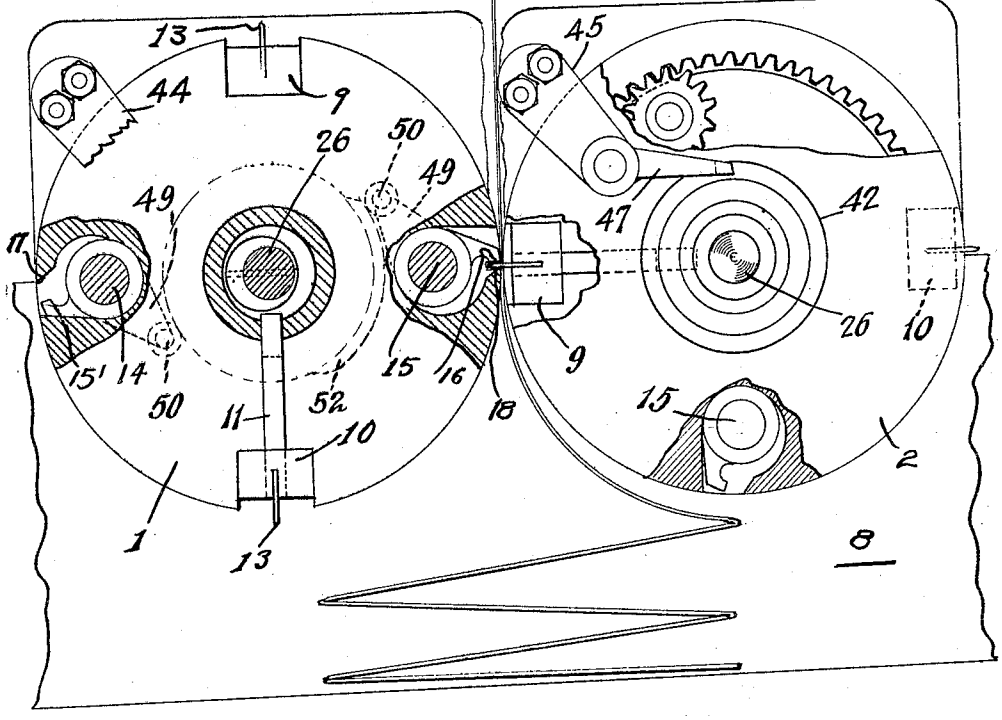
June 9, 1925. 1,541,201

E. G. WENNERBLAD ET AL

ZIGZAG PAPER STRIP FOLDING MACHINE

Filed Dec. 27, 1922 2 Sheets-Sheet 1

Fig. 1



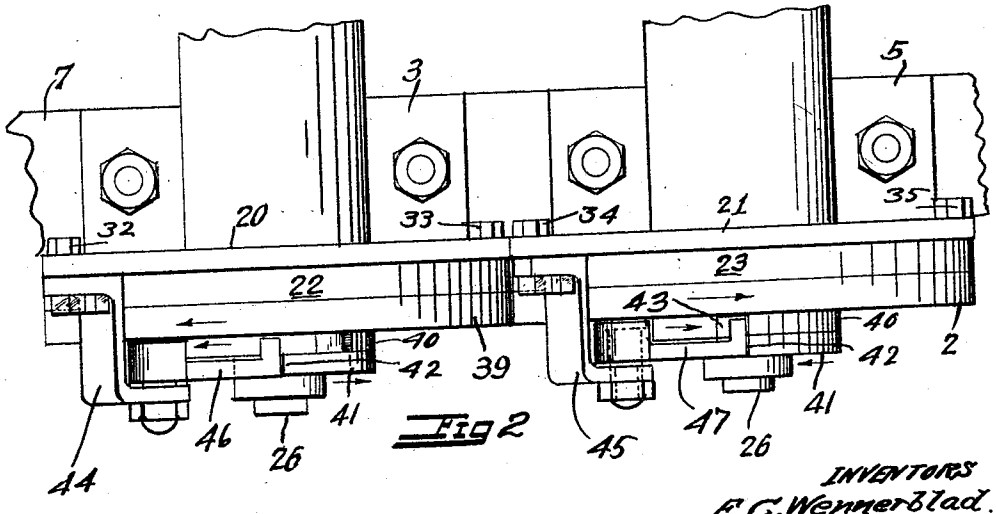


Fig 2

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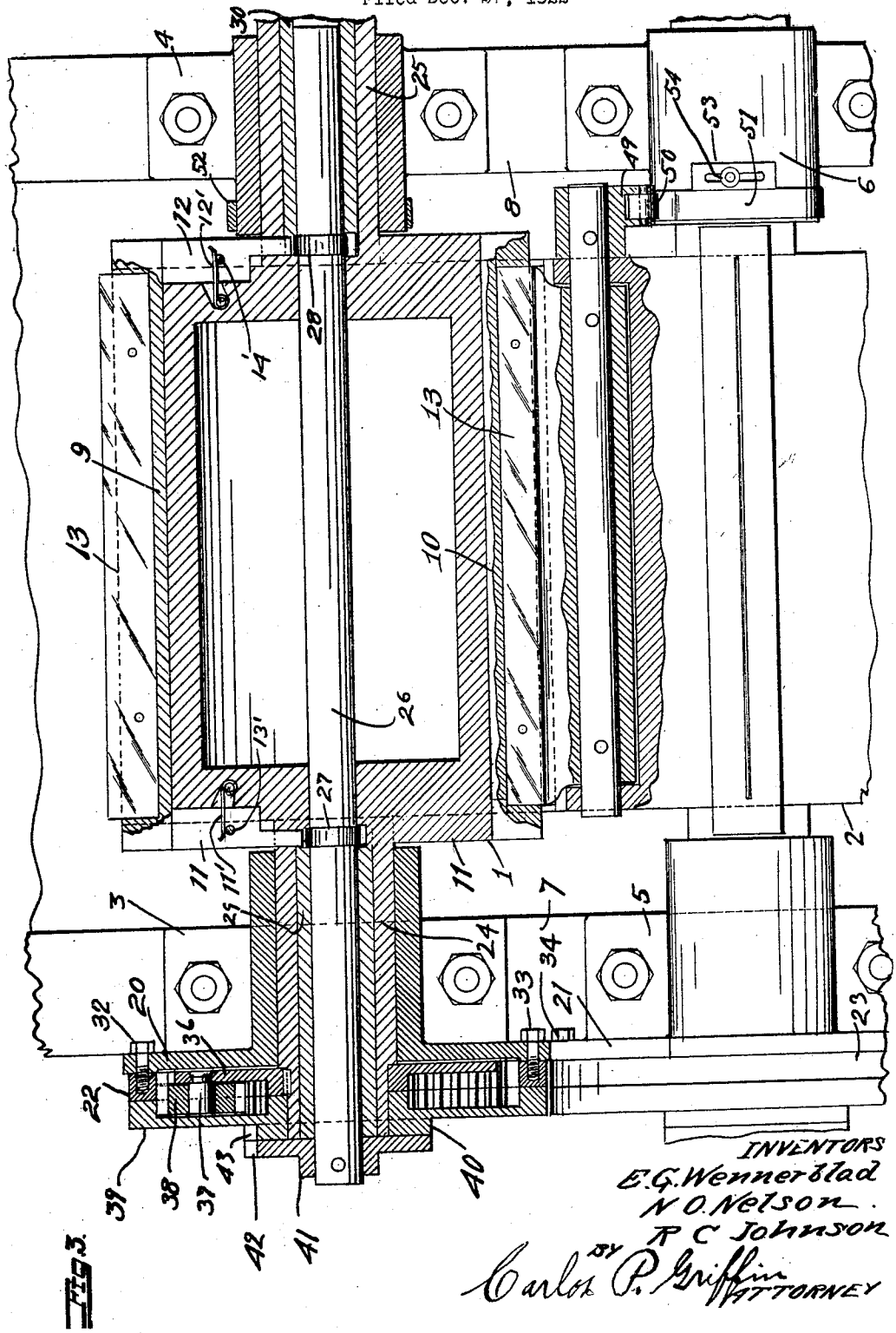


Fig 3.

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UNITED STATES PATENT OFFICE.

EINAR G. WENNERBLAD, NELS OSCAR NELSON, AND RAY C. JOHNSON, OF SAN FRANCISCO, CALIFORNIA.

ZIGZAG-PAPER-STRIP-FOLDING MACHINE.

Application filed December 27, 1922. Serial No. 609,277.

To all whom it may concern:

Be it known that we, EINAR G. WENNERBLAD, NELS OSCAR NELSON, and RAY C. JOHNSON, citizens of the United States, residing at San Francisco, in the county of San Francisco, State of California, have invented a new and useful Zigzag-Paper-Strip-Folding Machine, of which the following is a specification in such full and clear terms as will enable those skilled in the art to construct and use the same.

This invention relates to a machine for folding a paper strip zigzag fashion, and for cutting off the strip each time twenty-five folds have been made.

It will be understood by those skilled in the art that in the manufacture of manifolding books, and for a number of purposes, it is necessary to fold a continuous length of paper strip in zigzag fashion, and these folded strips are cut off in bunches of fifty or one hundred as may be desired, the number depending upon the use to which the material is to be placed. At present these zigzag piles of paper strips are cut by hand, a workman counting the number of folds to make each cut.

With the present invention the paper strip is run through the machine and is automatically folded and cut in bundles of fifty folds, although if a different number of folds was required, the cuts could be made at a different place by changing the gear ratios.

Other objects of the invention will appear as the description proceeds.

An embodiment of the invention is shown in the accompanying drawings in which the same reference numeral is applied to the same portion throughout, but we are aware that there may be modifications thereof.

Fig. 1 represents an end view of the folding rollers, certain portions of the apparatus being shown in section for purposes of illustration.

Fig. 2 is a plan view of the operating apparatus at one end of the folding rollers,

Fig. 3 is a plan view, partly in section, of the complete apparatus.

The folding apparatus consists of the pair of rollers 1 and 2, supported by bearings 3 to 6 inclusive, mounted on two frame members 7 and 8.

Each roller consists of a smooth cylinder with four recesses. Two of these recesses carry bars 9 and 10, each of which is moved by a pair of arms 11 and 12.

The bars 9 and 10 each support a knife as indicated at 13. The other recesses in the roll carry shafts 14 and 15 and said shafts carry short arms 15′ and 16 which contact with edges 17 and 18 of the roller, through the entire length of the roller, to hold the fold in the paper strip, as will be later explained.

The roller 2 is constructed precisely like roller 1 except that its position is changed 90 degrees from the position of the roller 1, so that its knives will move into the space adjacent the edges 17 and 18, while the knives of the roller 1 move into the similar spaces adjacent the edges 17 and 18 of the roller 2.

The bearings 5 and 6 have flanges 20 and 21 to which flanges are secured the two internal ring gears 22, 23. The rollers are supported in the bearings by means of the tubular stud shafts, each roller being supported like the other one and through said tubular stud shafts there passes the operating shaft 26. This shaft has cams 27, 28 thereon which cams operate the slides 11 and 12 which push the knives 13 out when required.

The shaft 26 is supported by two tubular members 29, 30 within the tubular shafts supporting the rolls.

The ring gears are secured to the bearing flanges by means of four bolts 32 to 35 inclusive.

Rigidly mounted on the tubular shaft 24 is an arm 36 carrying a stud shaft 37 on which is revolubly mounted a spur gear 38 in mesh with the internal gear 22, and in mesh with an internal gear 39. The internal gear 39 has a cam hub 40 formed thereon and it is revoluble on the shaft 24.

The gear 39 has fifty teeth while the gear 22 has fifty-one teeth.

On the end of the shaft 26, adjacent the gear 39 there is a flanged hub 41. This flange has a recess 42. The hub 40 has a notch 43. Secured to the bearing flanges 20, 21 are two arms 44, 45 and said arms each support a pawl as shown at 46, 47.

The cams 42 travel in the direction of the arrows adjacent them and when their notches register the pawls 46, 47 drop into the notches and cause the shafts 26 to stop. The hub 40, of course, continues to rotate and

in exactly one revolution of the roller will displace the pawl and permit the shaft 26 to continue its rotation.

Each of the shafts 14, 15 on each roller have an arm as indicated at 49, and each of said arms carries a small roller 50. These rollers run on rings cams 51, 52. Each of these cams has a side flange 53 with a set-screw 54 to enable the position of the cam to be adjusted as may be required for the operation of the arms 16. The operation of the apparatus is as follows:

Assuming a paper strip to be fed through between the rollers, the knife edges 13 will, from time to time, engage the paper strip and push it over either one of the edges 17 or 18, and as soon as the roller on the adjacent shafts 14 or 15 strikes the cam 51, the arm 16 will engage the paper strip and push it into contact with the knife. As the roller continues rotating the paper strip will be pulled off the knife and the knife will be removed therefrom and the reverse operation will take place with the next knife and holding arm.

As soon as the worm 50 leaves the high place on the cam 51 the paper strip will be dropped in the manner shown in Fig. 1. Inasmuch as there is a difference in the number of teeth of the internal gears 22 and 39 of one tooth, the position of the two cam notches 42, 43 will be changed at such a rate as to cause them to pass each other once every fifty revolutions and when that occurs the pawls 46, 47 will drop into said notches and stop the shaft 26 with the result that each roller will project one of its knives a little further than usual once every fifty revolutions.

In the present instance the two rollers are arranged to cut off the paper strip once every fifty revolutions, but each one effects the cutting equi-distant from the other one so that the paper folds are cut every twenty-five folds. The cutting is made by pressing the knife outward slightly from its normal position. At the time the outward movement takes place the arm 16 is engaged with the paper strip and the two edges 17 and 18 are sufficiently sharp to prevent the paper from pulling ahead, whereby it is cleanly cut off.

What we claim is as follows, but various modifications may be made in the construction shown in the drawings and above particularly described form within the purview of our invention:

1. A paper strip folding machine, comprising a pair of rollers between which the paper strip is passed, means to alternately crease the paper strip as it passed through said rollers in opposite directions whereby the strip will be delivered from the rolls in a series of zigzag folds and means carried by one of the rollers to cut off the paper strip after a predetermined number of folds have been made.

2. A paper strip folding machine comprising a pair of rollers, means on each roller to oppositely crease the paper strip against the other roller so that the creases will be equally distantly spaced from each other, means on each roller to alternately engage and hold the creased paper strip, and means to regularly advance the creasing mechanism to cut off the paper strip after a predetermined number of creases have been made.

3. A paper strip folding apparatus, comprising a pair of rolls, means on the rolls to oppositely crease the paper strip so that the creases will be equally spaced, means on each roller to hold the creased paper strip to deliver the folds on alternate sides of a stack of folds and means to shift the paper creasing mechanism on each roller to cut the paper strip when a given number of creases have been made.

4. A paper folding and creasing machine, comprising a pair of rolls between a paper strip is to be passed, means on the rolls to oppositely crease the paper strip to deliver it therefrom with a series of equi-distant spaced creases, a radial movable knife carried by each roll, and a cam revoluble with a roll shaft to advance a knife of each roll after a given number of turns of the roll to cut off the paper strip.

In testimony whereof we have hereunto set our hands this 14″ day of December A. D. 1922.

EINAR G. WENNERBLAD.
NELS OSCAR NELSON.
RAY C. JOHNSON.