Jan. 27, 1959 L. L. HERCIK 2,871,011

SIMULTANEOUSLY ADJUSTABLE PINCH ROLLS FOR FEEDING ENDLESS STRIPS

Filed June 13, 1955 4 Sheets-Sheet 1

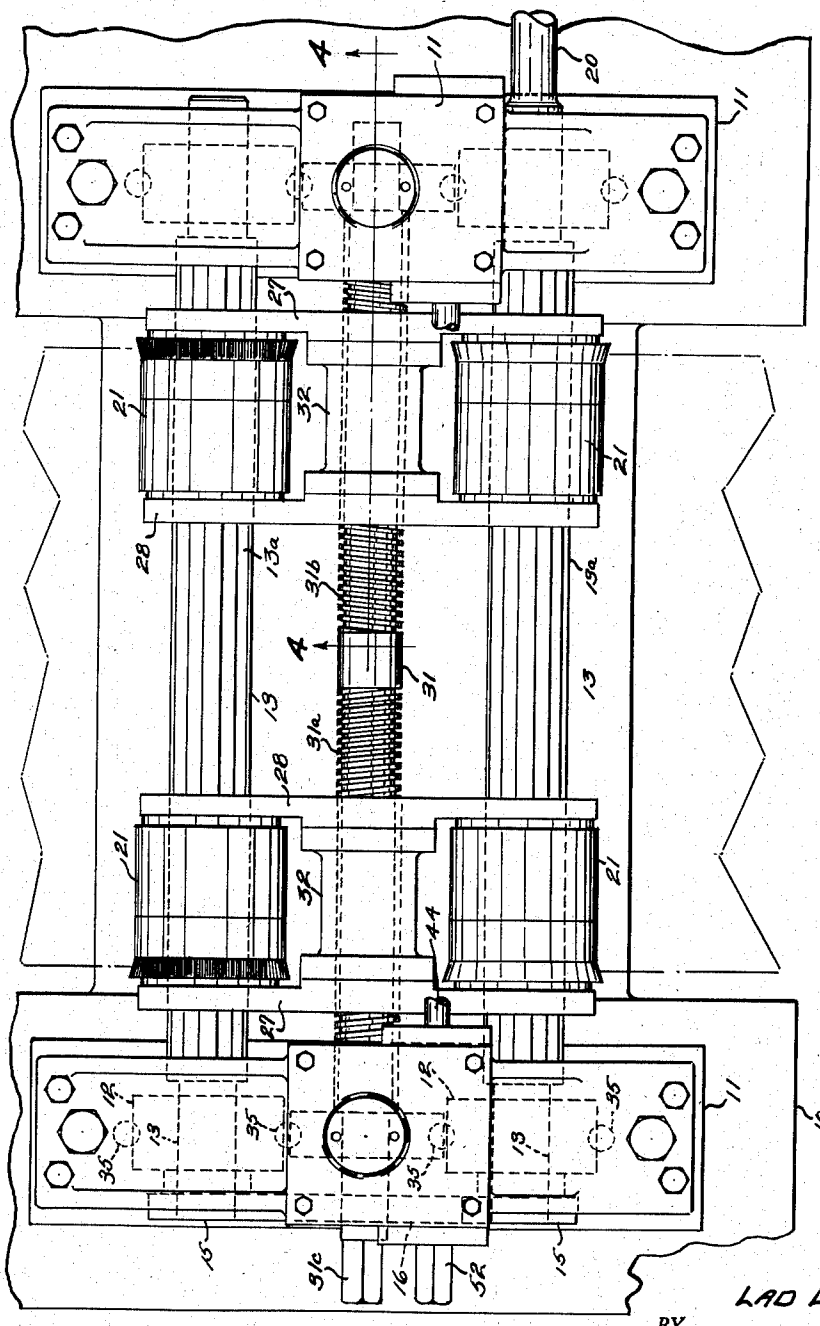

FIG. 1

INVENTOR.
LAO L. HERCIK
BY
Hyde, Meyer, Baldwin & Doran
ATTORNEYS

Jan. 27, 1959 L. L. HERCIK 2,871,011

SIMULTANEOUSLY ADJUSTABLE PINCH ROLLS FOR FEEDING ENDLESS STRIPS

Filed June 13, 1955 4 Sheets-Sheet 2

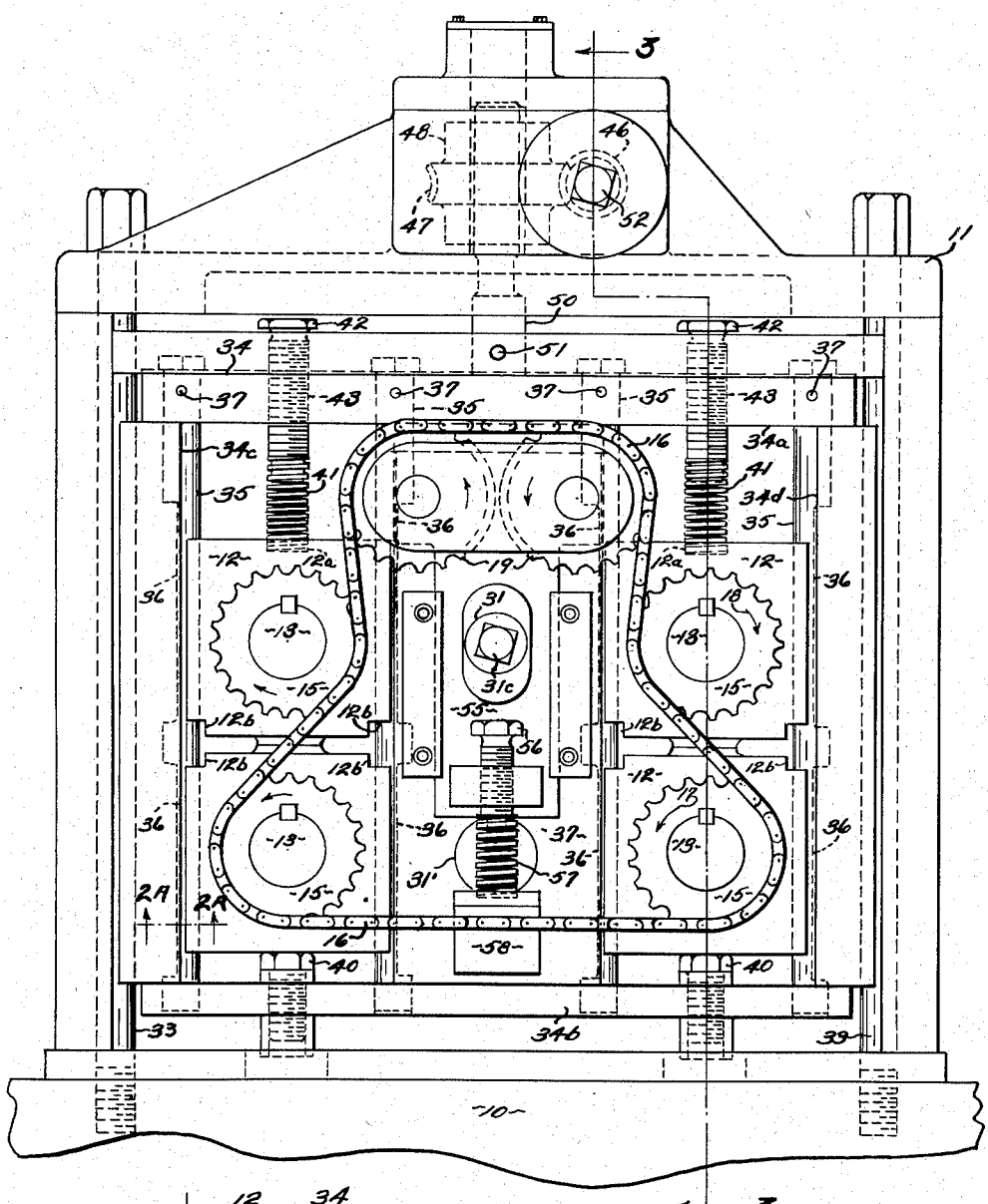

FIG. 2

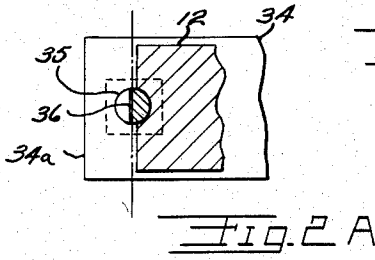

FIG. 2A

INVENTOR.
LAD L. HERCIK
BY
Hyde, Meyer, Baldwin & Doran
ATTORNEYS

Jan. 27, 1959 L. L. HERCIK 2,871,011

SIMULTANEOUSLY ADJUSTABLE PINCH ROLLS FOR FEEDING ENDLESS STRIPS

Filed June 13, 1955 4 Sheets-Sheet 3

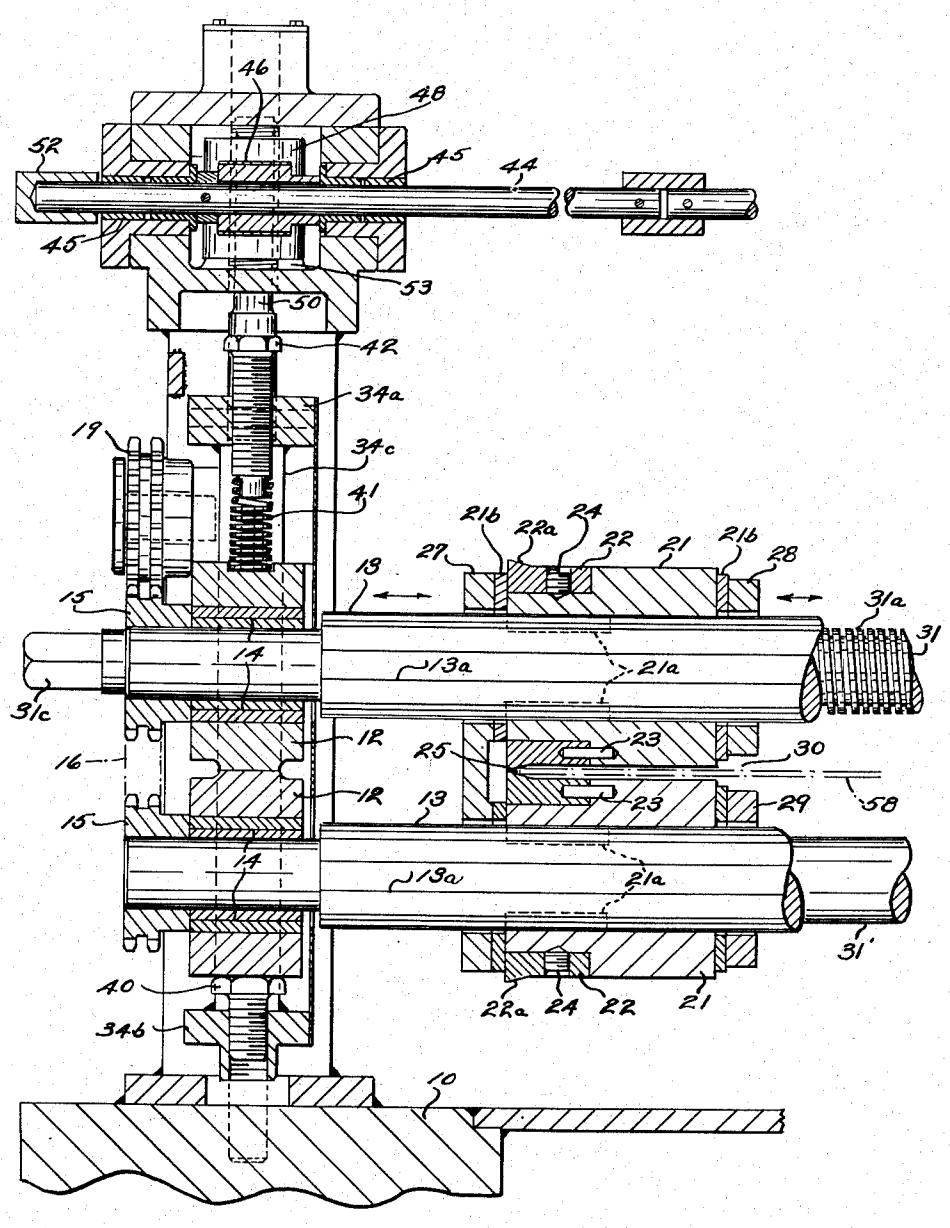

Fig. 8

INVENTOR.
LAO L. HERCIK
BY
Hyde, Myer, Baldwin & Swan
ATTORNEYS

Jan. 27, 1959 L. L. HERCIK 2,871,011

SIMULTANEOUSLY ADJUSTABLE PINCH ROLLS FOR FEEDING ENDLESS STRIPS

Filed June 13, 1955 4 Sheets-Sheet 4

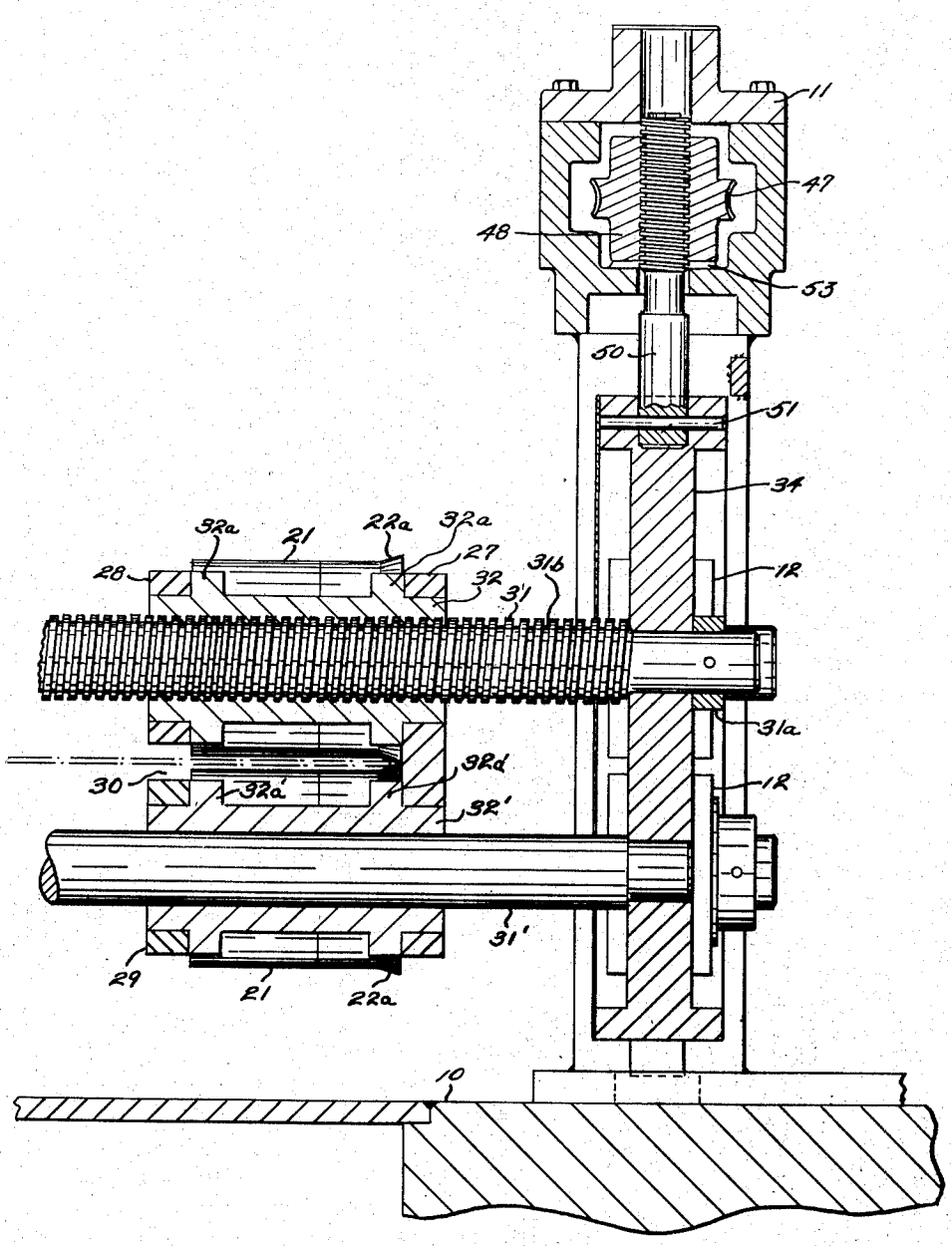

Fig 4

INVENTOR.
LAD L. HERCIK
BY
Hyde, Meyer, Baldwin & Doran
ATTORNEYS

United States Patent Office 2,871,011 Patented Jan. 27, 1959

2,871,011

SIMULTANEOUSLY ADJUSTABLE PINCH ROLLS FOR FEEDING ENDLESS STRIPS

Lad L. Hercik, Lakewood, Ohio

Application June 13, 1955, Serial No. 515,034

13 Claims. (Cl. 271—2.3)

This invention relates to machines for feeding endless strip material and more particularly to a machine employing novel simultaneously adjustable pinch rolls for this purpose.

An object of this invention is to provide improved apparatus of this character which includes a plurality of pinch rolls having frusto-conical strip-engaging rim portions and adapted for simultaneous lateral adjustment whereby the pinch rolls may be moved laterally toward and away from each other to engage the opposite edges of an endless strip.

Another object of this invention is to provide an improved apparatus of this character having a plurality of opposed pairs of pinch rolls, each roll having a cylindrical portion and a frusto-conical rim on said cylindrical portion which cooperates with the frusto-conical rim of the corresponding associated pinch roll to engage and advance an endless strip.

A further object of this invention is to provide an improved apparatus of this character wherein a plurality of cooperating pairs of edge-engaging members having frusto-conical portions are arranged to operate on the opposite edges of an endless strip by moving the edge-engaging members simultaneously laterally toward each other until the outermost edges of the strip are firmly gripped between the frusto-conical portions.

Another object of the present invention is to provide a machine for feeding endless strip characterized by its structural simplicity, the ease of assembly of its parts, its strong and sturdy nature and its low manufacturing cost. Other features of this invention reside in the arrangement and design of the parts for carrying out their appropriate functions.

Other objects and advantages of this invention will be apparent from the accompanying drawings and the following description and the essential features will be set forth in the appended claims.

In the drawings,

Fig. 1 is a top plan view of an apparatus employing my novel simultaneously adjustable pinch rolls.

Fig. 2 is an end elevational view of the device of Fig. 1 taken at the left-hand end thereof and showing the details of construction of the driving and adjusting means used in connection with the pinch rolls.

Fig. 2*a* is a cross sectional view taken along the plane of line 2*a*—2*a* of Fig. 2.

Fig. 3 is a vertical sectional view taken along the plane of line 3—3 of Fig. 2.

Fig. 4 is a vertical sectional view taken along the plane of line 4—4 of Fig. 1.

The present invention is directed to the feeding of endless strips for grinding and polishing purposes and particularly to a situation wherein the surface of the strip (other than at the very edge) must be freely suspended without touching any other surface. This type of handling is normally required of zinc plates which are used for etched printing plates and other sheets which must be

given a very fine polish approaching that of a mirror. This procedure also applies to laminated sheets which are steel on one side and white metal on the other side and used in certain types of bearings wherein the white metal portion must not be allowed to touch any surface. The present invention is particularly useful in handling such endless strips since only the extreme outer edges of the strip come into contact with the strip feeding means. The feeding means herein employed take the form of pinch rolls which are moved simultaneously laterally toward each other until they just grip the extreme edges of the strips to be fed.

As seen in Figs. 1 and 2 a base frame **10** supports a pair of spaced standards **11** in which are mounted suitable bearing boxes **12**. The bearing boxes **12** support pairs of front and rear splined shafts **13**, "front" meaning to the right and "rear" to the left, as viewed in Fig. 2. The splined shafts **13** extend transversely between the standards **11** and have their opposite ends journalled for rotation within suitable bearings **14** contained in the bearing boxes **12**. The splined shafts **13** are all disposed parallel to one another and the individual shafts of each of the front and rear pairs respectively are positioned one vertically above the other. Upper and lower shafts of the front and rear pairs of shafts are generally in horizontal alignment with one another. For the purpose of rotating the shafts **13**, one end of each shaft, preferably the left end, as viewed in Figs. 1 and 3, is provided with a sprocket driving gear **15**. An endless sprocket chain **16** engages each of the driving gears **15** and simultaneously drives each shaft **13** in the proper direction. The endless sprocket chain **16** is so interconnected between the various shafts and driving gears as to drive the shafts of each vertical pair in opposite directions. For example, as viewed in Fig. 2, the lower shafts are driven in a counterclockwise direction while the upper shafts are driven in a clockwise direction as indicated by the arrows **17** and **18** respectively. As seen in Fig. 2, a pair of idler sprockets **19** are provided to take up the slack in the endless sprocket chain **16**. One of the shafts **13** has an extended portion **20** at its right end, as seen in Fig. 1, which is connected to suitable power means not herein shown. Through this particular shaft the power means transmits a driving force to each of the other shafts by means of the endless sprocket chain **16** and sprocket gears **15**.

Each shaft **13** is splined with longitudinally extending splined grooves **13***a*. A pair of opposed generally cylindrical pinch rolls **21** are mounted in spaced relationship on each shaft and have splines **21***a* in engagement with the grooves **13***a*. The pinch rolls **21**, therefore, must rotate with the shaft **13**, but the rolls may slide axially along the shaft in driving engagement with the grooves **13***a* thereof. The spaced pinch rolls **21** provided on each shaft **13** cooperate with the pinch rolls similarly positioned on the shaft vertically above or below to form opposed front and rear sets of pinch rolls, one set of two being shown in Fig. 4. The individual pinch rolls **21** are generally cylindrical in configuration. The main cylindrical body portion of each roll is provided with a cutout portion at its outer end to receive a sleeve **22**. The sleeve **22** is inserted into this cutout portion and is prevented from rotating relative to the main cylindrical body portion of the pinch roll by means of pins **23** and set screw **24**, as seen in Fig. 3. The sleeve **22** is provided with a frusto-conical rim or flange **22***a* at its laterally outermost portion. The frusto-conical rim **22***a* may be plain or provided with suitable serrations depending upon the type of sheet material being used. The radially outermost edge of the frusto-conical rim **22***a* is in light contact with the frusto-conical rim of its associated pair, as seen in Fig. 3, thus

providing a V-shaped space **25** opening axially inwardly between each vertically disposed pair of adjacent rolls. This space is used to accommodate endless strip material by lightly wedging the opposed edges of the strip within the V-shaped space, as seen in Fig. 3.

For the purpose of properly aligning each of the opposed sets of pinch rolls with the edges of the endless strip, a plurality of support plates are provided at both ends of the pinch rolls and extend perpendicularly to the longitudinal axis of the shafts **13**. As seen in Figs. 1, 2 and 3, a pair of suitable support plates 27 are provided at the laterally outermost ends of the pinch rolls. Coplanar vertically spaced support plates **28** and **29** are provided at the inner ends of the pinch rolls, as best seen in Figs. 3 and 4. Two of these plates are required at the innermost end of each set of opposed pinch rolls in order to provide a space **30** therebetween to accommodate the endless strip of material, as seen in Figs. 3 and 4. Each of the pinch rolls **21** has its end portions suitably supported by thrust bearings **21***b* for free rotation between the support plates, as shown in Fig. 4.

Means are provided for laterally moving the opposed pairs of pinch rolls contained within the support plates laterally toward and away from one another along the length of splined shafts **13**. Such means include an adjusting screw shaft **31** rotatably supported in the spaced standards **11** and held in place by collar **31***a*. The screw shaft **31** is positioned between the front and rear pairs of pinch rolls and lies in substantially the same plane as the uppermost splined shafts **13**. Spaced nuts **32** having shoulders **32***a* engaging between plates **27** and **28** are threaded to receive the screw shaft **31**, as seen in Figs. 1 and 4. Other collars **32'** have shoulders **32***a'* engaging between plates **27** and **29** as seen in Fig. 4 to moveall rolls in unison. These collars **32'** slide on cylindrical shaft **31'**, directly below and parallel to shaft **31**, and held in standards **11**. Opposite halves of the screw shaft **31** are provided with opposed right and left-hand threads **31***a* and **31***b*, as seen in Fig. 1. The end of the shaft is provided with a tool receiving portion **31***c*, see Fig. 3, for the purpose of rotating the shaft. The shaft is adapted to turn within its end bearings contained in the spaced stadnards **11** so that the screw shaft is maintained against axial displacement. Thus, it will be seen that when the screw shaft **31** is turned in one direction, the opposed sets of pinch rolls are moved simultaneously toward or away from each other (depending upon the direction in which the screw shaft is turned) by means of the threaded engagement between the screw shaft **31** and the nuts **32**. The effect of this construction is to enable positioning the opposed sets of pinch rolls in any desired spaced apart relationship to accommodate any width of endless strip.

Means are also provided for the purpose of vertically adjusting the front and rear pairs of pinch rolls. For this purpose I provide a substantially square cage or frame member **34** having top and bottom members **34***a* and **34***b* respectively and side members **34***c* and **34***d* respectively, as seen in Fig. 2. The side members **34***c* and **34***d* are provided with suitable grooves which receive guideways **33** provided on the standards **11** and thereby permit a limited amount of vertical movement for the cage member. The bearing boxes **12** of each pair of front and rear pinch rolls are supported within the cage member **34** in such a manner as to permit a limited degree of vertical movement within the cage member. In Fig. 2, it is seen that the front and rear pairs of bearing boxes are supported at their side edges by four, spaced, vertically extending guide pins **35** provided on the cage member **34**. Each guide pin **35** is provided with spaced half round sections **36** intermediate its distal ends. The end and central portions of each guide pin are annular in cross section. The annular end portions are jouralled for rotation in the top and bottom cage members **34***a* and **34***b*. The upper end of each guide pin is provided with a square wrench receiving head, for purposes of manually rotating the pin. As seen in Figs. 2 and 2A the half round sections **36** of each guide pin are in engagement with suitable grooves provided in the side edges of the associated bearing boxes **12**. The laterally outermost edges of the bearing boxes **12** are so constructed as to terminate short of the center lines of the associated guide pins. Each bearing box is also provided with suitable corner cut-outs **12***b* to clear the annular central portion of each guide pin. By rotating the guide pins through 180° from their position shown in Figs. 2 and 2A the side edges of bearing boxes 12 are completely released and then permit the boxes **12** to be removed endwise. Aligned apertures are provided in the upper member **34***a* and each guide pin **35** to receive a suitable pin **37** which locks the guide pin against rotation during use. As seen in Fig. 3, the upper and lower bearing boxes rest one upon the other in such a manner that the radially outermost surface of the raised frusto-conical rim **22***a* of each pair of pinch rolls is so positioned as to lightly touch that of its associated pair. The lower surface of each of the bottom bearing boxes rests upon the head of an adjustable bolt **40** which threadedly engages the lower member **34***b* of the cage member **34**. The upper surface of the top bearing boxes are provided with a suitable bore **12***a* to receive a Danly coil spring **41** which is pressure loaded by means of a bolt **42** which threadedly engages the upper member **34***a* of the cage member **34** at **43**. By spring loading the top bearing boxes, the pinch rollers are protected against a sudden change in the thickness of the endless strip passing between the pinch rollers **21**. Through this construction the rollers may be moved apart slightly to accommodate for any variation in thickness in the endless strip, should this occur without injuring the pinch rolls or the strip. The degree of spring loading is controlled by adjustable bolts **42** and **40**. This novel construction also permits vertical adjustment of the front and rear pairs of bearing boxes and their associated pinch rolls, relative to one another.

For the purpose of raising or lowering the front and rear pairs of pinch rollers simultaneously, the upper ends of the spaced standards **11** carry a shaft **44** which is journalled in bearings **45** contained therein and provided, at each standard **11**, with worm gear segment **46**, as seen in Figs. 2 and 3 which rotates a worm gear **47** having an internally threaded hub **48** which when rotated acts as a nut to impart vertical movement to a threaded vertically disposed shaft **50** engaging hub **48**, and which is rigidly secured at its lower end to the upper member **34***a* of cage member **34** by pin **51**. The shaft **44** is provided with a tool receiving portion **52**. By rotating the shaft **44** the worm gear segments **46** are adapted to impart angular movement to the worm gears **47**, each of which is rotatably supported against axial movement on bearing surface **53** of its associated standard **11**. Angular movement in the worm gear is in turn transformed into axial movement of vertically disposed shafts **50**, which in turn causes the square cage members **34**, at opposite ends, to be raised and lowered according to the degree of rotation of the shaft **44**. It will now be understood that vertical movement of the cage member **34** causes the front and rear pairs of bearing boxes and their associated pinch rolls to be raised or lowered simultaneously.

It should be noted that means for vertically adjusting the pair of idler sheaves is also provided. Such adjustment means comprises a bracket **55** having its side portions slidably engaging the spaced guideways **36** and **36** to permit the idler sheaves to be moved upward or downward so as to increase or decrease the tension on sprocket chain **16**. Bolt **56** threadedly engages the bracket **55** and has its lower end supported by a coil spring **57** which is supported on bracket **58** located a distance below bracket **55**. The coil spring **57** exerts an adjustable spring load upon the bracket **55** through bolt **56** and thereby provides an additional safety fea-

ture against sudden overloading of the sprocket chain **16**.

The operation of the device should now be apparent. In the handling of endless strip material wherein the surface of the strip (other than at the very edge) must not touch any other surface the end of the strip is first introduced into the space **30** between the opposed front sets of upper and lower pinch rollers. By rotating the shaft **44** the opposed front and rear pairs of pinch rollers will be moved simultaneously toward each other so as to bring the frusto-conical rim portions **22***a* of opposed pairs of pinch rolls simultaneously toward each other until they just grip the extreme outer edges of the endless strip to be fed. The edges of the endless strip enter the V-shaped space **25** and become lightly wedged between rims **22***a*. Thus, as soon as there is sufficient friction between the frusto-conical rim portions **22***a* of the pinch rolls and the edges of the endless strip, to move the strip forward by rotation of the pinch rolls, the movement of the opposed pairs of pinch rolls laterally toward each other is stopped. This adjustment can be made while rolls are turning. When the edges of the endless strip are wedgingly engaged between the adjacent frusto-conical rim portions **22***a*, the remainder of the endless strip surface is raised slightly off the surface of the cylindrical pinch rolls, as seen in dot-dash lines at **58** in Fig. 3.

It should now be readily apparent that the structure and mode of operation may be conveniently described in another manner. There has been disclosed herein a machine for feeding endless strip, comprising frame **10**, parallel shafts **13** and **13** between which the strip passes; pair of opposed rolls **21** on each shaft **13**; each roll **21** having frusto-conical strip edge engaging portion **22***a*; and connecting means operatively connecting together said rolls **21**, said shafts **13** and said frame **10** with the opposed roll pairs **21** being positioned at opposite sides of said endless strip; said connecting means including a driving means, comprising gears **15**, sprockets **19**, chain **16**, etc. through splines **21***a* and grooves **13***a* for simultaneously rotating all of said rolls **21** and said shafts **13** as bearing blocks **12** maintain proper shaft spacing for chain **16**; said connecting means including adjusting means, comprising shaft **31**, nuts **32**, plates **27** and **28**, etc. for simultaneously moving said frusto-conical strip edge engageable portions **22***a* axially along said shafts **13** and along grooves **13***a* and splines **21***a* relative to said frame **10** into strip edge engagements during roll driving rotation, said adjustable means including adjustable screw shaft **31** fixed against axial movements relative to said frame **10** and having its axis laterally spaced from said roll shafts **13**; said connecting means including a keyed connection between each roll **21** and its associated shaft **13**, comprising spline **21***a* and groove **13***a*, permitting relative axial movement therebetween but preventing relative rotational movement therebetween; said connecting means including means for simultaneously moving all of said shafts **13** relative to said frame **10** in a direction transverse to said roll shafts **13** with this last mentioned means including bearing boxes **12**, bolts **42** and **43**, guide pins **35**, half round sections **36**, plates **27** and **28**, etc. The so-called connecting means operatively connecting the rolls **21**, shafts **13** and frame **10** for proper strip engagement includes the afore-recited members and portions **12**, **13***a*, **15**, **16**, **19**, **21***a*, **27**, **28**, **31**, **32**, **35**, **36**, **42** and **43** with bearing blocks **12**, grooves **13***a*, splines **21***a*, and plates **27** and **28**, each playing a part in the operation of more than one of the different means recited.

When certain materials such as zinc strip is fed, the lower pinch rolls are serrated to give a better grip. When feeding material such as steel it is preferable not to use serrations since it is likely to cause burrs on the steel. It is not my intention, however, to limit myself to either one of these particular provisions. Through the provision of opposed sets of simultaneously adjustable pinch rolls, it becomes possible to quickly and easily accommodate various widths of endless strip. Without the present invention, it is a tremendously long and tedious job to set each of the pinch rolls individually as was required with prior devices. It will be understood that normally a plurality of sets of pinch rolls are used at spaced distances along the path traveled by an endless strip. In certain situations there are as many as nineteen machines in a row, having a total of sixteen or more pinch rolls per machine, each of which must be loosened and adjusted to engage the edge of the endless strip by means of two set screws. This is a tremendously complicated job to try to adjust all of these pinch rolls with suitable clearance between them. The situation is even more complicated when the endless strips vary slightly in overall width. I have overcome these shortcomings by providing means for simultaneously moving opposed sets of pinch rolls toward each other in such a manner as to automatically engage the side edges of the endless strip upon contact.

In view of the foregoing description, taken in conjunction with the accompanying drawings, it is believed that a clear understanding of the construction, operation and advantages of the device will be quite apparent to those skilled in this art.

It is to be understood that even though there is herein shown and described a preferred embodiment of the invention, the same is susceptible to certain changes fully comprehended by the spirit of the invention.

Having thus described my invention and illustrated its use, what I claim as new and desire to secure by Letters Patent is:

1. A machine for feeding endless strip comprising in combination pairs of opposed rolls rotatably supported with each pair about a horizontal axis, said pairs of opposed rolls being positioned respectively at opposite sides of said endless strip, a housing, supporting means for supporting a plurality of horizontal guide shafts on said housing, said guide shafts extending transversely across the direction of strip travel, frame means supported on said guide shafts on opposite sides of said endless strip, said pairs of rolls rotatable relative to said frame means, said rolls adapted to slide axially on said guide shafts, driving means on said housing and connected to said rolls by said guide shafts whereby said rolls may be rotated simultaneously with lateral adjustment, means comprising screw shafts for laterally moving said pairs of opposed rolls by said frame means toward and away from each other along said guide shafts, at least one pair of opposed rolls having a substantially cylindrical portion for supporting said endless strip, an extension on each of said rolls providing a frusto-conical flange, said frusto-conical flanges on pairs of rolls cooperating to engage the edges of said endless strip as said opposed pairs of rolls are moved laterally toward one another to provide the sole means for supporting said strip during feeding, said shaft supporting means rotatably supporting opposite ends of said guide shafts and including means for simultaneously raising and lowering said guide shafts.

2. A machine for feeding endless strip material comprising a pair of horizontally disposed rolls, support maens for rotatably mounting said rolls including guide shafts for rotating and guiding said rolls, each of said rolls having a cylindrical portion, strip edge engaging means on said pair of rolls adapted to engage the side edges of said endless strip for strip feeding and providing the sole means for supporting said strip; said support means including means for moving said rolls axially toward said endless strip into strip feeding relationship simultaneously with roll rotation, means for rotatably

supporting opposite ends of said guide shafts and means for simultaneously raising and lowering said guide shafts.

3. A machine for feeding endless strip comprising pairs of cooperating pinch rolls, means mounting said pairs of pinch rolls along both sides of said endless strip, said rolls having a generally cylindrical body portion, said cylindrical body portion having a frusto-conical rim provided thereon, said frusto-conical rims of each pair of rolls cooperating to receive the side edges of said endless strip, means for advancing said opposed pairs of rolls toward each other, said frusto-conical rims of each pair of rolls wedgingly engaging the side edges of said endless strip as said pairs of rolls are moved into contact with said endless strip, said cylindrical body portions providing the sole means for supporting said sheet of material prior to engagement by said frusto-conical rims.

4. A machine for feeding endless strip material comprising a pair of horizontally disposed rolls, support means for rotatably mounting said rolls, guide shafts for rotating and guiding said rolls, means on said pair of rolls adapted to engage the side edges of said endless strip, each of said guide shafts being journalled for rotation in suitable bearing boxes, said bearing boxes being provided with grooved side edges, each of said bearing boxes supported between a pair of vertically extending guide pins, said guide pins provided with half-round sections, said half round sections normally disposed within said grooved side edges, frame means rotatably supporting the upper and lower ends of said guide pins, whereby rotation of said guide pins remove said half-round sections from said grooved side edges of said bearing boxes and permits endwise removal of said bearing boxes from said guide shaft.

5. A machine for feeding endless strip material comprising horizontally disposed rolls, guide shafts for rotating and guiding said rolls, means on said rolls adapted to engage the side edges of said endless strip, each of said guide shafts rotatably mounted in suitable bearing boxes, each of said bearing boxes supported between vertically disposed guide pins, said guide pins provided with cut-out portions, said guide pins supported for rotation at their upper and lower ends, rotation of said guide pins releasing said bearing boxes and permitting said bearing boxes to be removed endwise from said guide shafts.

6. A machine for feeding endless strip, comprising pairs of opposed rolls, each roll having a strip edge engaging portion, and connecting means operatively connecting together said rolls with the roll pairs being positioned at opposite sides of said endless strip with pairs aligned transversely to said strip being in feeding engagement with the same zone on said strip, said connecting means including a driving means for simultaneously rotating all of said rolls, said connecting means including adjusting means for moving said strip edge engageable portions into strip edge engagements during roll driving rotation.

7. A machine for feeding endless strip, comprising parallel shafts between which the strip passes, a pair of opposed rolls on each shaft, each roll having a strip edge engaging portion, and connecting means operatively connecting together said rolls and said shafts with the roll pairs being positioned at opposite sides of said endless strip, said connecting means including a driving means for simultaneously rotating all of said rolls and said shafts, said connecting means including adjusting means for moving said strip edge engageable portions axially along said shafts into wedging strip edge engagements during roll driving rotation.

8. A machine for feeding endless strip, comprising pairs of opposed rolls, each roll having a frusto-conical strip edge engaging portion, and connecting means operatively connecting together said rolls with the roll pairs being positioned at opposite sides of said endless strip, said connecting means including a driving means for simultaneously rotating all of said rolls, said connecting means including adjusting means for simultaneously moving said frusto-conical strip edge engageable portions into wedging strip edge engagements during roll driving rotation.

9. A machine for feeding endless strip, comprising pairs of opposed rolls, each roll having a strip edge engaging portion, and connecting means operatively connecting together said rolls with the roll pairs being positioned at opposite sides of said endless strip, said connecting means including a driving means for simultaneously rotating all of said rolls with each pair rotating about a separate axis, said connecting means including adjusting means for moving said strip edge engageable portions axially into strip edge engagements during roll driving rotation, said adjustable means including an adjustable screw shaft having its axis laterally spaced from the axis of each roll pair.

10. A machine for feeding endless strip, comprising parallel shafts between which the strip passes, a pair of opposed rolls on each shaft, each roll having a strip edge engaging portion, and connecting means operatively connecting together said rolls and said shafts with the roll pairs being positioned at opposite sides of said endless strip, said connecting means including a driving means for simultaneously rotating all of said rolls and said shafts, said connecting means including adjusting means for moving said strip edge engageable portions axially along said shafts into strip edge engagements during roll driving rotation, said connecting means including a keyed connection between each roll and its associated shaft permitting relative axial movement therebetween but preventing relative rotational movement therebetween.

11. A machine for feeding endless strip, comprising a frame, parallel shafts between which the strip passes, a pair of opposed rolls on each shaft, each roll having a strip edge engaging portion, and connecting means operatively connecting together said rolls and said shafts with the roll pairs being positioned at opposite sides of said endless strip, said connecting means including a driving means for simultaneously rotating all of said rolls and said shafts with each roll pair and its shaft rotating about a separate axis, said connecting means including adjusting means for moving said strip edge engageable portions axially along said shafts into strip edge engagements during roll driving rotation, said adjustable means including an adjustable screw shaft having its axis laterally spaced from said roll shafts, said connecting means including a keyed connection between each roll and its associated shaft permitting relative axial movement therebetween but preventing relative rotational movement therebetween.

12. A machine for feeding endless strip, comprising pairs of opposed rolls, each roll having a strip edge engaging portion, and connecting means operatively connecting together said rolls with the opposed roll pairs being positioned at opposite sides of said endless strip, said connecting means including a driving means for simultaneously rotating all of said rolls, said connecting means including adjusting means for moving said strip edge engageable portions into strip edge engagements during roll driving rotation, said connecting means including means for simultaneously moving all of said rolls in a direction transverse to the axes of rotation of said rolls.

13. A machine for feeding endless strip, comprising a frame, parallel shafts between which the strip passes, a pair of opposed rolls on each shaft, each roll having a frusto-conical strip edge engaging portion, and connecting means operatively connecting together said rolls, said shafts and said frame with the opposed roll pairs being positioned at opposite sides of said endless strip, said connecting means including a driving means for simultaneously rotating all of said rolls and said shafts, said con-

necting means including adjusting means for simultaneously moving said frusto-conical strip edge engageable portions axially along said shafts relative to said frame into strip edge engagements during roll driving rotation, said adjustable means including an adjustable screw shaft fixed against axial movements relative to said frame and having its axis laterally spaced from said roll shafts, said connecting means including a keyed connection between each roll and its associated shaft permitting relative axial movement therebetween but preventing relative rotational movement therebetween, said connecting means including means for simultaneously moving all of said shafts relative to said frame in a direction transverse to said roll shafts.

References Cited in the file of this patent

UNITED STATES PATENTS

1,142,208	Upham	June 8, 1915
2,071,682	Buccicone	Feb. 23, 1937
2,632,641	Rice	Mar. 24, 1953
2,643,475	Klopfenstein	June 30, 1953

FOREIGN PATENTS

200,635	Switzerland	Jan. 2, 1939
730,823	Germany	Jan. 28, 1943