No. 877,038. PATENTED JAN. 21, 1908.

C. A. BERTSCH.

BENDING ROLLS.

APPLICATION FILED JUNE 22, 1907.

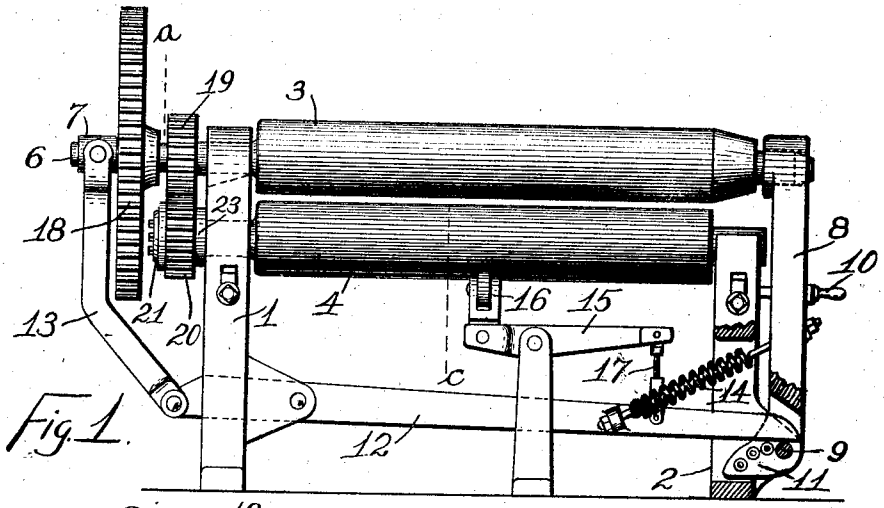


Fig. 1.

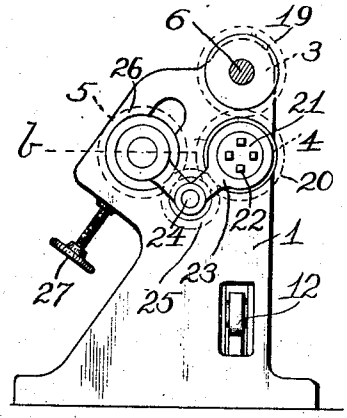


Fig. 2.

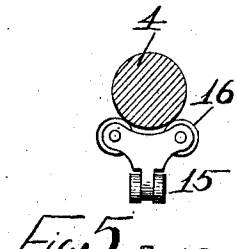


Fig. 5.

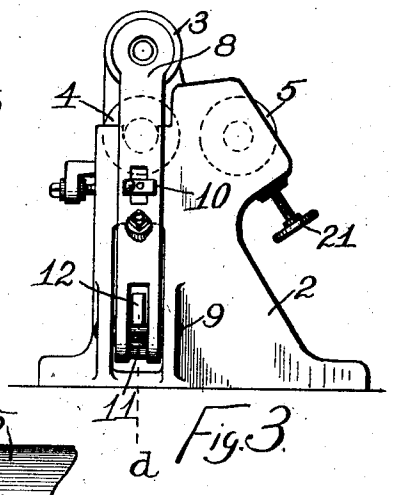


Fig. 3.

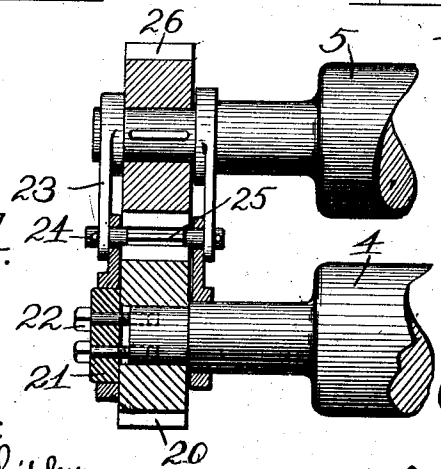


Fig. 4.

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BENDING-ROLLS.

No. 877,038. Specification of Letters Patent. Patented Jan. 21, 1908.

Application filed June 22, 1907. Serial No. 380,267.

To all whom it may concern:

Be it known that I, CHARLES A. BERTSCH, a citizen of the United States, residing at Cambridge City, Wayne county, Indiana, have invented certain new and useful Improvements in Bending-Rolls, of which the following is a specification.

My improved rolls will be readily understood from the following description taken in connection with the accompanying drawing in which:—

Figure 1 is a front elevation, part vertical section, in the plane of line *d* of Fig. 3: Fig. 2 an elevation of the head end of the machine, part section in the plane of line *a* of Fig. 1: Fig. 3 an elevation of the tail end of the machine: Fig. 4 a plan of the tail end of the bending roll and one pinching roll in the plane of line *b* of Fig. 2: and Fig. 5 a vertical transverse section in the plane of line *c* of Fig. 1.

In the drawing:—1, indicates the head housing: 2, the tail housing: 3, the top pinching roll: 4, the bottom pinching roll: 5, the bending roll: 6, the extension shaft of the top pinching roll: 7, the outboard of the extension shaft: 8, the buckle-bearing for the tail end of the top pinching roll: 9, the pivot at the lower end of the buckle-bearing: and 10, the latch for holding the buckle-bearing to normal position. All of the parts thus far referred to are of ordinary construction and arrangement and subject to the usual modifications.

Proceeding with the drawing:—11, indicates the toe of the buckle-bearing, the same forming an extension generally inward from the pivot of the buckle-bearing and carrying a series of rollers with their axes parallel with the axis of the pivot of the buckle-bearing, this series of rollers being arranged as a curve forming in effect a roller cam increasing in distance outward from the pivot of the buckle-bearing: 12, a heavy lever pivoted to the head housing and having its long arm in position to be engaged by the rollers of the buckle-bearing toe when the buckle-bearing is turned downward: 13, a link connecting the short arm of lever 12 with the outboard bearing of the extension shaft: 14, a spring acting tensionally between the buckle-bearing and lever 12 in such manner as to yieldingly resist the outward swinging of the buckle-bearing: 15, an anti-friction lever lying below and parallel with the lower pinching roll: 16, a saddle provided with two rollers and carried by the short arm of lever 15, this saddle engaging under the lower pinching roll at about its mid-length: 17, a link, of adjustable length, connecting the long arm of lever 12 with the long arm of lever 15: 18, the driving gear on the extension shaft of the top pinching roll to receive power for driving the machine in the usual manner: 19, a pinion fast on the top pinching roll: 20, a pinion loose on the lower pinching roll: 21, a friction clamp in the form of a disk coming against the outer face of pinion 20 and serving to frictionally clamp the pinion to its roll: 22, screws engaging clamp 21 and the lower pinching roll and serving in tightening the clamp: 23, two pairs of links, the outer ends of one pair being pivoted to the bending roll and the outer ends of the other pair being pivoted to the lower pinching roll, the two links of each pair straddling the pinion of the appropriate roll: 24, a journal-pin pivotally uniting the inner ends of the four links: 25, an intermediate pinion carried by this journal-pin and engaging pinion 20: 26, a pinion fast on the bending roll and also engaging the intermediate pinion 25: and 27, the adjusting screws for the bending roll.

When the parts are in normal position the saddle 16 gives support to the central portion of the lower pinching roll and serves in lessening deflection of that roll under the strains of heavy work, and when the rolls are of great length the saddle, by reason of its upward pressure, may normally produce some degree of upward deflection for the lower pinching roll, giving to the roll a slight degree of camber to provide for downward deflection under strains of work. When the rolls are to be opened, in order to remove a roll sheet, the buckle-bearing is to be unlatched and turned down as usual, and in thus lowering the buckle-bearing spring 14, which need not have any great amount of initial tension, aids in counterbalancing the weight of the heavy buckle-bearing. As the buckle-bearing is lowered, the rollers at its toe act cam-like under the outer end of lever 12 and, through link 13, pull down on the outer end of the extension shaft and, acting lever-like on the upper pinching roll, raises that roll some so as to open the gap between the two pinching rolls, or at least compensate for the sagging of the unsupported outer end of the upper pinching roll. At the same time the saddle becomes lowered so as to remove any upward deflection which it may have imposed upon the

lower pinching roll. By adjusting the link 17 the saddle may be adjusted to give the desired degree of upward pressure upon the lower pinching roll when the parts are in working position.

When the sheet is being rolled to a curve, its lower surface travels faster than its inner surface, and the frictional clamping of the pinion 20 to the lower pinching roll permits of a differential travel of the surfaces of the upper and lower pinching rolls. It is to be understood, of course, that pinions 19 and 20 will be proportioned according to the diameters of the upper and lower pinching rolls so that the two rolls will normally have the same rate of surface travel. The bending roll is also geared so as to be driven by power instead of depending for its rotation upon the friction of the sheet being bent, it being found that a non-driven bending roll is sometimes liable to remain stationary while the sheet is passing it, thus resulting in irregular wear of the bending roll, as well as imposing extraordinary sheet-feeding duty upon the pinching rolls. The two pinching rolls are subject to but small adjustment for distance, between their centers, but the bending roll is subject to a great range of adjustment. This is provided for by the expansion gearing illustrated, the intermediate pinion 25 being held in engagement with the pinions of the lower pinching roll and the bending roll regardless of the adjustment of the latter.

As above stated, if the bending roll be a mere idler, turning by the friction of the passing sheet, the friction may not be sufficient to turn the roll, the result being the wearing of flat places on the roll, and, as the bending roll is without energy, all of the feeding duty must be assumed by the pinching rolls. But, further than this, I have ascertained by practical experience, that in bending sheets to particularly small circles it is preferable to do the bending at one pass of the sheet rather than at several passes. The effect of the bending by the former method I find to be advantageous to the resulting molecular structure of the bent metal. The energizing of the three rolls bymeans of connecting gearing so that one roll acts aggressively on the inner short side of the curving sheet while two rolls act aggressively on its outer side, renders quite feasible the scheme of bending sheets to small circles at one pass where it could not otherwise be done.

Numerous modifications will suggest themselves to the skilled constructor and I have simply set forth the best form in which I at present contemplate applying that invention.

I claim:—

1. Bending rolls comprising housings, a top pinching roll, a bottom pinching roll, a head extension shaft for the top pinching roll, an outboard bearing on the extension shaft, a lever pivoted below the rolls, a link connecting the short arm of the lever with the outboard bearing, a pivoted buckle-bearing for the tail end of the top pinching roll, a toe carried by the buckle-bearing to engage the long arm of said lever, and a spring acting tensionally between the lever and buckle-bearing, combined substantially as set forth.

2. Bending rolls comprising housings, a top pinching roll, a bottom pinching roll, a head extension shaft for the top pinching roll, an outboard bearing on the extension shaft, a lever pivoted below the rolls, a link connecting the short arm of the lever with the outboard bearing, a pivoted buckle-bearing for the tail end of the top pinching roll, a curved series of rollers carried by the buckle-bearing to engage the long arm of said lever, and a spring acting tensionally between the lever and buckle-bearing, combined substantially as set forth.

3. Bending rolls comprising housings, a top pinching roll, a bottom pinching roll, a head extension shaft for the top pinching roll, an outboard bearing on the extension shaft, a lever pivoted below the rolls, a link connecting the short arm of the lever with the outboard bearing, a pivoted buckle-bearing for the tail end of the top pinching roll, a toe carried by the buckle-bearing to engage the long arm of said lever, a saddle disposed under the lower pinching roll at substantially its center of length, and connections between said lever and saddle for lowering the saddle when the buckle-bearing is disengaged from the top pinching roll.

4. Bending rolls comprising housings, a top pinching roll, a bottom pinching roll, a head extension shaft for the top pinching roll, an outboard bearing on the extension shaft, a lever pivoted below the rolls, a link connecting the short arm of the lever with the outboard bearing, a pivoted buckle-bearing for the tail end of the top pinching roll, a toe carried by the buckle-bearing to engage the long arm of said lever, a saddle disposed under substantially the mid-length of the lower pinching-roll and provided with rollers engaging that pinching roll, an anti-deflection lever pivoted below the rolls and carrying said saddle at one of its ends, and an adjustable connection between the opposite end of the anti-deflection lever and said first mentioned lever, combined substantially as set forth.

5. Bending roll comprising housings, a top pinching roll, a bottom pinching roll, means whereby power may be applied to one of said rolls, a pinion fast on one of said rolls, a pinion loose on the other roll and engaging the first mentioned pinion, and means for frictionally binding the loose pinion to its roll, combined substantially as set forth.

6. Bending rolls comprising housings, a first pinching roll, a second pinching roll, a bending roll, a first pinion on the first pinch-

ing roll a second pinion on the second pinching roll and engaging the first pinion, a third pinion on the bending roll, a link pivoted on the bending roll at each side of the third pinion, a link pivoted on the second pinching roll at each side of the second pinion, a journal-pin pivoted in the free ends of the four links, and a fourth pinion carried by said journal-pin and engaging the first and second pinions, combined substantially as set forth.

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