied to the cam shaft to check further free rotation thereof.

The drum, however, being rotatable relatively to the cam shaft, continues a rotational movement in its previously driven direction due not only to the inertia of the drum and its associated parts, but also to

the inertia of the coiled material. This causes the drum to over-run the cam shaft, whereby the parts move from their relative positions of Figure 1 into the collapsed position of Figure 2. In this position, the winding surface of the drum is sufficiently decreased to permit the formed coil to be readily stripped therefrom. After the stripping operation has been completed, the throat piece 32 moves to its full line position of Figure 2, and the parts are ready for a succeeding coiling operation.

By reference more particularly to Figure 3, it will be apparent that the contracting spring 21 is located adjacent the left hand end of the coiling drum, the spring extending along the axis generally indicated by the line *a*—*a* of this figure. The filler piece tension spring 29, on the other hand, is conveniently located adjacent the opposite end of the drum, the cam shaft 12 being provided with the reduced portion 33 in order provide clearance for the unrestricted operation of this spring.

From the foregoing description, it will be apparent to those skilled in the art that the greater the resistance to forward travel of the material being coiled, the tighter it will be gripped between the grippers 8 and 9, so that these grippers are automatically effective for producing the movement of the material necessary to a desired coiling operation.

The relationship of the various sections, together with the throat piece 32 and the filler block 24, is such that a substantially continuous and unbroken coiling surface is provided, whereby the material is not subjected to an abrupt change in its direction of travel, such as to produce undesirable ridges therein.

In Figures 4 and 5 of the drawings, there is illustrated a slightly modified embodiment of the invention, in which parts corresponding to the parts already described are designated by similar reference characters having a prime (′) affixed thereto.

In accordance with this embodiment of the invention, the adjacent edges of the sections 3′ and 4′ are provided with axially extending pivot shafts 35, with which cooperate toggles 36, preferably arranged in pairs, as clearly indicated in Figure 4. The respective pairs of toggles are connected by pins 37 which carry, adjacent their opposite ends, rollers 38 adapted to cooperate with cams 39 on the cam shaft 12′. In accordance with this embodiment of the invention, the cam 39 is discontinuous to provide recesses for the reception of the contracting springs 21′, which, in accordance with this embodiment of the invention, may be secured at their opposite ends to axially extending shafts 40, having offset portions 40*a* forming seats for retaining the springs in their desired positions.

The relationship of the parts is such that with the relatively movable sections 3′ and 4′ in their full expanded position, as illustrated in Figure 4, the toggle links 36 will not be in straight line position, but will be sufficiently offset one from the other to permit the springs 21′ to contract the sections upon an over-running movement between the drum and the shaft such as to move the cam 39 out of engagement with the rollers 38. This contracting movement of the sections may, however, be positively insured by providing one of each of the toggles with the knocker arm 41 projecting inwardly into such position as to be engaged by one side of the cam 39 upon over-running movement of the character referred to. This over-running movement, with both forms of my invention, may be limited by providing the relatively fixed section with a stop 42, as illustrated in Figures 1 and 2, or with a stop 42′, as illustrated in Figure 4, adapted to cooperate with a suitably shaped surface 43, on the cam shaft 12, or with a similar surface 43′ on the cam shaft 12′. By reason of this positive control of the over-running movement, the parts are prevented from a relative movement to such an extent as to bring them out of proper cooperative relationship. This obviates the necessity of any adjustment of the parts prior to the commencement of a succeeding coiling operation.

It will be apparent that if the entire surfaces 44 of the sections 3′ and 4′ of the embodiment of my invention illustrated in Figure 4 were formed with a common radius, that the nose portions 45 of such sections would be apt to form ridges on the material being coiled due to the fact that the material in passing over the gap between the nose sections would change from a substantially arcuate condition to a substantially tangential condition. In order to minimize such an effect, I may, and preferably do, construct the nose pieces in any desired portion of their length, in such manner that they have a radius of curvature which is considerably greater than the radius of curvature of the main portion of the sections 3′ and 4′. The radii of curvature of the nose portions and main portions of the sections is so chosen that they gradually emerge one with the other to prevent any abrupt change in the direction of travel of the material, while at the same time providing extreme ends, the surfaces of which are substantially tangent to the normal periphery of the drum.

In addition to forming the relatively movable sections in such manner that their winding portions embody sections of different curvature, I preferably curve the ex-

treme ends thereof, as clearly illustrated in Figure 4, whereby the possibility of marring the material is further minimized.

In order to further reduce the possibility of marring the material, I may modify the construction of the nose portions of the relatively movable section, in the manner illustrated in Figure 6, by providing the same with axially spaced fingers 46 adapted to interfit one with the other and thus provide a substantially continuous winding surface, giving substantially the characteristics of the surface provided by the use of a separate filler block, as illustrated in Figures 1 to 3.

In such case, the radius of curvature of the winding surfaces of the fingers 46 may constitute an exact continuation of the main portions of the sections 3′ and 4′ respectively, or they may have a modified radius of curvature, such as to effect a gradual transition from an arc into substantially a tangent and then into an arc, whereby an abrupt change in the characteristics of the winding surface is obviated.

In Figure 7 there is illustrated still another embodiment of the invention, similar in many respects to that illustrated in Figures 4, 5 and 6. In accordance with this embodiment, however, the movable throat pieces corresponding to the parts 32 and 32′ before described are replaced by a stationary extension 50 carrying a hardened nose piece 51, thereby providing a narrow throat 52 of fixed dimensions through which the material to be handled is adapted to be inserted.

The construction embodies a movable gripper 53 similar in construction and operation to that before described, and adapted to be operated by the cam shaft 54 upon rotation thereof relative to the reel proper.

Cooperating with the relatively fixed section 55 carrying the projection 50 are movable sections 56 and 57 similar to the sections 3—4 and 3′—4′ before described. For operating these movable sections, however, there are provided toggles 58 and 59 of the Pitman type. These toggles, of which there may be any desired number, are held in aligned relationship by shafts 60 and 61 extending through the toggles and carried entirely thereby. For taking the thrust of the toggles, the respective movable sections are provided with hardened bearing inserts 62 and 63, so positioned as to take the direct thrust of the toggles when they are in such position, as illustrated in Figure 7, as to expand the relatively movable sections.

For insuring movement of the toggles in synchronism, their cooperating ends may be shaped to receive pins 64 and 65 which carry toothed members 66 and 67 adapted to intermesh in manner illustrated. Also carried by these pins, which are generally similar to the shafts 60 and 61 before described, are interconnecting links 65′ tying the toggles 58 and 59 together and maintaining the teeth 66 and 67 in cooperative engagement. For urging the relatively movable sections 56 and 57 into collapsed position, there may be provided one or more springs 68 extending between such movable sections and secured thereto by means of detachable plates 69 of such contour that the ends of the springs may be hooked thereover in the manner illustrated.

Similarly to the construction illustrated in Figure 6, the ends of the movable sections may be provided with staggered overlapping fingers 70, similar in construction to the fingers 46 before described. Cooperating with these fingers for providing a winding surface of continually unbroken contour is a flexible winding plate 71, herein illustrated as rigidly secured to the movable section 56 in any desired manner as, for example, by means of screws 72. The free end 73 of this plate extends over fingers 70 and into a suitably shaped recess in the movable section 57. When the toggles are moved into such position as to cause the movable sections 56 and 57 to collapse, the spring plate 71 will move to a position substantially as illustrated in dotted lines in Figure 7, from which position it will again take its full line position when the sections are expanded.

With all of the forms of my invention there is provided a collapsible reel, adapted upon the commencement of a reeling operation to automatically grip the material to be coiled to an extent commensurate with the drag or resistance of the material, and to thereafter continuously wind or coil the same about a surface so constructed that the coiled material is free from ridges or breaks. Upon the conclusion of such winding or coiling operation, the inertia of certain of the rotating parts is sufficient to automatically collapse the drum to an extent sufficient to permit free stripping of the finished coil from the reel. This collapsing operation is accompanied by simultaneous movement of the gripping means such as to release the previously gripped end of the material, as will be readily apparent.

While I have herein illustrated and described certain preferred embodiments of the present invention, it will be understood that changes in the construction, operation, and relationship of the parts may be made without departing either from the spirit of my invention or the scope of my broader claims.

I claim:—

1. In a reel, the combination with a plurality of relatively movable sections, of pivoted gripping means cooperating with one of said sections, and a cam shaft for succes-

sively expanding said sections and turning said gripping means into operative position.

2. In a reel, the combination with a plurality of relatively movable sections, of pivoted gripping means cooperating with one of said sections, and means for successively expanding said sections and turning said gripping means into operative position, said last mentioned means comprising a cam shaft within said drum and rotatable relatively thereto.

3. In a collapsible block, a drive shaft for rotating the block, a stationary segment, a pair of segments pivoted at opposite sides of said segment and extending in opposite directions therefrom, a movable section capable of closing the space between the free ends of said segments when the block is expanded, a jaw section movable toward and from the stationary segment, a jaw on said latter segment adapted to cooperate therewith to grip a strip to be wound, said segments and sections being mounted for limited turning movement relative to the shaft, and means for connecting the movable segments and said sections with the shaft to shift them by said relative turning movements.

4. In a collapsible block, a stationary segment, two pivoted segments at opposite sides of the stationary segment and extending in oposite directions therefrom, a third movable section between the free ends of the two pivoted segments, a drive shaft concentric of the block for rotating the block, said segments having limited turning movement relative to said shaft, and means operated by said relative movement to shift the segments and section to expand and collapse the block.

5. In a reel, a drum comprising a relatively fixed section and a relatively movable section, pivoted gripping means cooperating with one of said sections, and a cam shaft for driving said drum and for effecting successive operation of said relatively movable section and said gripping means.

6. In a reel, a rotatable drum comprising a section fixed relative to the axis thereof, relatively movable sections hinged to opposite edges thereof, gripping devices carried by one of said sections, and a cam shaft relatively rotatable about the same axis as said drum, said shaft being effective upon rotation in one direction for effecting drum-expanding movement of said relatively movable sections and the operation of said gripping devices.

7. In a reel, a drum comprising a section fixed relative to the axis thereof, relatively movable sections movably cooperating with opposite edges thereof, gripping devices carried by one of said sections, a cam shaft relatively rotatable about the same axis as said drum, said shaft being effective upon rotation in one direction for effecting drum-expanding movement of said relatively movable sections and said gripping devices, and means cooperating with said relatively movable sections for contracting the same upon relative rotation of the cam shaft in the opposite direction.

8. In a reel, a drum comprising a section fixed relative to the axis thereof and a relatively movable section, pivoted gripping means cooperating with one of said sections, and a cam shaft for effecting successive operation of said relatively movable section and said gripping means.

9. In a reel, a drum comprising a section fixed relative to the axis thereof and a relatively movable section, pivoted gripping means cooperating with one of said sections, and a cam shaft for effecting sequential operation of said gripping means and said relatively movable section.

10. In a reel, a drum comprising a section fixed relative to the axis thereof and having a throat therein, a collapsible section, gripping means pivoted to said section within said throat, and a cam shaft for successively expanding said collapsible section and turning said gripping means into operative position.

11. In a reel, a drum comprising a section fixed relative to the axis thereof, a plurality of relatively movable sections cooperating therewith, movable gripping means cooperating therewith, and a cam shaft for effecting successive operation of said relatively movable sections and said gripping means.

12. In a reel, a drum comprising a section fixed relative to the axis thereof, a plurality of relatively movable sections cooperating therewith, pivoted gripping means cooperating therewith, and means for effecting successive operation of said relatively movable sections and said gripping means, said last-mentioned means comprising a cam shaft within said drum and rotatable relatively thereto.

13. In a reel, the combination with a plurality of relatively movable sections constituting a winding drum, of a shaft extending substantially axially of said drum, and adapted to support the same in operative position, pivoted gripping means cooperating with one of said sections, and a cam on said shaft for successively effecting an expansive movement of said sections and the operation of said gripping device upon rotative movement thereof in one direction.

14. A reel comprising an arcuate carrying plate, other carrying plates hinged thereto and disposed to swing inwardly at their free ends, and a toggle mechanism connected to said free ends for expanding the hinged plates into operative position.

15. A reel comprising an arcuate carrying plate, other carrying plates hinged

thereto and disposed to swing inwardly at their free ends, and a link mechanism connecting the free ends of said hinged plates, said link mechanism constituting a toggle for expanding the reel into cylindrical shape.

16. A reel for winding strip material, comprising a hub portion, arms extending from the hub portion at one side thereof, a segment of cylindrical outer contour carried by said arms, other segments pivotally connected to each end of said fixed segment, and a toggle mechanism joining the free ends of said pivoted segments, whereby the reel may be expanded to cylindrical shape or collapsed for removing reeled material.

17. In a reel, in combination, a shaft, a body portion journalled on the shaft, hinged carrying plates mounted on the body portion, a toggle mechanism for expanding the carrying plates, a material gripping member carried by the body portion, and means rigidly mounted on the shaft for operating the toggle mechanism and for operating the material gripping member when the body portion is turned relative to the shaft.

18. In a reel, a rotatable drum comprising two collapsible sections, a third section to which said two sections are movably connected, a gripping device carried by one of said sections, and means comprising a member movable relative to said third section for successively controlling the positions of said collapsible sections and said gripping device.

19. In a reel, a rotatable drum comprising a collapsible section, a section connected thereto and having a gripping device cooperating therewith, and a cam shaft movable relative to said drum operable in one direction of relative movement to successively expand said collapsible section and actuate said gripping device to operative position and in the other direction of relative movement to control the positions of said devices in reverse order.

In testimony whereof I have hereunto set my hand.

HOWARD H. TALBOT.