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APPARATUS FOR CREPING PAPER

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3 Sheets-Sheet 1

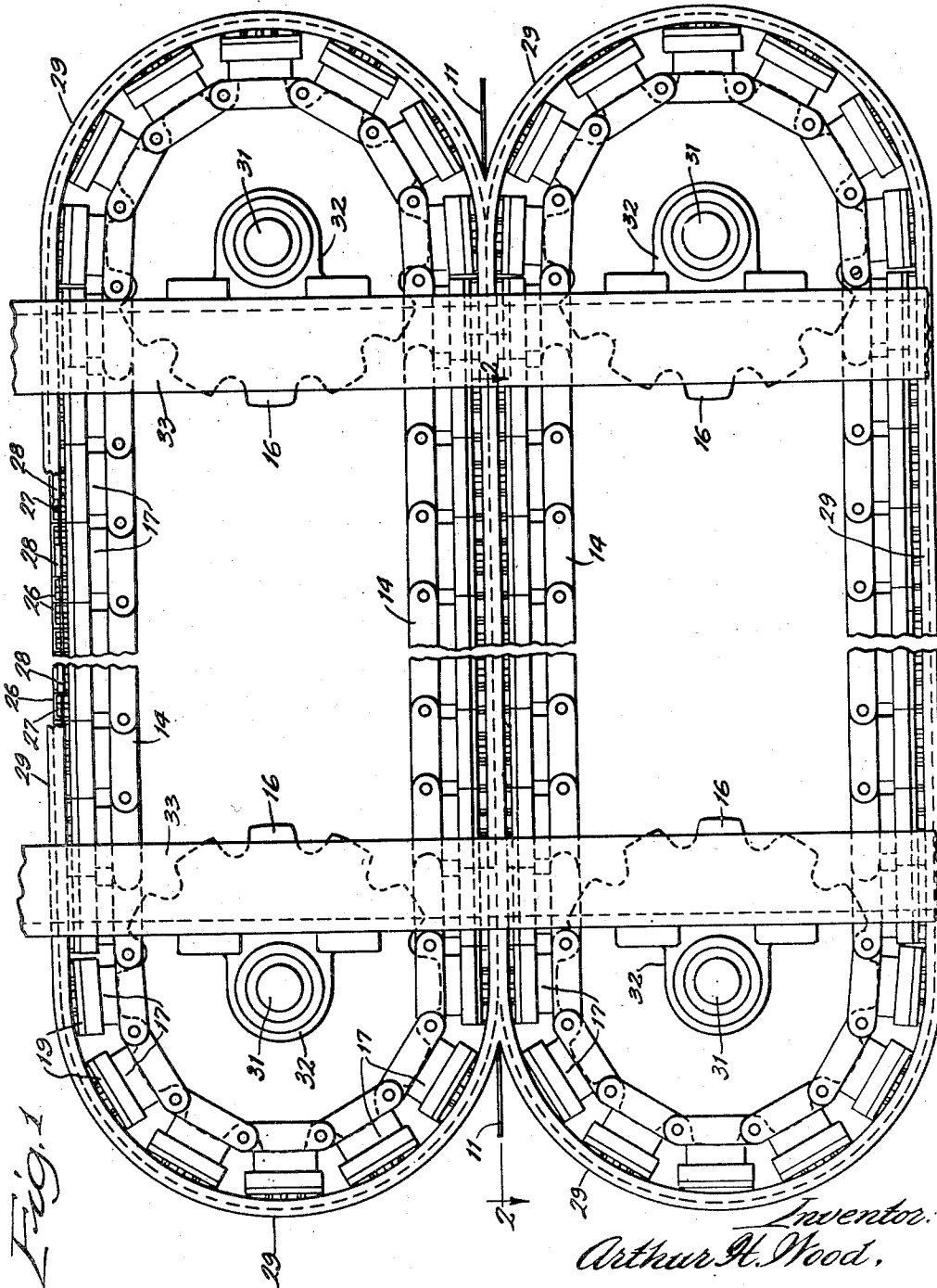


Fig. 1

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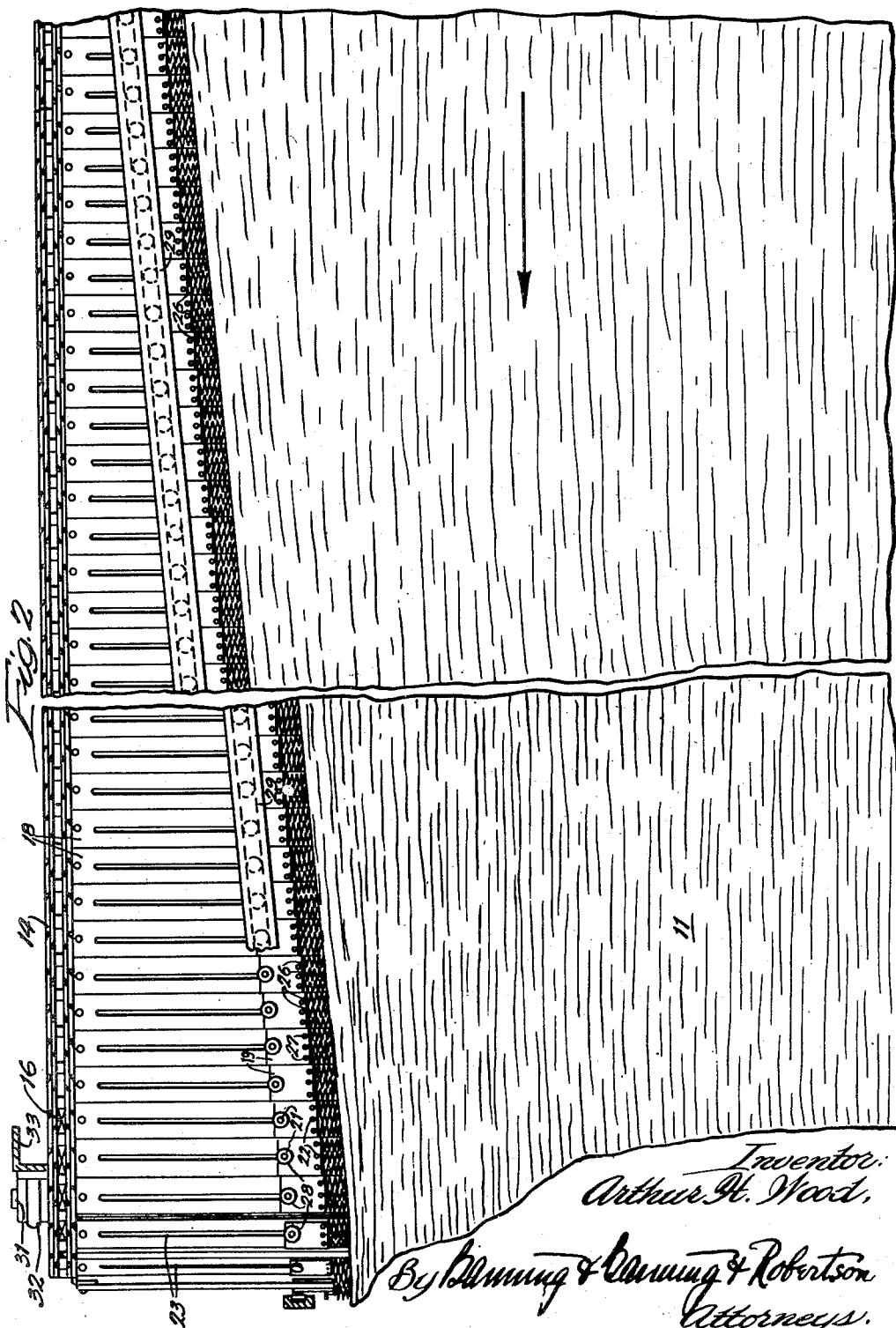
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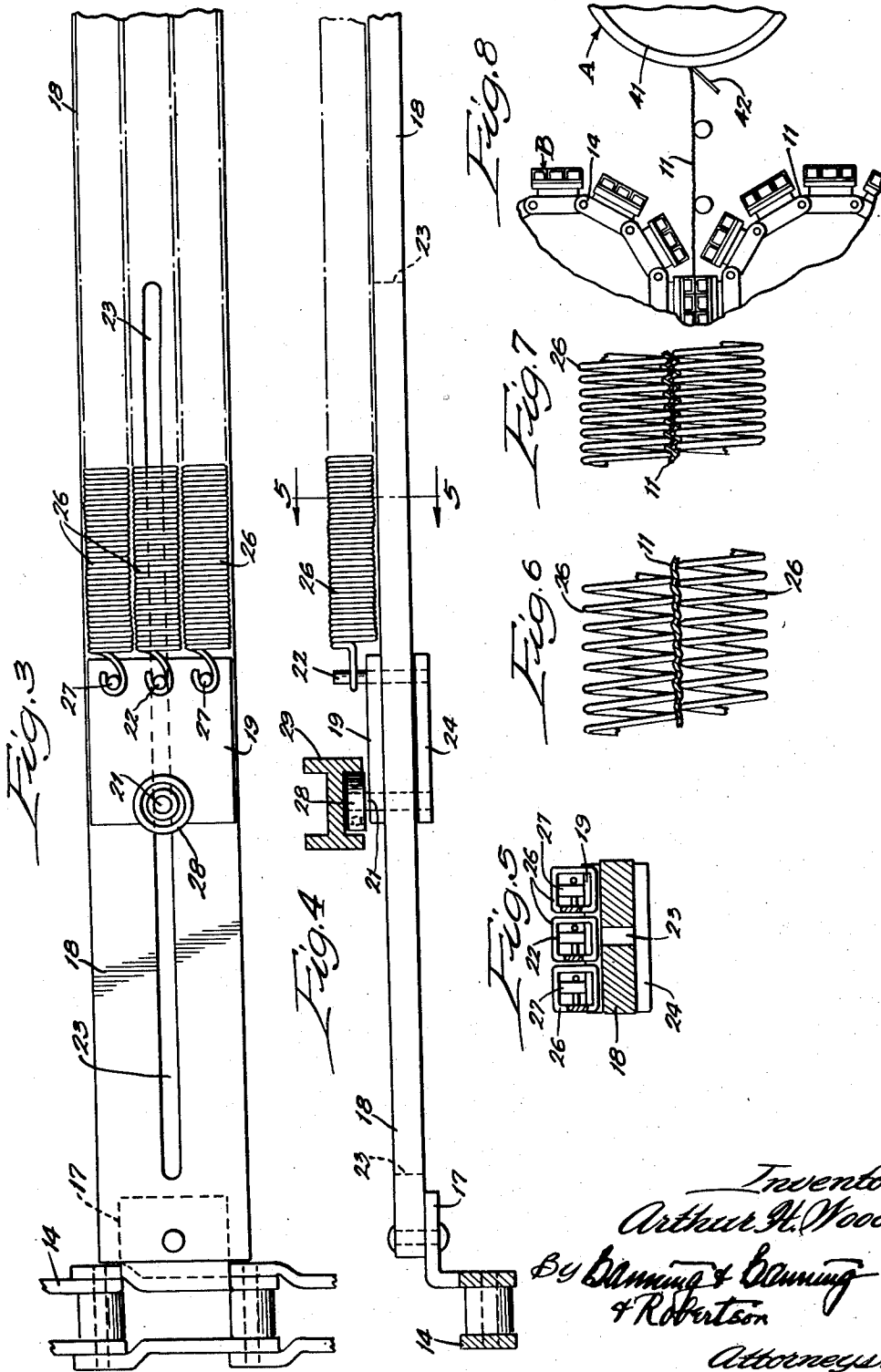
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UNITED STATES PATENT OFFICE

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APPARATUS FOR CREPING PAPER

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6 Claims. (Cl. 154—30)

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Heretofore, paper has been creped by being scraped from a drum to which it had slightly adhered in the process of partially drying the paper web. This method did not lend itself to creping in more than one direction.

Creped paper is very useful, but there are purposes for which creping in both directions would be desirable. Furthermore, when paper is creped only in one direction, it would sometimes be more desirable for it to have elasticity in a direction transverse to the predominant direction of the length of fibers. Since the fibers in a web of paper are predominantly longitudinally disposed and thus give the paper its greatest strength in the longitudinal or "machine" direction, it would sometimes be desirable for it to be creped transversely, with the ribs of the crepe running longitudinally of the web since the creping, to some extent, makes up for the lack of strength.

In wrapping articles of irregular shape, elasticity of the paper in both directions is desirable. Creping is the ideal form of elasticity since it is spread quite uniformly throughout the area of the paper. According to the present invention, a practical method and apparatus are provided for producing a paper which is creped transversely of the predominant fiber length or in both directions.

Figure 1 is a somewhat diagrammatic representation of the side view of a transverse creping unit;

Fig. 2 is a fragmentary, enlarged, sectional view taken approximately on the line 2—2 of Fig. 1;

Fig. 3 is a fragmentary view showing the face of one of the creping bars;

Fig. 4 is a view corresponding to Fig. 3 but showing a side of the bar;

Fig. 5 is a fragmentary, sectional view through the bar taken on the line 5—5 of Fig. 4;

Fig. 6 is a view showing the gripping of the paper by the expanded springs;

Fig. 7 is a view corresponding to Fig. 6 but showing the springs contracted and the paper consequently creped; and

Fig. 8 is a diagrammatic representation of the combination of the creping unit of Figs. 1 to 7 and a conventional longitudinal creping unit.

Although the law requires a full and exact description of at least one form of the invention, such as that which follows, it is, of course, the purpose of a patent to cover each new inventive concept therein no matter how it may later be disguised by variations in form or additions of

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further improvements; and the appended claims are intended to accomplish this purpose by particularly pointing out the parts, improvements, or combinations in which the inventive concepts are found.

In the illustrated form of the invention, the paper web 11 is fitted between stretched springs 26 which grip the paper and are permitted to contract, thus creping the paper.

The stretched springs are carried by endless chains 14 which pass around sprockets 16, one sprocket for each chain preferably being driven.

As seen best in Figs. 3 and 4, the inner side plates of the links of the chain are provided with flanges 17. A creping bar 18 is secured at each end to one of the flanges 17 and is thus carried around the sprockets 16 by the chain. The bar 18 is provided with a slide 19 which consists of a plate slidable on the face of the bar 18, being retained thereon by pins 21 and 22 which pass through a slot 23 in the bar and are rigidly secured to a retaining plate 24. The slide or plate 19 is also rigidly secured to pins 21 and 22.

Several coil springs 26 are secured to each slide 19 as by being hooked to the pin 22 and to additional pins 27. The other ends of the spring are secured in like manner to similar slides.

The pin 21 carries a roller 28 which is preferably provided with anti-friction bearings. The roller 28 is engaged by a cam track 29 which has a channel to receive the roller 28 and which slides the slide 19 back and forth along the bar 18 and hence stretches springs 26 and permits them to contract.

The cam tracks 29 are so shaped that as the springs 26 are presented to the damp moving web at the right-hand end of the structure shown in Fig. 1, the springs are stretched approximately to the limit permitted by the slot 23. As the springs and paper web travel together toward the left in Fig. 1, the cam tracks 29 converge toward one another so that the springs are permitted to contract. As they contract, they crinkle or crepe the paper as seen in Fig. 7. The cam track may be shaped to provide any desired percentage of contraction of the springs 26 thus creping the paper by the same percentage of its length. At present, a 25 per cent reduction in width of the paper is preferred.

As the paper is about to leave the springs, the cam track may stretch the paper about 10 per cent of its reduced width so as to release it and facilitate its being drawn away from the springs.

The springs 26 are preferably wound square,

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as seen in Fig. 5, rather than round, so that they will engage the paper almost continuously along its length. Although the springs may have their coils staggered and arranged to interfit, it is believed that the invention will work equally well if each coil of a lower spring lies directly below a coil of an upper spring so as to grip the paper directly therebetween. It will be observed that there will be some tendency for the springs to bear against one another rather than interfitting because the inclination of the bottom of the upper spring is in the opposite direction from the inclination of the top of the bottom spring, both springs being wound in the same direction.

The sprockets 16 may be carried by shafts 31 which in turn are carried by brackets 32 mounted on the machine frame 33. The cam tracks 29 are also carried by the frame 33. Anti-friction bearings may be interposed between the bracket 32 and the shaft 31. Likewise, it should be mentioned that the slide 19 and its associated parts may be equipped with anti-friction rollers or the like to reduce friction and wear of the parts. However, there should be only a very slight spacing, if any, between the springs 26 and their bars 18, since otherwise the upper and lower springs might spread apart and not have proper contact with one another. However, the upper springs 26 may be relatively slightly longer than the lower springs in their natural length so that when stretched to the same length they will tend to sag a little more than the lower springs and hence rest their weight on the lower springs.

It will be understood that the drawings are largely diagrammatic and various mechanical refinements will occur to machinery builders. One which might not occur to them, and which is therefore here pointed out, is that some provision should be made to prevent the springs from rupturing or damaging the web as they first come into engagement with the web. It should be observed that on each creping bar 18, the two side springs will be further from the axis of the sprocket than the center spring; hence, the sets of sprockets at one end of the machine should be far enough apart so that none of the springs will interengage severely enough to injure the paper. The chains may then be brought gradually closer together by idler rollers until the springs grip the paper.

Fig. 8 diagrammatically represents a conventional creping unit A and a transverse creping unit B of the type illustrated in Figs. 1 to 7. The unit A includes a driving roll 41 and a scraping blade 42 shaped and adjusted to crepe the paper as it scrapes it from the roll 41. If desired, the paper may be dried and redampened between the two creping units.

Of course, it should also be dried after creping by the unit of Figs. 1 to 7. It may be dried after removal therefrom.

From the foregoing, it is seen that an apparatus and method have been provided for creping paper transversely of the web, whether or not it has previously been creped longitudinally of the web. The resulting product has the advantage of elasticity in the direction transverse to the predominant direction of the fiber, and when previously creped paper is used, elasticity in both directions. In either case, the elasticity is distributed uniformly throughout the paper.

I claim:

1. In creping apparatus, a frame, laterally

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spaced upper and lower endless sprocket chains arranged in parallelism at opposite sides of the frame, upper and lower creping bars secured to and carried by the links of the chains, paper engaging coil springs extending longitudinally of the creping bars, means for mounting the springs on the bars including slides slidably mounted on the bars and connected with the coil springs, and cams converging throughout substantially the length of the apparatus and engaged by the slides and arranged to expand the springs and also to cause the springs to contract gradually and positively to effect a creping of the paper.

2. In creping apparatus, a frame, laterally spaced upper and lower endless sprocket chains arranged in parallelism at opposite sides of the frame, upper and lower creping bars secured to and carried by the links of the chains, groups of contiguous paper engaging coil springs extending longitudinally of the creping bars, the springs of each group being located in the same plane, means for mounting the springs on the bars including slides slidably mounted on the bars and connected with the coil springs, and cams converging substantially throughout the length of the apparatus and engaged by said slides and arranged to expand the springs and also to cause the springs to contract gradually and positively to effect a creping of the paper.

3. In creping apparatus, a frame, laterally spaced upper and lower endless sprocket chains arranged in parallelism at opposite sides of the frame, upper and lower creping bars secured to and carried by the links of the chains, groups of contiguous paper engaging coil springs having rectangular coils and extending longitudinally of the creping bars, the springs of each group being located in the same plane, means for mounting the springs on the bars including slides slidably mounted on the bars and connected with the coil springs, and cams converging substantially throughout the length of the apparatus and engaged by said slides and arranged to expand the springs and also to cause the springs to contract gradually and positively to effect creping of the paper.

4. In creping apparatus, a frame, laterally spaced upper and lower endless sprocket chains arranged in parallelism at opposite sides of the frame, upper and lower creping bars secured to and carried by the links of the chains and provided with longitudinal slots, slides arranged on the creping bars and having fastening devices extending through and slidable in the slots and securing the slides to said bars, groups of paper engaging coil springs connected to said slides, the springs of each group being located in the same plane, and cams converging substantially throughout the length of the apparatus and engaged by said slides and arranged to expand the springs, and also to cause the springs to contract gradually and positively to effect a creping of the paper.

5. In a creping apparatus, a frame, upper and lower pairs of endless sprocket chains arranged in parallelism at opposite sides of the frame, upper and lower creping bars secured to and carried by the links of the chains and provided with slots, slides mounted on the creping bars and composed of upper and lower plates, and inner and outer pins extending through the slots of the bars and connecting the plates and having projecting portions, paper engaging coil springs extending longitudinally of the bars and connected with the projecting portions of the inner

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pins, rollers mounted on the projecting portions of the outer pins, and cams converging substantially throughout the length of the apparatus and provided with channels receiving the said rollers and arranged to expand the springs and also to cause the springs to contract gradually and positively to effect a creping of the paper.

6. In creping apparatus, a frame, upper and lower pairs of endless sprocket chains arranged in parallelism at opposite sides of the frame, upper and lower creping bars secured to and carried by the links of the chains and provided with slots, slides mounted on the creping bars and composed of upper and lower plates and inner and outer pins extending through the slots of the bars and connecting the plates and having projecting portions, groups of springs arranged on the creping bars and connected with the projecting portions of the inner pins and provided with rectangular coils, rollers mounted on the outer pins, and cams converging throughout substantially the length of the apparatus and hav-

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ing channels receiving the rollers of the slides and arranged to expand the springs and also to cause the springs to contract gradually and positively to effect a creping of the paper.

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