Feb. 9, 1937. C. J. BECK 2,070,505

DECURLING DEVICE

Original Filed Oct. 24, 1929 2 Sheets-Sheet 1

Fig. 1.

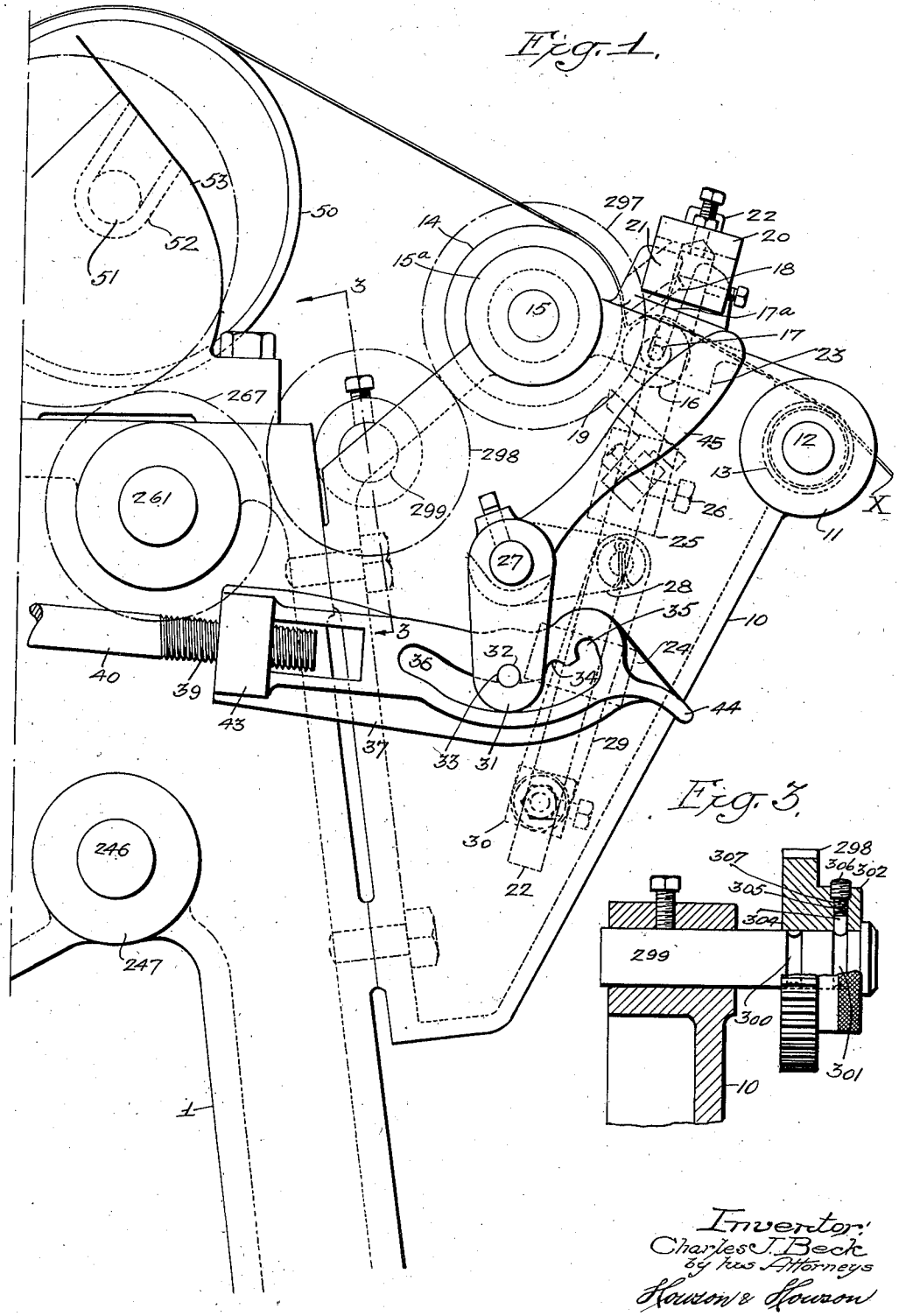


Fig. 3.

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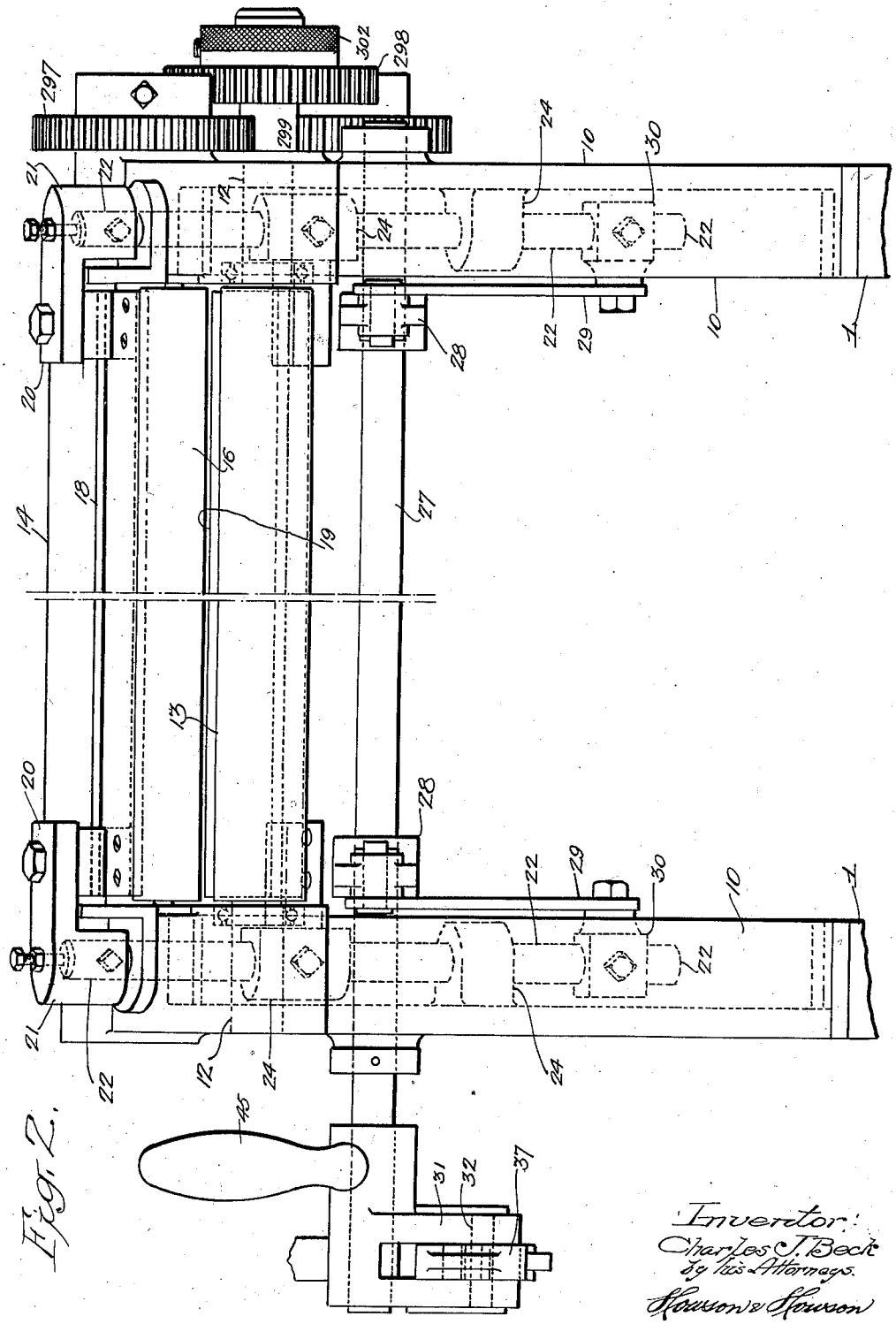


Fig. 2.

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2,070,505

DECURLING DEVICE

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Original application October 24, 1929, Serial No. 402,024. Divided and this application March 7, 1934, Serial No. 714,513

5 Claims. (Cl. 92—70)

This application constitutes a division of application Serial No. 402,024, filed October 24, 1929 now Patent Number 1,962,128 and relates to a decurling device for straightening paper and similar stock drawn from a roll and fed to a cutting or printing unit or a machine comprising a combination of such units as in the case disclosed in the above noted application.

The construction and operation of the decurling device forming the subject of the present application will be fully disclosed hereinafter, reference being had to the accompanying drawings, of which:

Fig. 1 is a side elevation;

Fig. 2 is a front elevation; and

Fig. 3 is a sectional elevation taken on the line 3—3, Fig. 1.

Wall paper, for example, as it is delivered from the machine which prints the design thereon is wound in rolls of suitable size, sometimes with the design face outermost, other times with the design face innermost. These rolls, if to be cut into sample sheets, are then placed on a suitable support at the feeding and cutting end of the machine and so disposed on the support that the plain side of the web is delivered uppermost to the machine.

In order to accurately position the identifying data on each sample, it is essential that the sheet be delivered to the printing mechanism in a substantially flat condition, and paper of this kind after having been rolled has a natural tendency to curl when drawn from the roll.

In order to remove such curl from the web, I have provided at the receiving end of the machine a curl-removing mechanism from which the web travels to a feeding mechanism. The feeding mechanism delivers the continuous web to a cutting unit which is adapted to cut the said web into sheets of uniform predetermined lengths, each sheet being cut from the continuous web falling upon and being positively gripped by a conveying mechanism. The conveying mechanism delivers the flat sheet to the printing mechanism from which the printed sheets are delivered to a receiving or stacking table.

The curl-removing mechanism comprises side frames 10, 10 rigidly secured to the side frames 1, 1 of the machine as illustrated in Fig. 1. Rotatably mounted in bearings 11, 11 formed in the side frames 10, 10, are trunnions 12, 12 which project from the opposite ends of and rotatably support a guide roll 13 over which the continuous web X is adapted to pass.

Spaced apart from and extending substantially parallel to the roll 13 is a second roll 14, which is rigidly secured to a shaft 15 rotatably mounted in bearings 15a, 15a formed in the side frame members 10.

Intermediate and substantially parallel to the rolls 13 and 14 is a roll 16 having trunnions 17 rotatably mounted in grooves or slots 17a, 17a formed in the side frames 10, 10.

Above and below and substantially parallel with the roll 16 are located decurling blades 18 and 19 respectively. The upper decurling blade 18 is secured at its opposite ends to arms 20, 20 which project laterally from collars 21, 21 which are secured to the upper ends of rods 22, 22 respectively. The rods 22, 22 are slidably mounted in bearing lugs 23 and 24 formed on the inside of the side frames 10, 10 respectively.

The lower decurling blade 19 is secured to collars 25, 25 which are adjustably fastened to the slide rods 22 by means of set screws 26. The blades 18 and 19 are disposed in planes substantially at right angles with respect to each other, and the plane of each being disposed at an angle with respect to the axes of the slide bars 22, 22 and each blade is provided with a beveled edge adapted to be brought into an operating position between the adjacent surfaces of the rolls 14 and 16 respectively.

Axial movement of the slide rods 22, 22 to bring the desired decurling blade into operative position is effected by means of a rock shaft 27 rotatably mounted in the side frames 10, 10 and provided with levers 28, 28 to the opposite ends of which are connected links 29, 29. The opposite end of each link 29 is pivotally connected to a collar 30 secured to the lower end of a corresponding slide bar 22.

When operating upon a web which has been rolled with the plain side outermost the decurling blade 18 is employed in the manner illustrated in Fig. 1. The paper or web passing over the upper surface of the roll 16 and under the beveled edge of the decurling blade 18, thence over the upper surface of the adjacent roll 14 which tends to produce a curl in the paper in a direction opposite to the natural curl therein which balances the said natural curl and causes the sheet to lie flat.

When operating with a web which has been rolled with the plain surface innermost the decurling blade 19 is employed, the web then passing from the roll 13 under the roll 16 over the beveled edge of the blade 19 and under the roll 14, the rods 22, 22 being moved axially to raise the blade 18 out of position and to bring the

blade 19 into such a position that the roll 16 is engaged thereby and is raised slightly to bring its trunnion 17 out of the bottom of the slots 17a, whereupon the roll 16 rests upon the paper being drawn over the beveled edge of the blade 19 to hold the paper down against said blade, whereupon the curl is removed from the paper.

The outer end of the shaft 27 is provided with a lever 31 having a laterally extending pin 32 which is adapted to enter either of a series of notches 33, 34, and 35 extending outwardly from a slot 36 formed in a head 37 adjustably mounted on the threaded end 39 of a rod 40, the opposite end of the rod 40 being rotatably mounted in a bearing supported by one of the side frames at the delivery end of the machine, a hand wheel being provided on the end of the adjusting rod 40 by means of which the rod may be rotated thereby moving the head 37 axially of said rod by means of the threads 39 thereon co-operating with threads formed in a collar portion 43 of the head 37.

Movement of the head 37 rocks the shaft 27 in a manner to increase or decrease the degree of the angle formed in the paper by the decurling blade which happens to be functioning.

In order to throw one of the decurling blades out of operation and to throw the other of the blades into operating position the head 37 is raised by grasping the finger grip 44 thereof which releases the pin 32 in the lever 31 from the notch in the head 37 which is occupied thereby, and by grasping the handle 45, which forms part of the lever 31, the shaft 27 may be rocked to bring the pin 32 into line with one of the other notches in the head 37 which brings the desired curling blade into an operative position with respect to the rolls 14 and 16.

From the guide roll 14 a web X passes over the top of a feed roll 50 which is secured to a shaft 51 rotatably mounted in bearings 52 formed in brackets 53, 53 which are secured to the side frames 1 of the machine.

Power may be applied to the shaft 15 of the roll 14 in any suitable manner, and in the present case under conditions hereinafter noted this shaft is driven from a rotary shaft 261 of the machine to which the decurling device is attached.

When the web X is being fed over the top of the rolls 13, 14 and 16 with the decurling blade 18 operating between the rolls 14 and 16, the roll 14 is permitted to rotate freely, but when the paper is being delivered over the top of the roll 13 and under the rolls 14 and 16 with the decurling blade 19 operating between the rolls 14 and 16, the roll 14 is then adapted to be driven and for this purpose the shaft 15, on which the roll 14 is secured, is provided with a gear wheel 297 which is adapted to mesh with a gear wheel 298 rotatably mounted on a stud 299 projecting laterally from the side frame of the machine.

The gear wheel 298 is adapted to be brought into mesh with or disengaged from the gear wheel 267 for the purpose of driving the roll 14 or for permitting the same to run free as above noted.

In order to permit of such manipulation of the gear wheel 298 the said gear is adapted to be moved axially of the stud 299 on which it is rotatably mounted, means being provided for locking the gear in either its operative or its inoperative position, such means being shown in detail in Fig. 3, wherein the stud 299 is provided with a pair of circumferential grooves 300 and 301 and the hub 302 of the gear 298 is provided with a spring-pressed detent 304 slidably mounted in a radially extending opening 305 formed in the hub 302, said opening being closed by a screw or plug 306 between which and the outer end of the detent 304 is provided a compression spring 307. When the detent 304 is riding in the groove 301 the gear 298 is out of mesh with the gears 267 and 297, but when the detent 304 is riding in the groove 300 the gear wheel 298 is then in mesh with both the gear 267 and the gear wheel 297, whereby the roll 14 is power driven.

The operator by watching the sheets as they come through the machine may by operating the control rod 40 move the decurling blade to a position to place a greater counter-curl in the paper to offset the natural curl thereof.

I claim:

1. In a machine for cutting sheets from a continuous and rolled web having a tendency to curl when unrolled and for printing upon the cut sheets, the combination of a feeding unit, and a decurling unit, said decurling unit comprising a roll adapted to receive the web initially, a second roll intermediate the receiving roll and the feeding unit and around which the web is adapted to pass, a decurling roll disposed between the intermediate roll and the receiving roll, a pair of decurling blades spaced apart and disposed respectively at opposite sides of the decurling roll, and means for moving the decurling blades to bring one edge of one of said blades into a position disposed in the angle formed between the peripheries of the intermediate and decurling rolls.

2. In a machine for cutting sheets from a continuous and rolled web having a tendency to curl when unrolled and for printing upon the cut sheets, the combination of a feeding unit, and a decurling unit, said decurling unit comprising a roll adapted to receive the web initially, a second roll intermediate the receiving roll and the feeding unit and around which the web is adapted to pass, a decurling roll disposed between the intermediate roll and the receiving roll, a pair of decurling blades spaced apart and disposed respectively at opposite sides of the decurling roll, means for moving the decurling blades to bring one edge of one of said blades into a position disposed in the angle formed between the peripheries of the intermediate and decurling rolls, and means for adjusting the operative decurling blade to control minutely the degree of decurling effected by the said operative blade.

3. A decurling device comprising a pair of closely disposed parallel rolls over the peripheries of which a web passes, a pair of decurling blades parallel to and disposed at opposite sides respectively of said rolls opposite the spaces formed by and between the peripheries of said closely disposed rolls, means for maintaining said blades in fixed positions between said rolls and means for selectively pressing said blades into said spaces to bend the web passing across said space into said space at an acute angle around one edge of the selected blade.

4. A decurling device comprising a pair of closely disposed parallel rolls over the peripheries of which a web passes, a pair of decurling blades parallel to and disposed at opposite sides respectively of said rolls opposite the spaces formed by and between the peripheries of said closely disposed rolls, means for pressing one of said blades into one of said spaces to bend the web passing across said space into said space at an acute angle around one edge of the blade, and mean for reversing the direction of press to remove the one

blade from its occupied space and for pressing the other of said blades into the second of the spaces formed by and between the peripheries of said rolls.

5. A decurling device comprising a pair of closely disposed parallel rolls over the peripheries of which a web passes, a pair of decurling blades parallel to and disposed at opposite sides respectively of said rolls opposite the spaces formed by and between the peripheries of said closely disposed rolls, means for pressing one of said blades into one of said spaces to bend the web passing across said pace into said space at an acute angle around one edge of the blade, means for reversing the direction of press to remove the one blade from its occupied space and for pressing the other of said blades into the second of the spaces formed by and between the peripheries of said rolls, and means for minutely varying the extent of pressing of said blades into said openings in accordance with variations in the extent of curl in the web.

CHARLES J. BECK.