April 15, 1941. H. H. TALBOT 2,238,542

SHEAR

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Fig. 1.

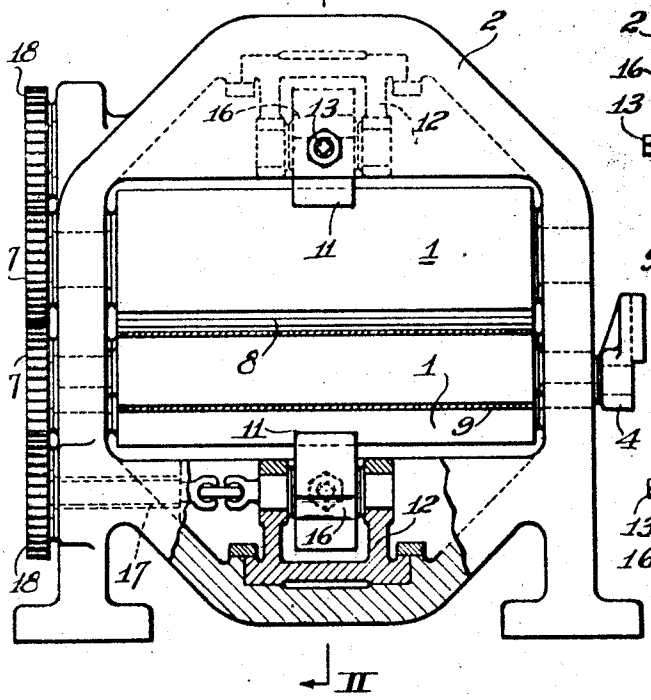


Fig. 2.

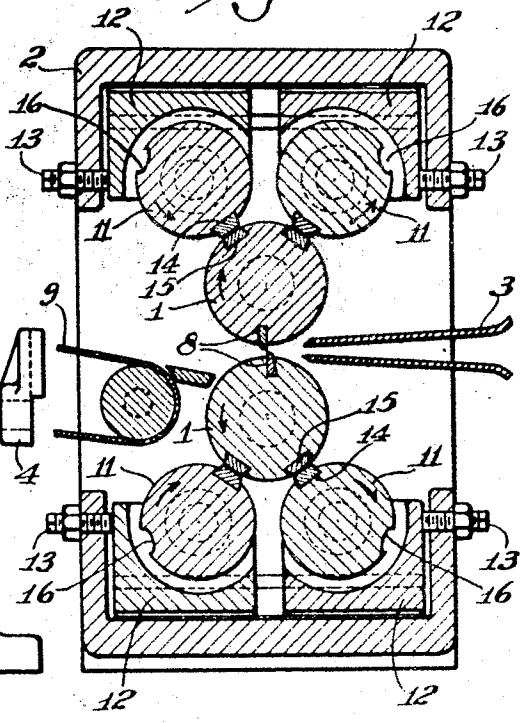
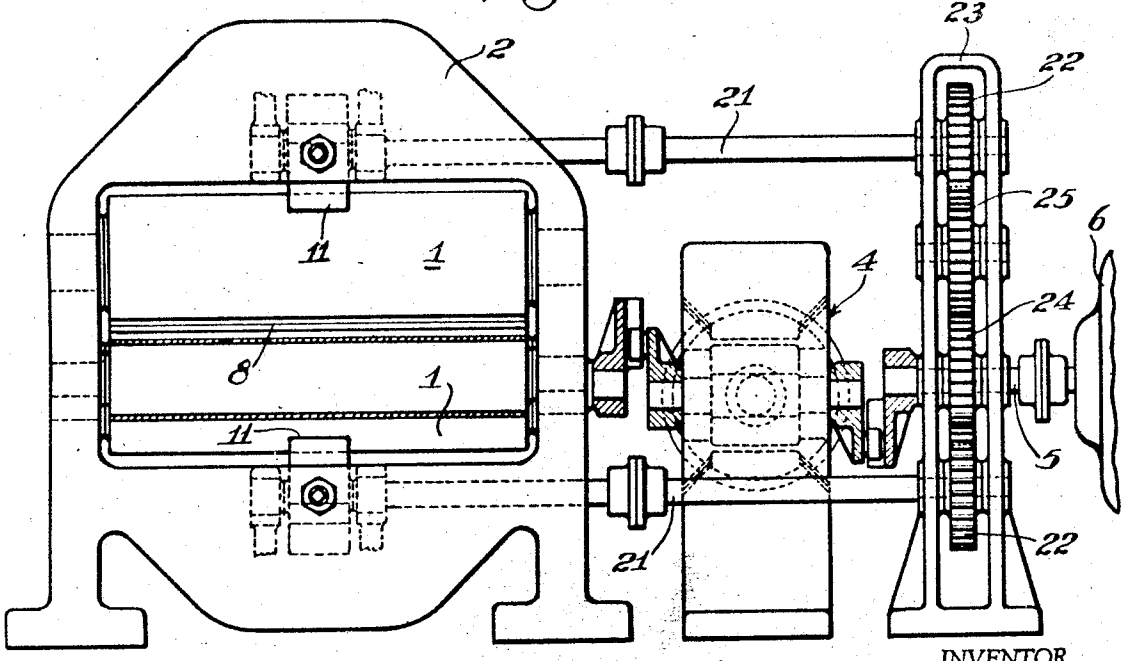


Fig. 3.



INVENTOR.
Howard H. Talbot
BY J. E. Dickinson
ATTORNEYS.

WITNESSES
A. B. Wallace.
V. A. Peckham.

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2,238,542

SHEAR

Howard H. Talbot, Pittsburgh, Pa., assignor to United Engineering and Foundry Company, Pittsburgh, Pa., a corporation of Pennsylvania

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12 Claims. (Cl. 164—66)

This invention relates to flying shears for severing strip material into predetermined lengths, and more particularly to shears of this character of the rotary type.

The desideratum in the operation of flying shears of this type is to produce the cuts with the blade carriers or drums rotating at a uniform speed and thus avoid constant acceleration and deceleration. To obtain this, if the strip is to be cut into relatively short lengths the drums must be of small diameter. On the other hand, it is usually necessary to shear the strip into pieces of different lengths, and to do so by varying the rotational velocity of the drums during every revolution. This increases the strain on the entire apparatus. To hold this strain as low as possible it is again desirable to use drums of relatively small diameter so that there is not so much inertia to overcome. In either case, if the strip is wide the long drums of small diameter are likely to be bowed or deflected out of line when the blades carried thereby strike the strip. This, of course, prevents proper shearing.

It is among the objects of this invention to provide a rotary type flying shear in which the blade carrying drums are of small diameter compared with their length but are prevented from bending during shearing, in which the impact of shearing is transmitted to the shear frame principally through means other than the bearings of the drums, and in which the rotational velocity of the drums can be accelerated and decelerated between cuts without placing undue strain on the apparatus.

In accordance with this invention a pair of blade carriers, such as superimposed drums, are rotatably mounted in a frame in such manner that strip material can pass between them, and they carry shear blades which cooperate in periodically severing the moving strip. Although the drums are long and narrow, they are prevented from bending at the time of cutting by backing rolls. These backing rolls are provided with recesses extending across their faces for receiving the blades while they are passing the rolls. The rolls may engage the drums at all times, but it is preferred that the faces of the rolls be spaced from the drums and be provided with projecting wear-resisting inserts which engage the drums only during the cut. The backing rolls may be driven either at a uniform speed, or at a varying velocity in accordance with the variable drive of the drums.

The invention is illustrated in the accompanying drawing in which Fig. 1 is an end view of my flying shear, partly broken away to show the backing roll mounting; Fig. 2 is a vertical section taken on the line II—II of Fig. 1; and Fig. 3 is a view similar to Fig. 1 showing in full the shear drive and a modified drive for the backing rolls.

Referring to Figs. 1 and 2 of the drawing, a pair of drums 1 are journaled at their ends in superimposed relation in the sides of a housing 2. The drums are spaced far enough apart to permit metal strip to be continuously fed between them from a guide 3 leading from a roller leveler or other apparatus. The lower drum is driven in the same manner as the embodiment in Fig. 3 through an adjustable accelerating mechanism 4 (Fig. 3), such as shown in my Patent No. 2,067,513, from the shaft 5 of a motor 6. Mounted on the outer ends of the drum necks at the opposite side of the housing are gears 7 which mesh with each other so that the two drums rotate in unison. Extending lengthwise of each drum and suitably attached thereto is a shear blade 8. The two blades in this embodiment are mounted on the drums in such positions that they cooperate in shearing the strip every time the drums make one revolution. The sheared lengths are caught by a belt conveyor 9 and carried away to be piled.

It is a feature of this invention that although the drums have diameters which are small enough in comparison with their lengths to permit the drums and blades to bow away from the strip during the shear cuts, they are prevented from doing this. Accordingly, the drums are supported by backing means which prevent them from being deflected in this manner. Preferably, the backing means comprise a pair of short rolls 11 adapted to engage the central portion of each drum on both sides of the vertical center line of the pass so as to prevent the drum from being deflected vertically or horizontally. Each roll is rotatably mounted in a frame 12 which is mounted in the housing for sliding adjustment transversely of the drums on the side opposite to the pass, and can be moved inwardly by an adjusting screw 13 in order to compensate for wear and to vary the pressure on the adjoining drum. Although the rolls may be made to engage the drums at all times, friction and wear can be reduced if they are spaced from the drums and only engage them during the shear cuts. For this purpose the rolls are provided with projections which are preferably in the form of hardened contact members 14 inserted in the roll faces across which they extend. Likewise, the central portions of the

drums may be provided with similar hardened inserts 15 for engaging contact members 14. The various inserts are so positioned circumferentially of the rolls and drums relative to the shear blades that inserts 14 engage inserts 15 only at the time of a cut, at which time they take the shock of the shearing impact and thus protect the rolls and drums. This impact is transmitted to the shear housing principally through the backing rolls, rather than through the drum necks. The rest of the time the drums and rolls are free of each other. The hardened inserts also take the wear and can be replaced when worn without having to replace the drums and rolls.

To prevent the shear blades from interfering with the rotation of the drums, in case the backing rolls are not spaced far enough from the drums to clear the blades, the rolls are provided with recesses 16 extending across their faces for receiving the blades as they pass the rolls. Registering of the blades and recesses, as well as engagement of inserts 14 and 15, is assured by connecting a shaft 17 to each backing roll and driving it from its outer end by a gear 18 meshing with one of the gears 7 on the drums. If the velocity of the drums is varied during each revolution by mechanism 4 (Fig. 3) the velocity of the rolls is varied in synchronism therewith. Of course, it is not necessary in this embodiment for the hardened inserts to project from the rolls and drums.

On the other hand, acceleration and deceleration of the rolls can be avoided, as shown in Fig. 3, by driving them at a uniform speed through shafts 21 carrying gears 22 on their outer ends. These gears are journaled in a gear case 23 through which drive shaft 5 extends. Rigidly mounted on the drive shaft is a gear 24 that drives the lower pair of gears 22 at a uniform speed, and that also drives an idler gear 25 journaled in the gear case where it meshes with the upper pair of gears 22. As the drums may be rotating at a higher speed than the backing rolls at the time that the shear blades pass the rolls, it may be found desirable to provide the rolls with wider blade-receiving recesses than in the first embodiment. Hardened inserts 14 and 15 (Fig. 2) are of especial importance in the embodiment of Fig. 3 in which the drums and backing rolls rotate at different speeds during at least part of every revolution. This would cause slippage and wear between them, but the projecting hardened inserts reduce this to a minimum, or eliminate it entirely if the rolls and drums are rotating at the same speeds during the cut.

According to the provisions of the patent statutes, I have explained the principle and construction of my invention and have illustrated and described what I now consider to represent its best embodiment. However, I desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

I claim:

1. A flying shear comprising a pair of rotatably mounted blade carriers between which strip material is adapted to pass, a pair of shear blades mounted on the rotating carriers for periodically severing said strip, and means for backing up said carriers against deflection at the time of shearing.

2. A flying shear comprising a pair of rotatably mounted superimposed blade carriers between which strip material is adapted to pass, a pair of shear blades mounted on the rotating carriers for periodically severing said strip, and backing rolls for supporting said carriers against bending at the time of shearing.

3. A flying shear comprising a pair of rotatably mounted superimposed drums between which strip material is adapted to pass, a pair of shear blades carried by the rotating drums for periodically severing said strip, and a pair of backing rolls engaging each drum at circumferentially spaced points on the drum at the time of shearing.

4. A flying shear comprising a pair of rotatably mounted superimposed blade carriers between which strip material is adapted to pass, a pair of shear blades carried by the rotating carriers for periodically severing said strip, backing rolls engaging said carriers at the time of shearing, each of said rolls being provided with a recess extending longitudinally across its face for receiving the shear blade attached to the adjoining carrier as the blade is carried past the roll, and means synchronizing the rotation of the carriers and rolls so that said recesses always receive said blades while the blades are passing the rolls.

5. A flying shear comprising a pair of rotatably mounted superimposed drums between which strip material is adapted to pass, a pair of shear blades carried by the rotating drums for periodically severing said strip, backing rolls for said drums for supporting them against bending at the time of shearing, and hardened contact members connected to said rolls and drums in such positions that they engage each other at the time of shearing and transmit the shearing impact from the drums to the rolls.

6. A flying shear comprising a pair of rotatably mounted superimposed drums between which strip material is adapted to pass, a pair of shear blades carried by the rotating drums for periodically severing said strip, backing rolls for said drums for supporting them against bending at the time of shearing, and hardened contact members connected to said rolls and drums in such positions that they engage each other at the time of shearing and transmit the shearing impact from the drums to the rolls, the faces of said rolls and drums being out of contact with one another.

7. A flying shear comprising a pair of rotatably mounted superimposed drums between which strip material is adapted to pass, a pair of shear blades carried by the rotating drums for periodically severing said strip, backing rolls for said drums for supporting them against bending at the time of shearing, and hardened contact members connected to said rolls and drums in such positions that they engage each other at the time of shearing and transmit the shearing impact from the drums to the rolls, the hardened members of said rolls projecting from the faces thereof whereby those faces are spaced from the drum faces.

8. A flying shear comprising a pair of rotatably mounted superimposed blade carriers between which strip material is adapted to pass continuously, a pair of shear blades mounted on the rotating carriers for periodically severing said strip, means for driving said carriers at velocities varying during each revolution, backing rolls for said carriers on the sides opposite to the strip, and means for driving said rolls at a uniform speed.

9. A flying shear comprising a pair of rotat-

ably mounted superimposed blade carriers between which strip material is adapted to pass continuously, a pair of shear blades carried by the rotating carriers for periodically severing said strip, means for driving said carriers at velocities varying during each revolution, backing rolls for said carriers on the sides opposite to the strip, and means for driving said rolls at the same varying velocities as the blade carriers.

10. A flying shear comprising a pair of rotatably mounted superimposed blade carriers between which strip material is adapted to pass continuously, a pair of shear blades carried by the rotating carriers for periodically severing said strip, means for driving said carriers at velocities varying during each revolution, backing rolls for said carriers on the sides opposite to the strip, and means gearing the rolls directly to the carriers so that the rolls are driven by the blade carriers.

11. A flying shear comprising a pair of rotatably-mounted superimposed blade carriers between which strip material is adapted to pass, a plurality of cooperating shear blades carried by the rotating carriers for periodically severing said strip, backing rolls engaging said carriers, each of said rolls being provided with a plurality of recesses extending longitudinally across its face for receiving the shear blades attached to the adjoining carrier as the blades are carried past the roll, and means synchronizing the rotation of the carriers and rolls so that said recesses always receive said blades while the blades are passing the rolls.

12. A flying shear comprising a pair of rotatably-mounted superimposed drums between which strip material is adapted to pass, a pair of shear blades carried by the rotating drums for periodically severing said strip, a pair of backing rolls engaging each drum at circumferentially-spaced points and each of said rolls being provided with a recess extending longitudinally across its face for receiving the shear blade attached to the adjoining carrier as the blade is carried past the roll.

HOWARD H. TALBOT.