E. E. SLICK.

ROTARY SHEARS.

APPLICATION FILED JAN. 3, 1907.

965,034. **Patented July 19, 1910.**

3 SHEETS—SHEET 1.

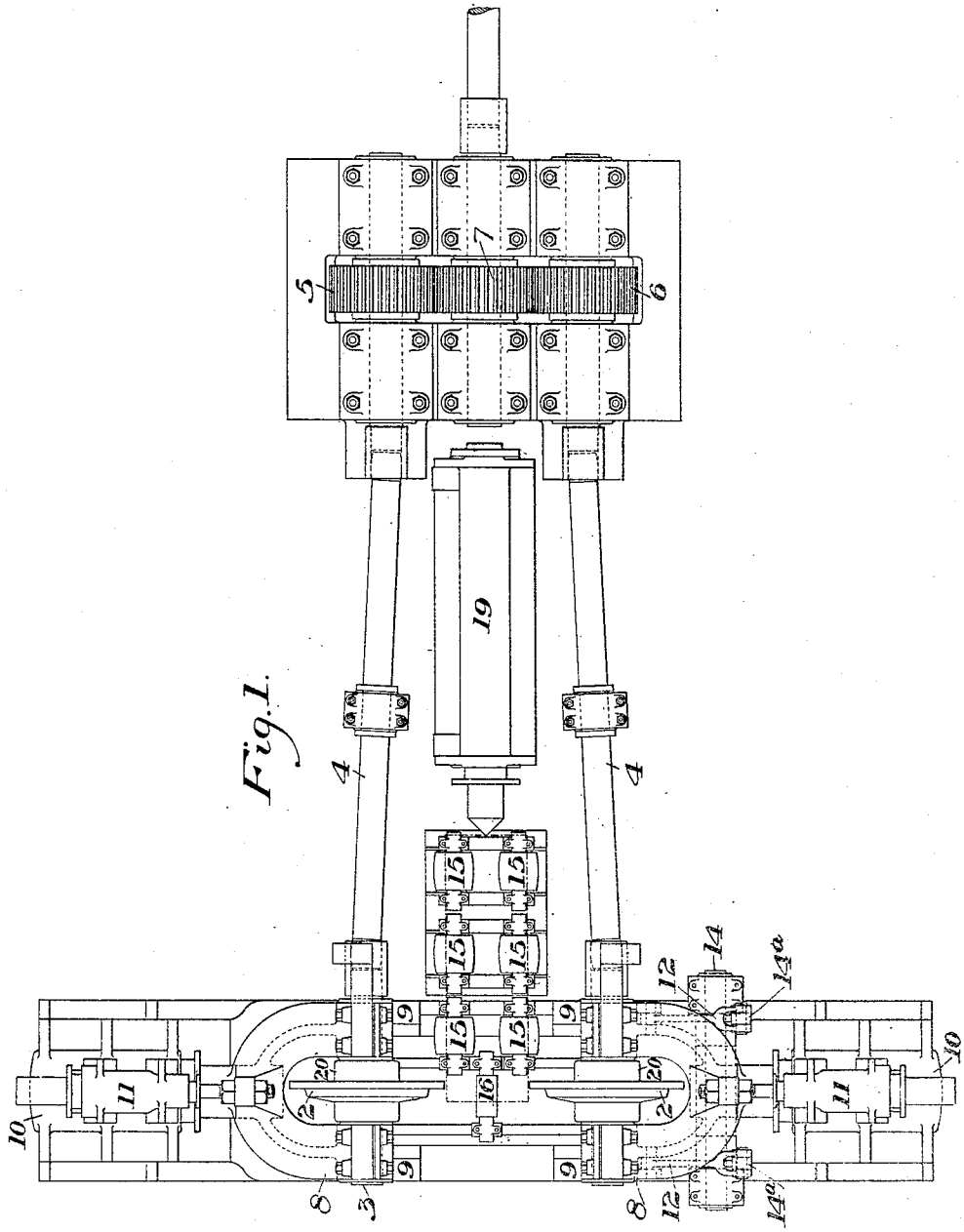

Fig. 1.

WITNESSES

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R. A. Balderson

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by Robertson & Byrnes

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3 SHEETS—SHEET 2.

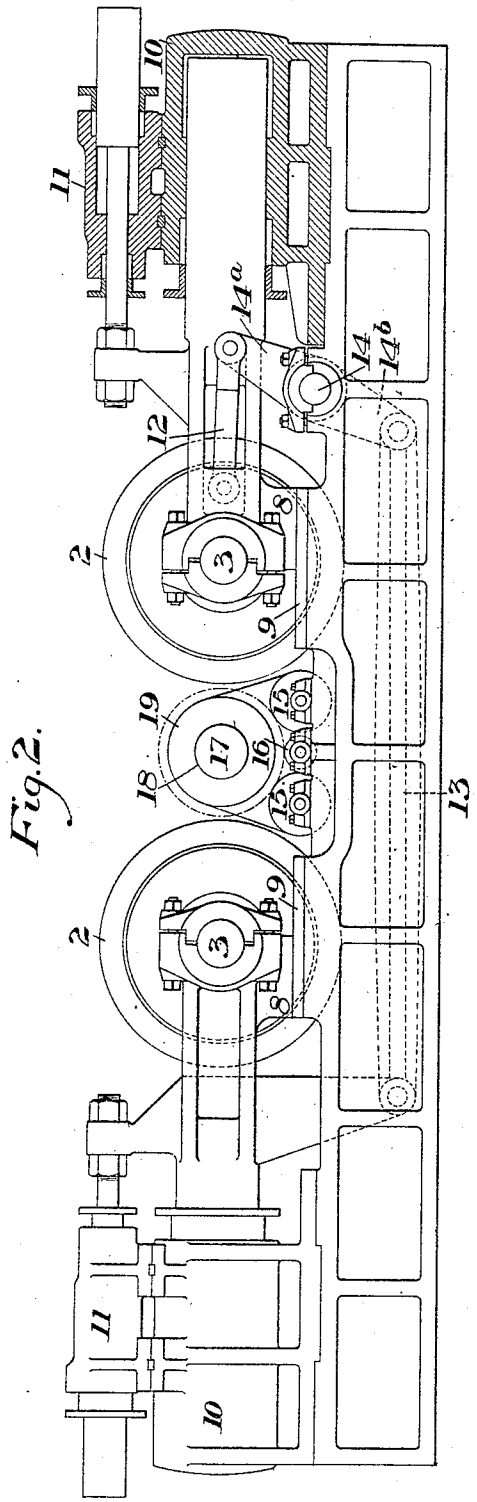

Fig. 2.

WITNESSES

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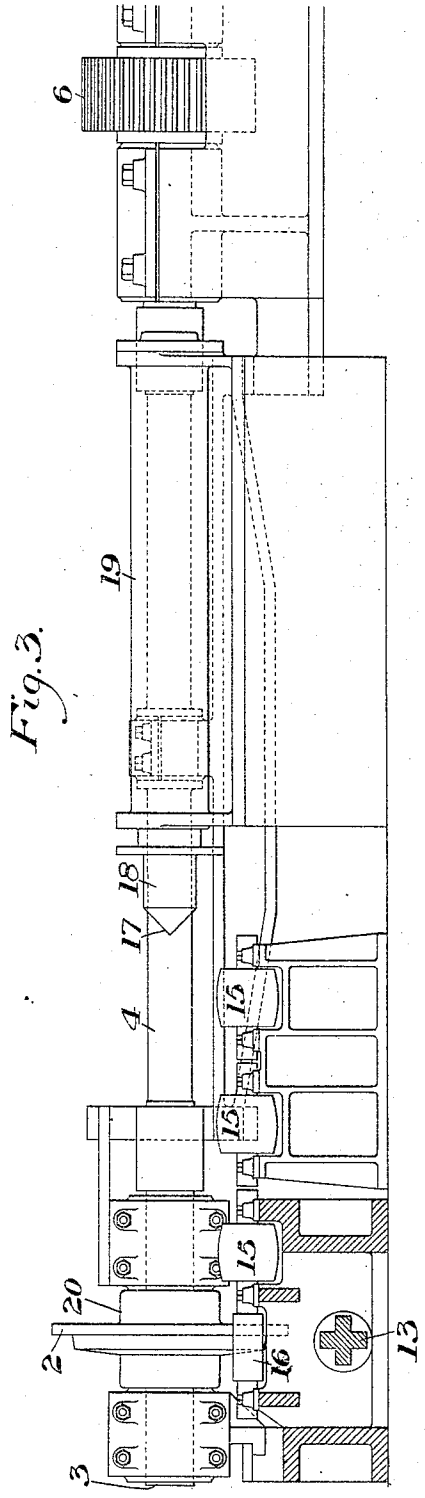

Fig. 3.

WITNESSES

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UNITED STATES PATENT OFFICE.

EDWIN E. SLICK, OF PITTSBURG, PENNSYLVANIA.

ROTARY SHEARS.

965,034. Specification of Letters Patent. Patented July 19, 1910.

Application filed January 3, 1907. Serial No. 350,608.

To all whom it may concern:

Be it known that I, EDWIN E. SLICK, of Pittsburg, Allegheny county, Pennsylvania, have invented a new and useful Rotary Shears, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a plan view of rotary shears apparatus constructed in accordance with my invention; Fig. 2 is a front elevation of the same partly in section; and Fig. 3 is a side elevation, partly in section.

My invention relates to rotary shears, and particularly to the shearing of hot ingots or blooms of substantially cylindrical form.

The invention relates particularly to the forming of steel wheel blanks from a cast steel ingot, though it may be employed for cutting off tire blanks or other blanks from a long cylindrical blank or section.

The object of the invention is to provide a simple, cheap and rapidly-operating device by which the blanks may be sheared from the ingot, and if desired, partially shaped during the shearing action.

In the drawings, 2, 2 represent the rotary shear blades which are mounted on shafts 3, 3, the blades either being rotatably mounted on the shafts or being secured to the shafts which turn in suitable bearings. In either case, the rotary shear blades are positively rotated, this being done in the form shown by wabbler connections 4 to pinions 5 and 6 driven from the intermediate pinion 7. The bearings for the rotary shears are carried on sliding cross-heads 8 moving on guides 9. The cross-heads are moved toward or from each other by hydraulic or other fluid pressure cylinders 10, and are drawn back by the pull-back cylinders 11. In order to cause uniform travel of the two shear blades, I preferably connect the cross-heads by links 12 and 13 with the oppositely projecting equalizing levers 14^a and 14^b secured on the pivot shaft 14. Other means, however, may be employed for making the travel of the two shear blades uniform, or such device may be done away with entirely.

The ingot to be sheared is carried upon a suitable support which I have shown as consisting of two rows of antifriction rollers 15, and an antifriction roller 16 between and below the two shear blades. The ingot lies upon these sets of rollers, and may be adjusted forwardly by the pointed end 17 of a plunger 18 in the cylinder 19 in line with the roller 16.

In the operation of the apparatus, the cylindrical ingot is laid on the antifriction rollers in substantially the position shown in dotted lines in Figs. 1 and 2. It is then shoved forward by the pointed end of the plunger 18, so that its front end projects upon the shears the desired distance. The shears are then positively rotated, and at the same time simultaneously moved toward each other. They gradually enter the sides of the ingot and cut a deepening annular groove therein, the fluid pressure cylinders 10 finally bringing the two shear blades together, if this is desired. The operation may also be carried out without completely severing the blank, as the remaining neck or stem portion may afterward be cut away or removed, either by punching a central hole in the blank, or in any other desired way. After the blank is thus severed, the cutting disks are retracted, the ingot is adjusted forwardly to the proper distance, and the operation repeated.

It will be noted that during the operation of cutting off one blank, the circular hub portion 20 of the shears acts upon the next blank to size it before it is cut off, thus in the form shown, there is a sizing action on one blank simultaneously with the cutting off of the other blank ahead of it.

The ingot may be supported upon centers projecting into centering holes in its opposite ends. The shape of the shear blades may be varied so as to simply cut the blank, or to partially shape the blank being cut, or the next blank being cut off or both; and many other changes may be made without departing from my invention.

I claim:—

1. In rotary shear mechanism, a support for a cylindrical article arranged to allow rotation thereof, a pair of opposite shear blades arranged in substantially the same plane of rotation on opposite sides of the support, connections for positively driving the shear blades, and mechanism for positively forcing one of said shear blades toward the other during the rotation of the article to sever the end portion of the article in its continued revolutions, said shear blades being caused to approach each other in paths forming substantially flat planes; substantially as described.

2. In rotary shear mechanism, a support for a cylindrical article arranged to allow rotation thereof, a pair of opposite shear blades arranged in substantially the same plane of rotation on opposite sides of the support, connections for positively driving the shear blades, and mechanism for forcing said shear blades toward each other, the cutting edges of said shear blades moving in paths forming flat planes; substantially as described.

3. In rotary shear mechanism, a pair of substantially circular shear blades arranged in substantially the same plane, connections for positively rotating said shear blades, and mechanism for moving at least one of said shear blades toward the other during their continued rotation, the cutting edges of said shear blades moving in paths forming flat planes; substantially as described.

4. In rotary shear mechanism, a pair of rotary shear blades arranged in the same plane, slides upon which said shears are mounted, connections for moving said shears toward and away from each other, and connections for continuously rotating the shear blades, the axes of rotation of said shear blades being parallel throughout the cutting operation; substantially as described.

5. In rotary shear mechanism, a support for the metal to be operated upon arranged to allow rotation thereof, means arranged to shift the metal endwise along said support, a pair of shear blades arranged in substantially the same plane and adapted to act upon the projecting end portion of the metal on the support, mechanism for moving said shear blades inwardly toward each other in parallel planes, and connections arranged to rotate such shear blades during their cutting movement toward each other; substantially as described.

6. In rotary shear mechanism, a support for the article arranged to allow rotation thereof, a pair of oppositely arranged shear blades in the same plane, connections arranged to continuously rotate said shear blades, and mechanism independent of the rotating mechanism for adjusting said blades toward and away from each other during rotation, the cutting edges of said blades moving in a path forming a flat plane; substantially as described.

7. In rotary shear mechanism, the combination with a pair of opposing rotary shear blades, connections for continuously rotating the shear blades, and slides upon which said shear blades are mounted, connections for simultaneously advancing or retracting said slides toward and away from each other, said slides being arranged to advance or retract at the same speed; substantially as described.

8. In rotary shear mechanism, the combination with a pair of opposing rotary shear blades, mechanism for moving said shear blades inwardly toward each other in a single flat plane, and connections arranged to rotate said shear blades, of a support for the metal to be operated upon, and power mechanism arranged to shift the metal endwise on said support; substantially as described.

9. In rotary shear mechanism, the combination with a pair of circular opposing shear blades, and connections for positively driving the shear blades of mechanism for positively forcing said shear blades toward each other during the shearing operation in a path forming a substantially flat plane, and means arranged to retract said shear blades after the shearing operation; substantially as described.

10. In rotary shear mechanism, a support for a cylindrical article consisting of rotary surfaces on which the article is mounted during shearing, a pair of opposite rotary shear blades, connections for positively rotating said shear blades, and means for forcing at least one of the shear blades toward the other during rotation of the other in a path forming a substantially flat plane; substantially as described.

11. In rotary shear mechanism, supports and guides for a cylindrical article comprising rotary elements arranged below and on opposite sides of the axis of the article and separated from each other, opposite rotary shear blades arranged in substantially the same plane, connections for positively rotating the shear blades, and mechanism for forcing at least one of said shear blades toward the other during the rotation of the article on the guiding rotary supports; substantially as described.

12. In rotary shear mechanism, a support for a cylindrical article consisting of rotating surfaces arranged on opposite sides of and below the axis of the article, opposite shear blades arranged to sever the article and mechanism for forcing the article endwise and longitudinal of said rotary elements in position for another shearing cut; substantially as described.

13. In rotary shear mechanism, a support for a cylindrical article consisting of rotating elements, opposite shear blades arranged to shear the article and an end pushing device arranged to act on the end of the article to force it endwise of the rotary supporting elements into position for another cut; substantially as described.

14. In rotary shear mechanism, a support for an article, a pair of opposing shear blades arranged to sever the same and an end pusher adapted to shift the article endwise into successively new positions on said support; substantially as described.

15. In rotary shear mechanism, a support for an ingot or a similar article arranged to permit rotation of the same, a pair of oppositely arranged shear blades,

mechanism for positively rotating said shear blades and thereby rotating the ingot by frictional contact with said blades, and power connections arranged to force at least one of said rotary shear blades toward the other in a path at right angles to the axis of said articles; substantially as described.

16. In rotary shear mechanism, supports and guides for a cylindrical article comprising rotary elements arranged on opposite sides of and below the axis of the article and separated from each other, shear blades at opposite sides of the axial center of the article, connections for positively rotating the shear blades and mechanism for forcing at least one of said shear blades toward the other during the rotation of the article on the guiding rotary supports; substantially as described.

17. Rotary shear mechanism, comprising a rotating support for an article, a pair of opposing shear blades, arranged to sever the article while it is being rotated, and means for positively actuating said shear blades, the path of approach of said shear blades being in a single flat plane; substantially as described.

18. In rotary shear mechanism, a support for a cylindrical article arranged on opposite sides of and below the horizontal axis of the article, opposing shear knives arranged to contact with diametrically opposite portions of the blank, means for positively actuating the said shear knives in causing a relative approach to sever the article, said shear knives moving in paths forming a flat plane during the cutting operation; substantially as described.

19. In rotary shear mechanism, a rotary support for an ingot or similar article arranged below the axis of the ingot to permit rotation of the same, a pair of oppositely arranged shear blades, mechanism for positively rotating said shear blades and thereby revolving the ingot by frictional contact with the blades and power connections arranged to force at least one of said rotating shear blades toward the axis of the article, the path of approach of the blades toward each other being in a path forming a single flat plane; substantially as described.

20. Shear mechanism comprising supports for a cylindrical article arranged on opposite sides of and below the axis of the article, opposite shear blades arranged to rotate and sever the article and mechanism for causing a relative approach of the shear blades while the article is being severed; substantially as described.

21. Shear mechanism comprising an ingot support arranged to permit rotation thereof, a pair of oppositely arranged shear blades, and mechanism for actuating said shear blades adapted to rotate the ingot by frictional contact while causing a relative approach of said blades in a path at right angles to the axis of the ingot; substantially as described.

22. In apparatus for shearing ingots and similar articles, the combination with a pair of opposing shear blades adapted to rotate and sever the ingot, and connections for positively actuating the shear blades, of a support for the ingot arranged to permit rotation of the ingot during the shearing operation; substantially as described.

23. In apparatus for shearing ingots and similar articles, the combination with a pair of opposing shear blades adapted to rotate and sever the ingot, and connections for positively actuating the shear blades, of an ingot support below the axis of the ingot arranged to permit rotation thereof during the shearing operation; substantially as described.

In testimony whereof, I have hereunto set my hand.

EDWIN E. SLICK.

Witnesses:
R. D. LITTLE,
H. M. CORWIN.