May 13, 1941. W. M. McCONNELL 2,241,669

REEL BLOCK

Filed Aug. 2, 1940

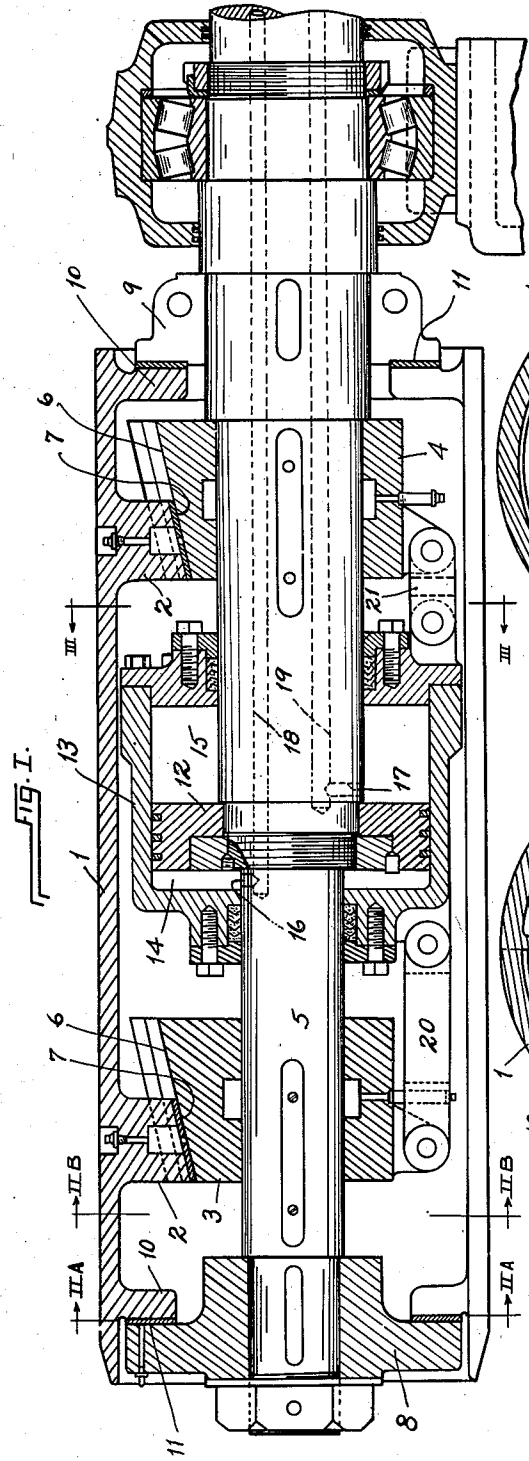


FIG. I.

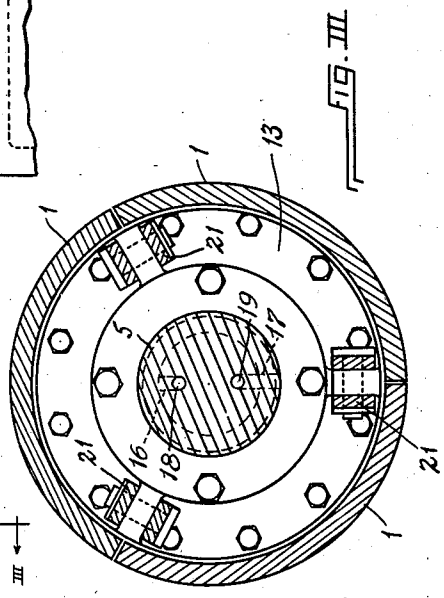


FIG. III.

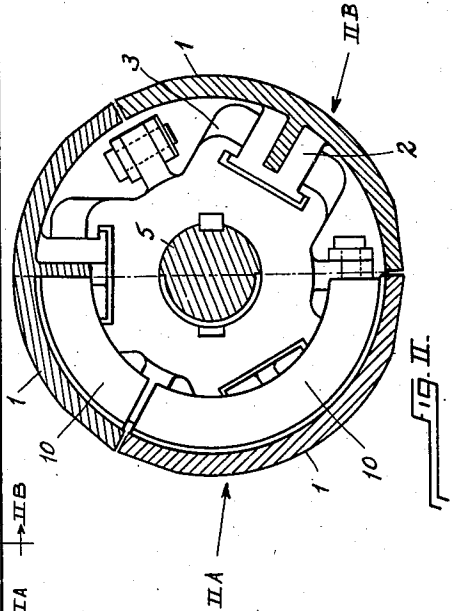


FIG. II.

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REEL BLOCK

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6 Claims. (Cl. 242—72)

My invention relates to a collapsible reel block, or reel mandrel, for strip steel and other strip metal.

Reel blocks, or reel mandrels, of the type in which my invention more particularly resides are for the purpose of receiving coils of strip, and rotatably to mount the coils for unreeling, or to coil the strip in rewinding. A mandrel of such type may be considered as the primary element of a transfer reel. It is necessary that such reel block, or mandrel, be contractile in order that it may enter at the center of a coil, and that it be expansible from its contracted condition in order that it may adequately grip the coil into which it has been inserted. The reel blocks, or mandrels, of this type have an outer structure which is longitudinally divided into a plurality of coil-contacting segments. Operating means and connections move these segments toward and away from the common longitudinal axis of the mandrel.

The object of my invention is so to construct and arrange a collapsible mandrel that it is compact within the approximate space bounded by the coil-contacting segments of the mandrel, and that the operating means of the mandrel act quickly and positively in moving the segments toward and away from the axis of the mandrel.

In the accompanying drawing, which shows an exemplary embodiment of my invention:

Fig. I shows the mandrel in central longitudinal section.

Fig. II is a cross-sectional view through the mandrel, taken one-half on the section line IIA—IIA and one half on the section line IIB—IIB of Fig. I.

Fig. III is a cross-sectional view taken on the section line III—III of Fig. I.

In the illustrated mandrel the segments 1 are shown in all figures of the drawing in their radially-inward, or contracted, position. Each segment has two longitudinally-spaced inwardly projectant feet 2, which at their inner ends have a mortised connection with two spiders 3 and 4 spaced along and keyed to the rotatably-mounted mandrel shaft 5. The inner ends of the segment feet 2 are inclined to the axis of shaft 5 equally and oppositely to the inclination of cooperative surfaces 6 of the spiders, and the inner ends of the feet desirably carry anti-friction shoes 7.

Movement of the spiders along the shaft 5, the segments 1 being restrained against endwise movement, therefore, moves the segments radially outward, or radially inward, away from or toward the shaft, in accordance with the direction in which the spiders are moved along the shaft. Endwise movement of the segments is restrained by abutment members 8 and 9 keyed to the shaft 5, and so spaced along the shaft as to accommodate between them the operating assembly for the segments. Each of the segments 1 has at both of its ends a flange 10 projected radially inward toward the shaft. It will be noticed in Fig. I of the drawing, that the segment flanges 10 lie in contact with the abutments 8 and 9, so that movement of the spiders along the mandrel shaft causing the segment feet 2 to ride up or down the inclines 6 of the spiders, is in the segments resolved wholly into radial movement away from or toward the mandrel shaft. Desirably, anti-friction washers 11 are mounted on the inner surfaces of both the abutments 8 and 9, so that the segment flanges 10 slide more easily against them.

The operating means and connections for the segments include a piston 12 fixed to the shaft 5 against movement in any direction with respect to the shaft. Movable along the shaft but held against rotation relative thereto, there is a cylinder 13 embracing the fixed barrier-piston 12, and having a sealed moving contact with the circular outer edge of the piston. The cylinder 13, is thus concentric with the shaft 5, piston 12, and assembly of segments 1, and lies wholly within the bounds of the segment assembly when the segments are in their contracted position. Within the cylinder 13, the piston separates spaces 14 and 15, which are of variable volume in accordance with the position of the cylinder. Ports 16 and 17 are placed close to the opposite sides of the piston 12, to open respectively into the spaces 14 and 15. Ducts 18 and 19 within the body of shaft 5, lead to the ports 16 and 17.

Assuming that the ducts 18 and 19 are controllably connected with a source of fluid pressure, for application at the opposite sides of the piston 12, the cylinder may be moved in both directions along the shaft. Cylinder 13 is connected by links 20 with spider 3 and by links 21 with spider 4. Referring to Fig. I, which shows the contracted condition of the mandrel, if fluid pressure be admitted to the space 14 (to the left in Fig. I) within the cylinder by way of port 16 and duct 18, the cylinder 13 is moved to the left. This pushes spider 3 and pulls spider 4 both to the left, so that the inclined surfaces 6 of both spiders acting on the feet 2 of the segments force the segments radially outward. If in that position pressure be applied in the space 15 (to the right in Fig. I) the cylinder pushes spider 4 and pulls spider 3

to the right. This brings the segments radially inward along the inclined surfaces 6 of both spiders into the collapsed, or contracted, position shown in the drawing.

From the foregoing it will be seen that competent operating means and connections causing expanding and contracting movement of the segments are wholly contained within the space between the abutments 8 and 9 and within the least space bounded by the segment assembly. Also, the fluid pressure connections in the mandrel being contained within the mandrel shaft, the inclusion of an extended operating rod, or pressure-transmitting tube is avoided. These facts give marked advantage to the mandrel in constructing, installing, and using a reel assembly in which it is included.

It is to be understood that the foregoing is illustrative of an embodiment of my invention, and that within the bounds of the claims hereto appended substantial change may be made from the elements as herein specifically shown and described. As exemplary of such changes, I may utilize well known connections, such as knuckles, instead of the specifically shown and described segment-carried feet, inclined surfaces, and links, to provide operating connections functionally between the cylinder and the segments appropriately to transmit movement of the cylinder to the segments.

I claim as my invention:

1. In a collapsible mandrel the combination of a rotatable shaft, a piston immovably fixed around the said shaft, a cylinder movable along the shaft and embracing the piston, controlled fluid pressure ducts opening within the cylinder at opposite sides of the piston selectively to apply fluid pressure for moving the cylinder in opposite directions along the shaft, a plurality of mandrel segments mounted around the shaft and cylinder for radial movement with respect thereto; and operating connections functionally between the said segments and the said cylinder, and contained within the space defined by the segments, effective to move the segments radially toward and from the shaft in accordance with the direction in which the cylinder moves along the shaft.

2. In a collapsible mandrel the combination of a rotatable shaft, a piston immovably fixed around the said shaft, a cylinder movable along the shaft and embracing the piston, controlled fluid pressure ducts within the said shaft opening within the cylinder at opposite sides of the piston selectively to apply fluid pressure for moving the cylinder in opposite directions along the shaft, a plurality of mandrel segments mounted around the shaft and cylinder for radial movement with respect thereto; and operating connections functionally between the said segments and the said cylinder, and contained within the space defined by the segments, effective to move the segments radially toward and from the shaft in accordance with the direction in which the cylinder moves along the shaft.

3. In a collapsible mandrel the combination of a rotatable shaft, a piston immovably fixed around the shaft, a cylinder movable along the shaft and embracing the piston, controlled fluid pressure ducts opening within the cylinder at opposite sides of the piston selectively to apply fluid pressure for moving the cylinder in opposite directions along the shaft, a plurality of mandrel segments mounted around the shaft and cylinder for radial movement with respect thereto, fixed abutments spaced along the shaft in end contact with the segments; and operating connections functionally between the said segments and the said cylinder, and contained within the space defined by the segments and the said abutments, effective to move the segments radially toward and from the shaft in accordance with the direction in which the cylinder moves along the shaft.

4. In a collapsible mandrel the combination of a rotatable shaft, a piston immovably fixed around the shaft, a cylinder movable along the shaft and embracing the piston, controlled fluid pressure ducts within the said shaft opening within the cylinder at opposite sides of the piston selectively to apply fluid pressure for moving the cylinder in opposite directions along the shaft, a plurality of mandrel segments mounted around the shaft and cylinder for radial movement with respect thereto, fixed abutments spaced along the shaft in end contact with the segments; and operating connections functionally between the said segments and the said cylinder, and contained within the space defined by the segments and the said abutments, effective to move the segments radially toward and from the shaft in accordance with the direction in which the cylinder moves along the shaft.

5. In a collapsible mandrel the combination of a rotatable shaft, a piston immovably fixed around the shaft, a cylinder embracing the said piston movable along the shaft and held against rotation relative to the shaft, controlled fluid pressure ducts opening within the cylinder at opposite sides of the piston selectively to apply fluid pressure for moving the cylinder in opposite directions along the shaft, a plurality of mandrel segments mounted around the shaft and cylinder for radial movement with respect thereto, and operating connections functionally between the said segments and the said cylinder effective to move the segments radially toward and from the shaft in accordance with the direction in which the cylinder moves along the shaft.

6. In a collapsible mandrel the combination of a rotatable shaft, a piston immovably fixed around the shaft, a cylinder embracing the said piston movable along the shaft and held against rotation relative to the shaft, controlled fluid pressure ducts within the said shaft opening within the cylinder at opposite sides of the piston selectively to apply fluid pressure for moving the cylinder in opposite directions along the shaft, a plurality of mandrel segments mounted around the shaft and cylinder for radial movement with respect thereto, and operating connections functionally between the said segments and the said cylinder effective to move the segments radially toward and from the shaft in accordance with the direction in which the cylinder moves along the shaft.

WILLIAM M. McCONNELL.