United States Patent

Wagner

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[54] ADJUSTABLE ROLL DRIVE

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[52] **U.S. Cl.**.....**74/397,** 74/409, 226/177, 226/187

[51] **Int. Cl.**.....**F16h 35/06,** F16h 55/18, B65h 17/22

[58] **Field of Search**.....74/397, 409; 226/186, 187, 226/176, 177

[56] **References Cited**

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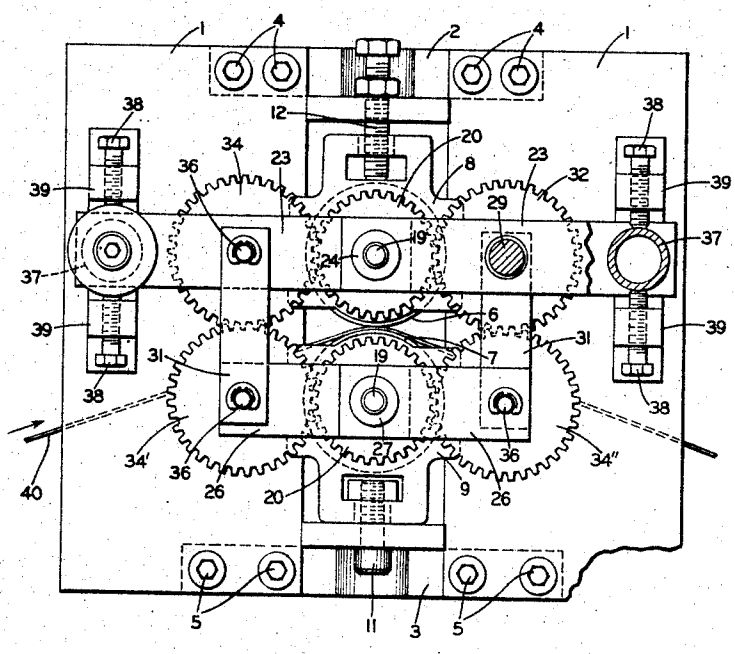
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[57] **ABSTRACT**

An adjustable drive for a pair of rolls which allows for adjustment of the rolls relative to each other and for backlash take-up in the train of gears driving the rolls. A shaft extension on each roll has a roll gear fixed thereon. The shaft extensions of the rolls turn in bushings. The bushings of one shaft extension are fitted in the overlapped ends of adjusting forks and the bushings of the other shaft extension are fitted in the overlapped ends of horizontal links. Three alignment idler gears and a drive gear mesh with the roll gears. The drive gear and the adjacent alignment gear mesh with each other, and each pair of said gears is connected with vertical links. The drive gear and one of the alignment gears are carried by said forks and the other two alignment gears are carried by said horizontal links. The upper roll is adjustable relative to the lower roll and the outer ends of the forks are adjustable vertically by fork adjusting screws.

10 Claims, 6 Drawing Figures



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SHEET 1 OF 2

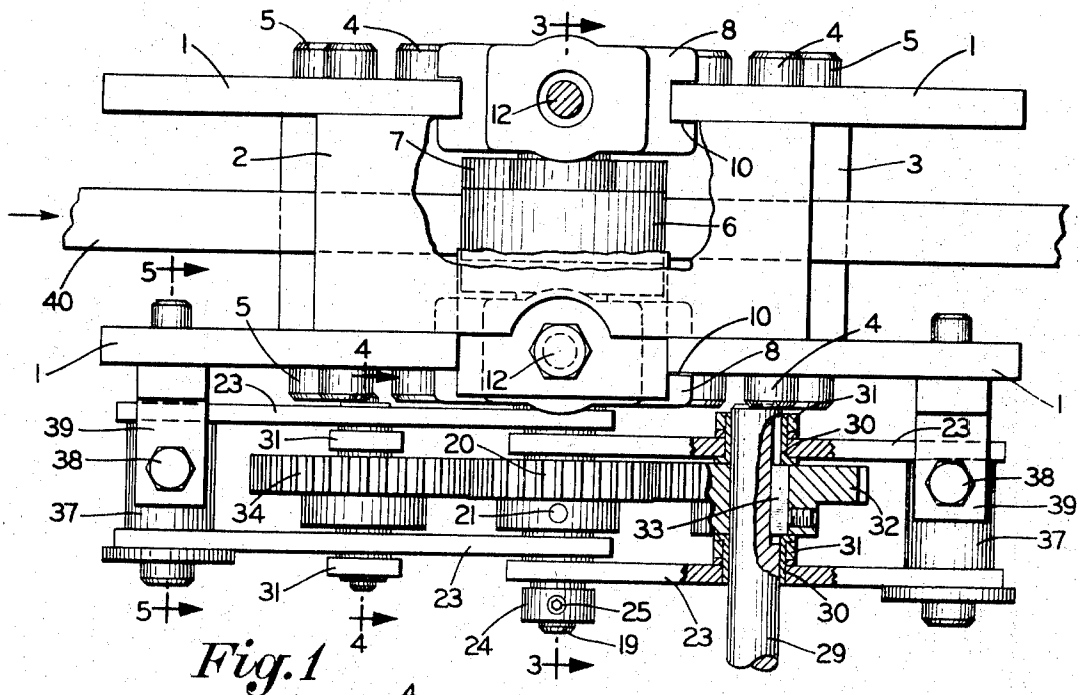


Fig. 1

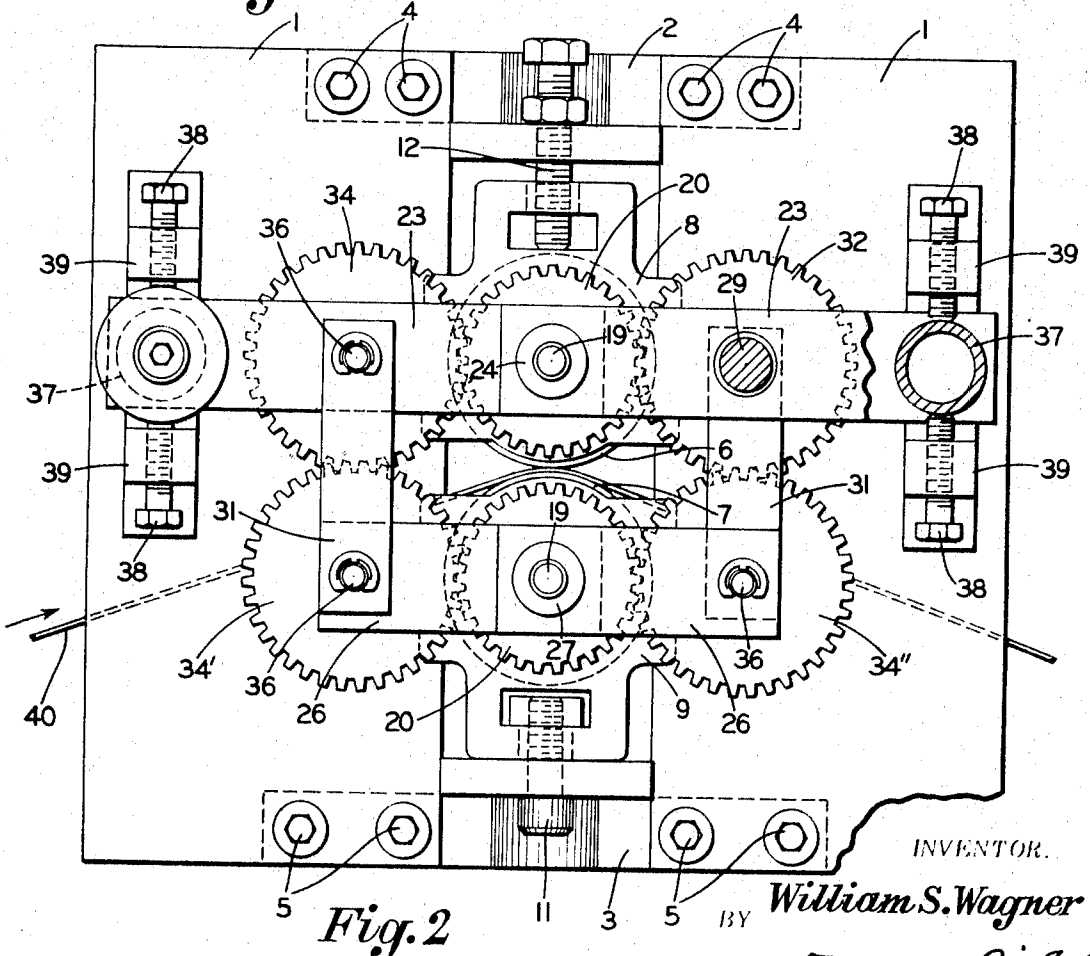


Fig. 2

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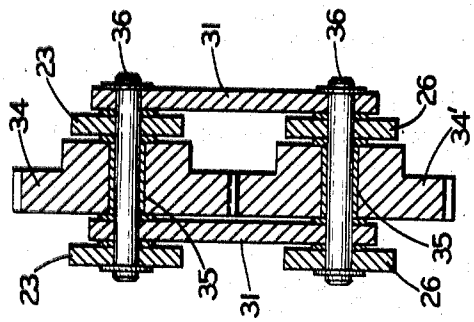


Fig. 4

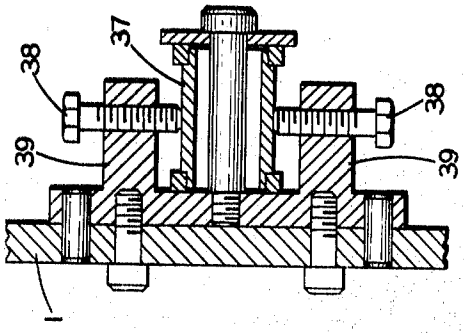


Fig. 5

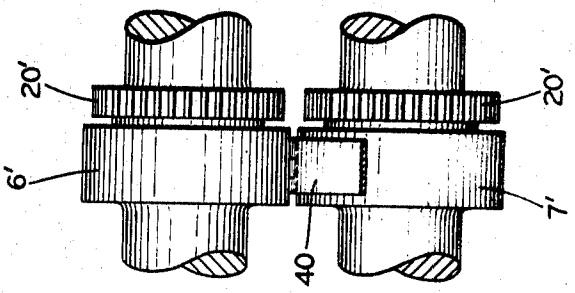


Fig. 6

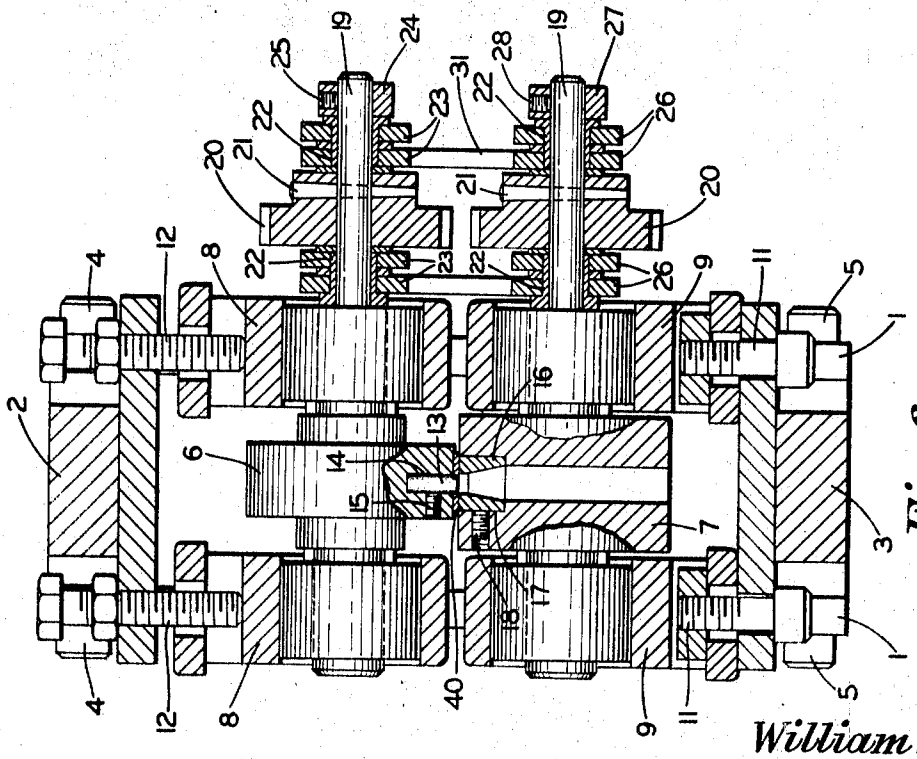


Fig. 3

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ADJUSTABLE ROLL DRIVE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates to an adjustable roll drive in which a pair of rolls is driven by a chain of gears, and allows roll adjustment and backlash take-up in the gears.

2. Description of the Prior Art

To the best of applicant's knowledge, there is no prior roll drive operating upon the same principle as the present invention.

SUMMARY OF THE INVENTION

In general terms the invention may be briefly described as comprising a frame formed of spaced pairs of side plates connected at their upper and lower edges to top and bottom plates. The lower roll is journaled in bearings connected to the bottom plate by bolts.

The upper roll is journalled in bearings which are adjustable relative to the lower roll by means of adjusting screws located through the upper plate to admit different thicknesses of stock between the rolls.

The upper roll may carry a punch cooperating with a die in the lower roll. Each roll has a shaft extension upon which is rigidly affixed a roll gear.

The shaft extension of the upper roll turns in bushings which are fitted in the overlapped end of two generally horizontally disposed adjusting forks. The shaft extension of the lower roll is fitted in the overlapped ends of generally horizontally disposed links.

A drive shaft is journaled in bushings, through one fork. A drive gear is keyed upon the drive shaft and meshes with one side of the upper roll gear.

An alignment idler gear meshes with the drive gear and with the adjacent side of the lower roll gear. Alignment idler gears mesh with the opposite sides of the roll gears and with each other.

The alignment gears have bushings pressed into their hubs and run on linkage pins located through the adjusting forks, or the horizontal links as the case may be, and through two pairs of vertical links which together with the horizontal links hold the alignment gears in engagement.

The outer ends of the forks are held between opposed adjusting screws located through brackets upon the adjacent side of the frame. By adjusting both pairs of fork adjusting screws in the same direction, the backlash will be taken out of the gear chain. The two rolls will then have a definite angular relationship with each other, which relationship may be adjusted by said fork adjusting screws.

By adjusting one fork up and the other fork down, both rolls will be rotated in the same direction. In this rotation the roll contact point or punch on the upper roll will move in one direction and the roll contact point or die on the lower roll will move in the other direction, changing the angular alignment of the rolls.

A primary object of the invention is to provide an adjustable roll drive for a pair of rolls which allows both roll adjustment and backlash take-up.

Another object of the invention is to provide such an adjustable roll drive in which roll gears are fixed upon shaft extensions on the rolls and mesh with a chain of alignment gears and a drive gear which mesh with each other.

A further object of the invention is to provide an adjustable roll drive of the character referred to in which the drive gear and one of the alignment gears are rotatably carried by a pair of generally horizontal forks, the inner ends of which are pivoted upon the corresponding roll shaft extension and the outer ends of which are adjustable around said pivot by opposed adjusting screws.

A still further object of the invention is to provide such an adjustable roll drive in which the alignment gears and drive gear are held in engagement by two sets of vertical links and two sets of horizontal links which are free to pivot about their own pins and shafts.

The above objects together with others which will be apparent from the drawings and following description, or which may be later referred to, may be attained by constructing the improved adjustable roll drive in the manner hereinafter described in detail and illustrated in the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top plan view of an adjustable roll drive embodying the invention, a portion of the top plate being broken away for the purpose of illustration;

FIG. 2 is a front elevation of the adjustable roll drive;

FIG. 3 is a transverse section through the rolls on the line 3—3, FIG. 1;

FIG. 4 is a transverse section through two meshing alignment gears on the line 4—4, FIG. 1;

FIG. 5 is a transverse section through the fork adjusting means on the line 5—5, FIG. 1; and

FIG. 6 is a fragmentary elevation of the rolls of a modification in which the roll gears are formed integral with the rolls.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Reference is now made to the accompanying drawings in which similar numerals refer to similar parts throughout the several views.

The adjustable roll drive is supported upon a frame comprising two spaced pairs of vertical side plates **1**, and top and bottom plates **2** and **3**, respectively. Bolts or cap screws **4** and **5** connect the top and bottom plates respectively to the side plates.

Upper and lower rolls **6** and **7**, respectively, are journaled in the respective bearings **8** and **9** which are mounted in the frame. Each bearing has vertical grooves **10** in its edges which receive the adjacent edge portions of the vertical frame plates **1**.

The lower bearings **9** are fixed to the bottom plate as by bolts **11** and the upper bearings **8** may be adjusted up and down by screws **12**, to admit different thicknesses of strip stock between the rolls **6** and **7**.

The upper roll **8** may have at least one punch **13** held in a socket **14** by a setscrew **15**. A corresponding die **16** is held in a diametric passage **17** in the lower roll by a setscrew **18**.

Each roll **6** and **7** has a shaft extension **19** on one end, on which is mounted a roll gear **20** rigidly affixed thereto as by a pin **21**.

The shaft extensions **19** turn in bushings **22**. The bushings on the upper shaft extension are fitted in the overlapped end portions of a pair of generally horizontally disposed adjusting forks **23**. A collar **24** is held on the end of the upper roll extension **19** by a setscrew **25** and retains the bushings **22** on said shaft extension.

The bushings **22** on the lower roll extension **19** are fitted in the overlapped ends of the generally horizontally disposed links **26**. The bushings **22** are retained on the lower shaft extension **19** by a collar **27** held on the end portion of the shaft extension by a setscrew **28**.

A drive shaft **29**, driven by any suitable source of power, runs in its own bushings **30**, located through one adjusting fork **23** and the adjacent vertical links **31**. A drive gear **32** is keyed to the drive shaft **29** as indicated at **33** and meshes with one side of the upper roll gear **20**.

One alignment idler gear **34** meshes with the other side of the upper roll gear **20** and with the top of a similar alignment idler gear **34'**.

The alignment idler gear **34'** also meshes with the adjacent side of the lower roll gear **20**. A third alignment idler gear **34''** meshes with the other side of the lower roll gear **20** and with the underside of the drive gear **32**.

The alignment idler gears **34**, **34'** and **34''** have bushings **35** pressed into their hubs to run on linkage pins **36** located through the adjusting forks **23**, or horizontal links **26** and vertical links **31**.

The cylindrical connecting portions 37 at the outer ends of the adjusting forks 23 are held between adjusting screws 38, threaded through brackets 39 mounted upon the outer surfaces of the frame side plates 1 on the front side of the frame.

The adjusting screws 38 adjust the outer ends of the forks 23 up and down while the inner overlapping ends of the forks pivot upon the upper shaft extension 19.

In FIG. 6 is shown a modification of the invention in which the roll gears 20' are formed integrally upon the rolls 6' and 7'.

OPERATION

In the operation of the device, if both pairs of fork adjusting screws 38 are adjusted in the same direction, for instance downward, the backlash will be taken out of the train of gears 20, 32, 34, 34' and 34''. The two rolls 6 and 7 will then have a definite angular relationship with each other.

If the punch 13 does not register with the die 16 so that holes may be punched in the strip 40 thereby, this relationship may be adjusted by the use of the screws 38.

For instance, if these adjusting screws are turned so as to adjust the left fork upward and the right fork downward these movements will rotate both rolls 6 and 7 in the same direction, namely, clockwise.

In this clockwise rotation the roll contact point or punch 13 on the upper roll will move to the left and the roll contact point or die 16 on the lower roll will move to the right thus changing the angular alignment of the rolls.

In the same manner, by adjusting the left fork 23 downward and the right fork 23 upward, these movements will rotate both rolls 6 and 7 in counterclockwise direction. In this counterclockwise rotation, the roll contact point or punch 13 on the upper roll will move to the right and the roll contact point or die 16 on the lower roll will move to the left.

It will thus be seen that with this apparatus the backlash may be taken out of the gear train and the two rolls may be adjusted in proper direction to make the desired or necessary change in the angular alignment of the rolls.

Although the drawings show the drive shaft 29 operatively connected to the gear 32, it should be understood that the drive shaft may be operatively connected to any of the gears 34 or either of the rolls 6 or 7, as the only purpose is to drive the entire gear train.

In the foregoing description certain terms have been used for brevity, clearness and understanding, but no unnecessary limitations are to be implied therefrom beyond the requirements of the prior art, because such terms are used for descriptive purposes herein and are intended to be broadly construed.

Moreover, the embodiment of the improved construction illustrated and described herein is by way of example, and the scope of the present invention is not limited to the exact details of construction.

Having now described the invention or discovery, the construction, the operation, and use of the preferred embodiment thereof, and the advantageous, new and useful results obtained thereby; the new and useful construction, and reasonable mechanical equivalents thereof obvious to those skilled in the art, are set forth in the disclosure.

I claim:

1. An adjustable roll drive for cooperating upper and lower rolls having bearings, said adjustable roll drive including a frame, the roll bearings being located in the frame, shaft extensions upon the rolls, a roll gear fixed upon each shaft extension, a pair of generally horizontally disposed adjusting forks having their overlapping inner ends pivoted upon the upper shaft extension, means for vertically adjusting the outer ends of said adjusting forks, a third gear journaled in one of said adjusting forks and meshing with one side of the upper roll gear, an alignment idler gear rotatably mounted in the other adjusting fork and meshing with the other side of said upper roll gear, alignment idler gears meshing with both sides of the lower roll gear, one of said last named alignment idler gears meshing with the third gear and the other meshing with the first named alignment idler gear, means holding the alignment idler gears in engagement, and means for driving said gears and rolls.

2. An adjustable roll drive as defined in claim 1 in which the upper roll bearings are vertically movable in the frame and the lower roll bearings are fixed in the frame.

3. An adjustable roll drive as defined in claim 1 in which the means for vertically adjusting the outer ends of the adjusting forks comprises adjusting screws mounted in bracket means on said frame.

4. An adjustable roll drive as defined in claim 1 in which the frame comprises spaced pairs of vertical plates, a top plate and a bottom plate.

5. An adjustable roll drive as defined in claim 1 in which the means holding the alignment idler gears in mesh comprises two sets of vertical links and two sets of horizontal links.

6. An adjustable roll drive as defined in claim 5 in which the overlapping inner ends of the horizontal links are pivoted upon the lower shaft extension.

7. An adjustable roll drive as defined in claim 6 in which the alignment idler gears are journalled upon linkage pins in said vertical and horizontal links and said other fork.

8. An adjustable roll drive as defined in claim 1 in which the roll gears are formed integral with the rolls.

9. An adjustable roll drive as defined in claim 1 in which the means for driving said gears and rolls comprises a drive shaft operatively connected to said third gear.

10. An adjustable roll drive as defined in claim 1 in which the means for driving said gears and rolls comprises a drive shaft operatively connected to one of said rolls.

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