

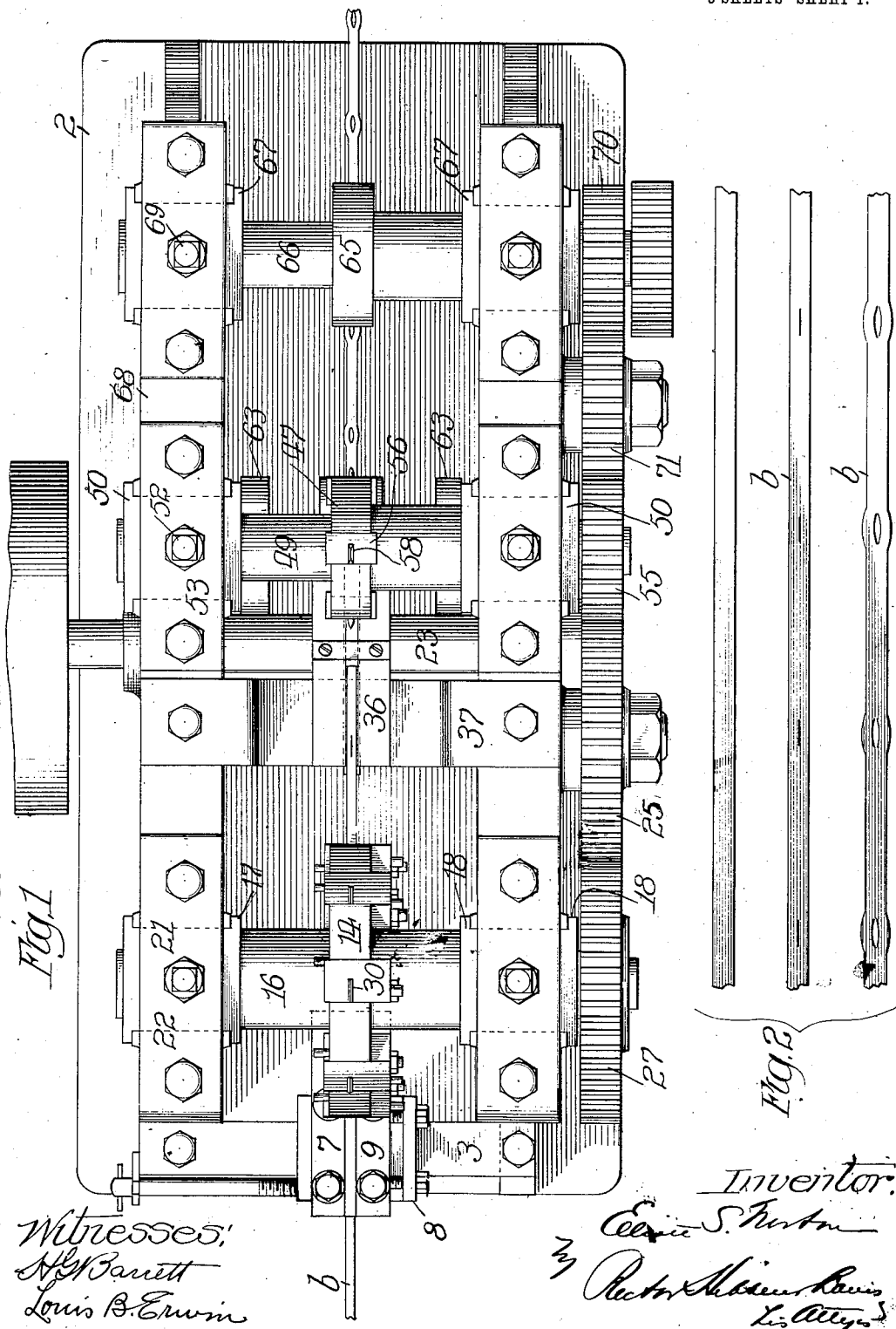
No. 870,195.

PATENTED NOV. 5, 1907.

E. S. NORTON.
APPARATUS FOR MAKING BOX STRAPPING.

APPLICATION FILED AUG. 14, 1906.

5 SHEETS—SHEET 1.



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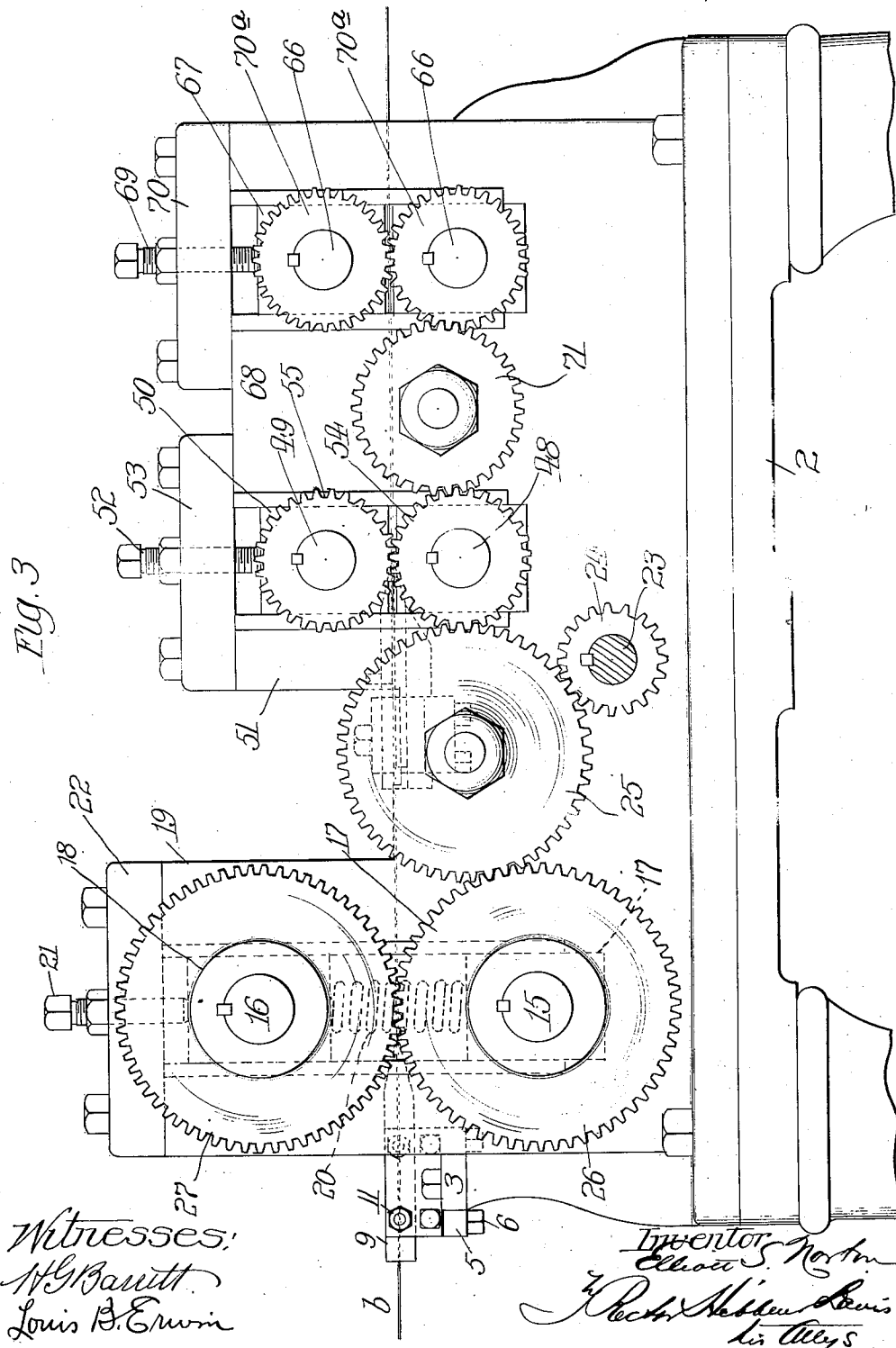
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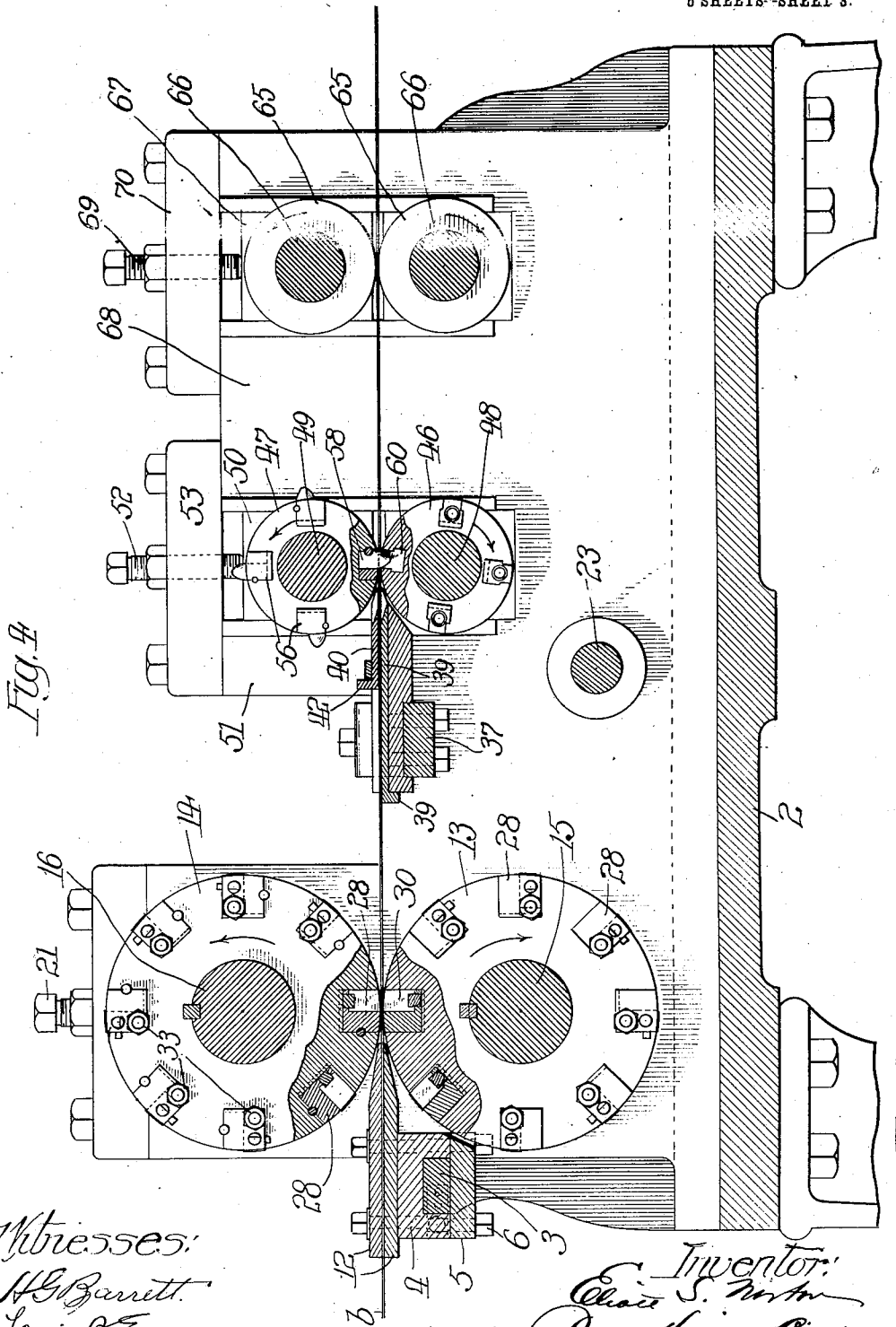


Fig. 4

Witnesses:
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Louis B. Erwin

Inventor:
E. S. Norton
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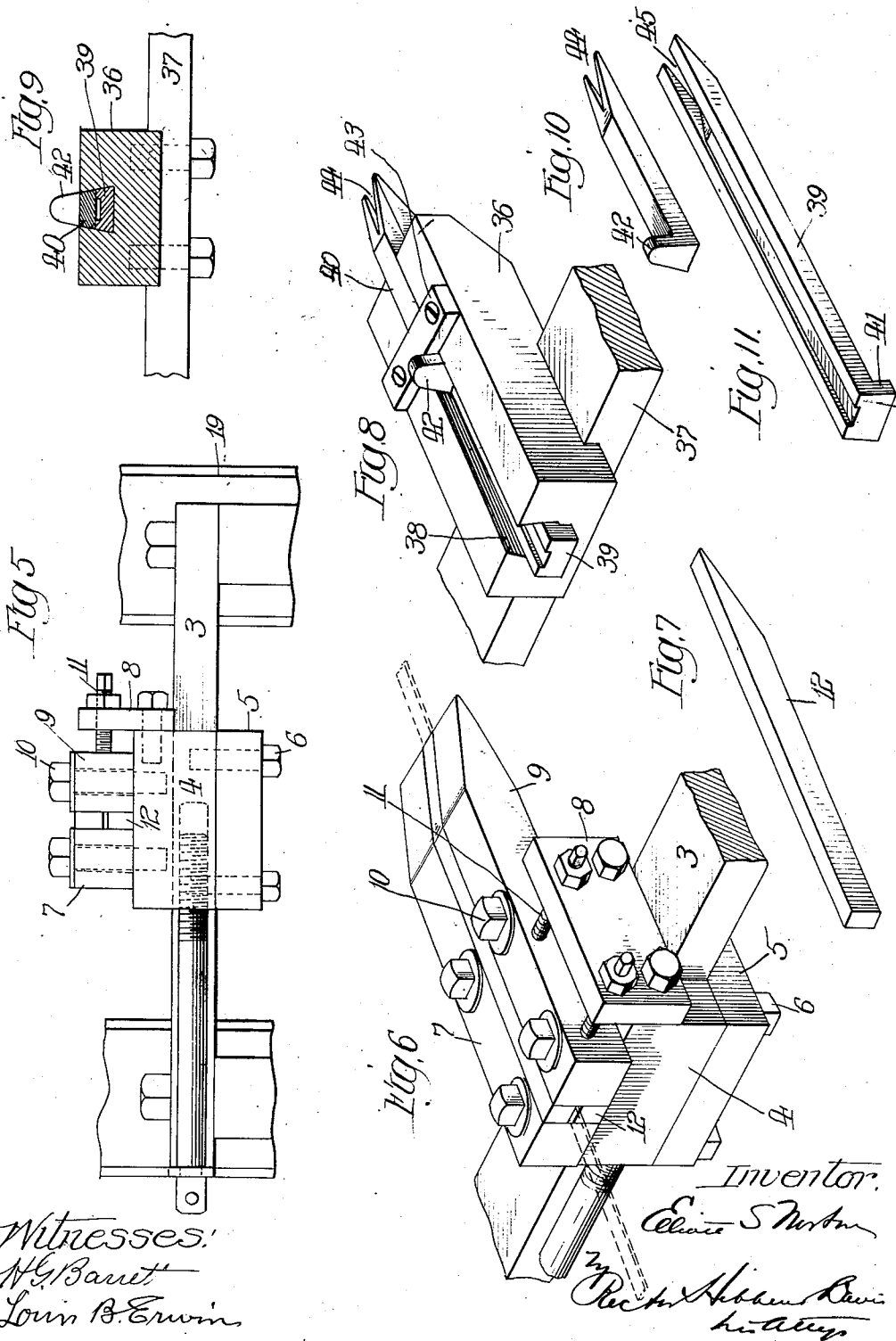
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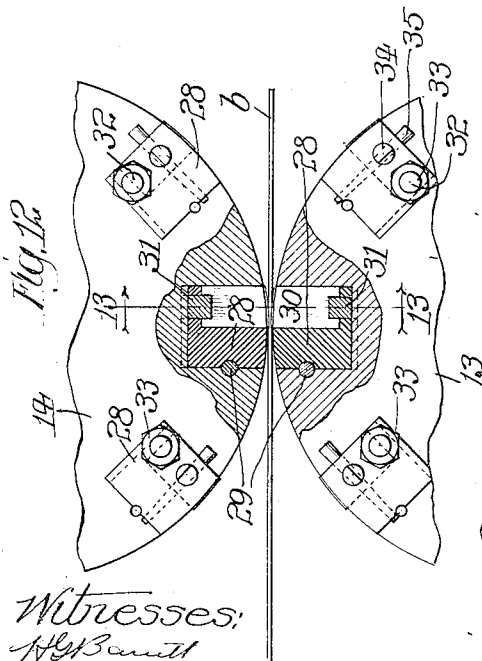
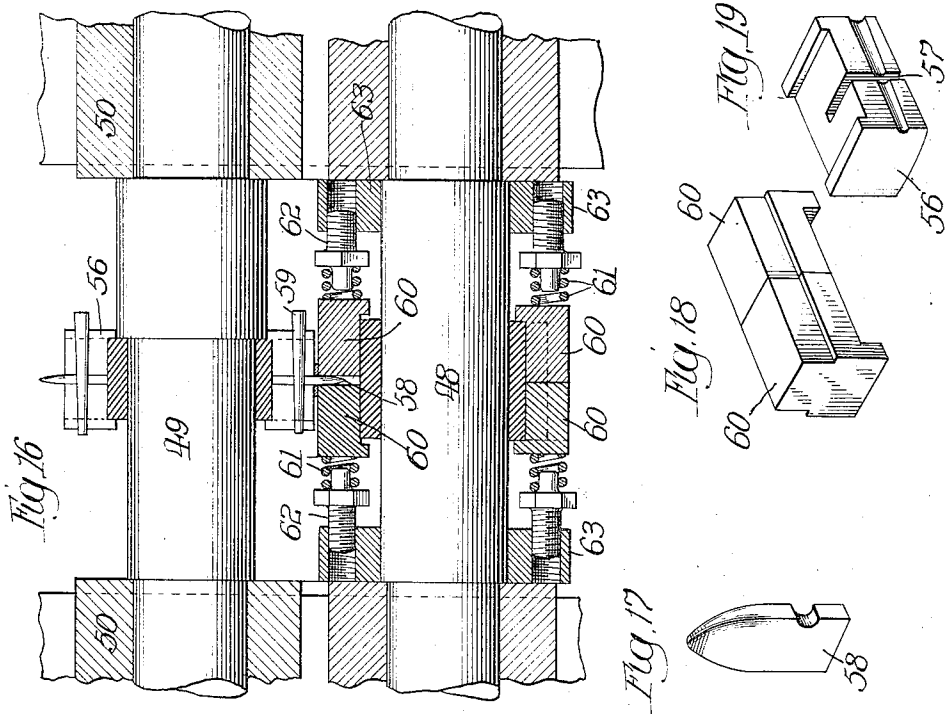
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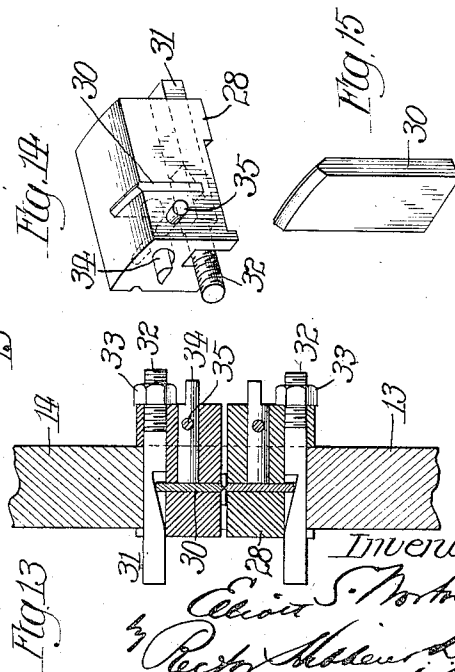
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5 SHEETS—SHEET 5.



Witnesses:
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UNITED STATES PATENT OFFICE.

ELLIOTT S. NORTON, OF CHICAGO, ILLINOIS, ASSIGNOR TO ACME FLEXIBLE CLASP COMPANY,
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APPARATUS FOR MAKING BOX-STRAPPING.

No. 870,195.

Specification of Letters Patent

Patented Nov. 5, 1907.

Application filed August 14, 1906. Serial No. 330,556.

To all whom it may concern:

Be it known that I, ELLIOTT S. NORTON, residing at Chicago, Cook county, Illinois, have invented certain new and useful Improvements in Apparatus for Making Box-Strapping, as set forth in the annexed specification.

The present invention relates to the manufacture of what is known in the trade as flat wire box strapping, the same consisting of a comparatively narrow metal strip formed at intervals with eyes through which fastenings are driven when the strapping is applied to a box or like article.

The principal object of the present invention is to provide apparatus for automatically turning out such a product by continuous operation upon a blank metal strip drawn from the reel. A product of this character must of course be turned out in large quantities at a minimum expense of labor in order that it may be profitably marketed.

The present invention provides for converting the blank metal strip into finished box strapping by the automatic operations of a single machine which can be run at a high speed. The blank strip enters such machine through suitable guides and is scored on opposite sides at proper intervals and passes on to be expanded at the scored portions whereby eyes are produced, the expanded strip being finally flattened out to remove irregularities which may be produced in the expanding operation.

The accompanying drawings illustrate an apparatus for carrying out the invention.

Figure 1 represents such apparatus in top plan view; Fig. 2 represents sections of a metal strip illustrating different stages in the operations performed upon it; Fig. 3 represents said apparatus in side elevation; Fig. 4 represents the same in longitudinal section with some parts broken away; Fig. 5 is an end elevation of certain guiding devices; Fig. 6 is perspective view of the same; Fig. 7 is a perspective detail of one member of this guiding structure; Fig. 8 represents in perspective another guiding structure; Fig. 9 is a cross-section of the same; Figs. 10 and 11 are detail perspectives of members of the last-named guiding structure; Fig. 12 represents portions of the scoring rolls in side elevation with parts broken out to show others in section; Fig. 13 represents a section taken on the line 13-13 of Fig. 12; Fig. 14 represents a scoring tool and holder in perspective; Fig. 15 represents in perspective the tool detached; Fig. 16 represents an axial section of expanding rolls; Fig. 17 shows an expanding tool in perspective; Fig. 18 shows an expanding die in perspective; and Fig. 19 shows in perspective a holder for the expanding tool.

The reference numeral 2 designates the bed plate of the machine supported on suitable legs and upon which are erected a series of housings for the roll bearings.

The rolls comprise a scoring set, an expanding set and a flattening set all arranged in tandem. The blank metal strip *b* enters the machine at one end and is conducted through suitable guides to the scoring rolls.

The guiding structure is of the following description: Upon a cross-bar 3 of the supporting frame-work of the machine there is mounted a block 4 secured in place by a cap plate 5 and bolts 6 and having bolted to its upper side a block 7. A flange 8 is bolted to one side of the block 4 and on the inner side of this flange there rests upon the top of the block 4 a block 9 which is a counterpart of the block 7, both being tapered at their inner ends as shown in Fig. 6. The bolts 10 which secure the block 9 to the block 4 pass loosely through the former so as to permit lateral movement thereof. Set screws 11 entered through the flange 8 bear against the block 9 and serve the purpose of securely clamping between said block and its mate a pair of bars 12 with a space between them constituting a guide-way for the metal strip. The dimensions and spacing apart of the bars will depend upon the character of the work, the described construction obviously providing for interchangeability of guide-bars and adjustment thereof to suit strips of different dimensions. These bars 12 taken together conform to the contour of the blocks 7 and 9, being beveled at the inner ends. The object of this beveling is to have the guide extend into the bight of the scoring rolls as shown in Fig. 4. Said rolls are designated in the drawings by the numerals 13 and 14 and are secured to shafts 15 and 16 respectively journaled in box bearings 17 and 18 in the housings 19. Springs 20 are interposed between the bearings of the shafts and screws 21 entered through the cap plates 22 of the housing 19 engage the upper bearings to set the rolls in proper relation to each other. Motion is transmitted to these rolls from a drive-shaft 23 through a pinion 24 meshing with an idler 25 which in turn meshes with a gear wheel 26 on the shaft 15, said gear wheel meshing with a similar wheel 27 on the shaft 16, all as shown in Fig. 3. Each roll is formed in its periphery with a series of equidistant recesses and in these recesses are secured tool holders 28. Each tool holder is in the form of a block with a curved outer surface to conform with the contour of the periphery of the roll and a rabbeted inner side to take over the sides of the roll. The block is held in the recess by a tapered pin 29 and is slotted to receive the tool which is in the form of a scoring blade 30 adapted to project from the curved surface of the block and hence from the periphery of the roll. The scoring edge of the tool is caused to project exactly the proper extent by the adjustment of a wedge 31 against the inclined surface of which the back of the tool bears as shown in Fig. 13, this wedge having a screw-threaded shank 32 engaged by a nut 33. The

tool is prevented from falling or being thrown out of the holder by a pin 34 which occupies a hole in the holder and is driven and held against the side of the tool by a tapered pin 35 passing at right angles through the first-named pin as shown in Fig. 14.

The holders and tools are so located in the rolls and the latter so geared together as to cause the tools to arrive in pairs for action upon the strip, each pair composed of a tool of each roll. The scoring edges of a pair of tools thus confront each other as they arrive at the bight of the rolls and with the metal strip passing between the rolls these edges will act simultaneously upon opposite sides of said strip scoring the same lengthwise in exact registry. The opposed scoring edges do not come into contact with each other and thus do not score to a depth which would mean actually cutting through the strip. However, they do approach each other so nearly that although the metal is not actually cut through what is left of it between the scoring edges is not sufficient to hold together and a break occurs extending throughout nearly if not quite the full length of the scoring. The edges of the scoring tools are somewhat blunt and produce a slight spreading effect upon the metal strip as the metal gives way in the scored portions.

The scored strip passes from the scoring rolls to a second guiding structure of the following description: A block 36 beveled on the under-side at one end is bolted to a cross-bar 37 of the supporting frame-work and is formed with a dove-tailed channel 38 receiving a bar 39 grooved in its upper side to form part of a guide-way for the metal strip. A somewhat similar but shorter bar 40 fits in the channel 38 above the bar 39 to complete the guide-way. These bars have lugs 41 and 42, the former engaging an end surface of the block 36 and the latter engaging a cross-bar 43 on said block, to prevent advance with the metal strip. Both bars are beveled at their forward ends to accommodate the bight of the expanding rolls and both bars are bifurcated as shown at 44 and 45 to permit the passage of the expanding tools. The bar 39 is interchangeable with others to provide for different dimensions of metal strips, the groove of different bars varying accordingly.

The rolls which perform the expanding or spreading operation are designated by the numerals 46 and 47, the same being secured to shafts 48 and 49 journaled in box bearings 50 fitting slideways of housings 51. Screws 52 entered through cap plates 53 of said housings engage the upper box bearings and serve to secure the proper relative adjustment of the rolls. Motion is transmitted to the latter through the medium of a gear wheel 54 meshing with the idler 25 and secured to the shaft 48 and a similar gear wheel 55 secured to the shaft 49 and meshing with said gear wheel 54. The upper roll 47 is recessed in its periphery to receive holders for the expanding tools, each holder being in the form of a block 56 rabbeted to take over the outer sides of the roll and cross-slotted as shown at 57 to receive the tool 58. The latter is shown in perspective in Fig. 17 and is in the form of a blade tapered in both directions to a blunt point. It is held in place by a tapered pin 59 engaging grooves in the block 56 and in the tool, said pin also serving to hold the block in the roll by engaging grooves in the latter as shown in Fig. 4. The double tapered portion of the tool projects from the periphery

of the roll and is adapted to enter the scored portion of the strip as the latter arrives at the bight of the rolls 46 and 47. Of course these rolls and the scoring rolls are properly timed to insure a scored portion of the strip arriving in position to be acted upon as each expanding tool passes through the bifurcation of the upper guide bar 40. As this tool descends and turns its forward edge will enter the score in the upper side of the strip, the point of the tool immediately following so that when the tool arrives at a perpendicular position as shown in Fig. 4 it has forced its way through the strip spreading it apart and forming an eye with the general cross-sectional contour of the base of the tool. As the roll 47 continues to rotate and the strip is fed forward the tool of course turns and rises through the eye and leaves the strip. In the present instance four of such tools are shown arranged to act upon the strip one after another and there are represented twice as many pairs of scoring tools but this arrangement is of course subject to modification.

The lower roll 46 carries dies to cooperate with the spreading and expanding tools so as to properly support the strip on opposite sides of the scoring while the said tool is forcing its way through the strip. Each die is composed of two members in the form of blocks 60 rabbeted at the ends to take over the sides of the roll and at the sides to engage under-cut portions of recesses in the periphery of the roll. The blocks are arranged to slide in these recesses and are held together by spiral springs 61 pressing against their outer ends, said springs being confined in place by projections on the heads of screws 62 engaging tapped holes in collar 63 secured to the shaft 48. By turning said screws the tension of the springs may be regulated. The blocks 60 abut exactly in the line of travel of the front edges of the expanding tools and there are of course as many dies in the roll 46 as there are tools in the roll 47 and they are so located that the die arrives simultaneously with the tool at the bight of the rolls. The forward edge of the tool forces its way between the blocks 60 which retreat as the tool advances but always hug the latter closely thereby supporting the metal of the strip on both sides of the tool as illustrated in Fig. 16. Of course as the tool withdraws from the metal strip it leaves the die and the members of the latter are brought together again by the action of the springs 61.

As some distortion of the strip is likely to take place notwithstanding the employment of the dies above described, a pair of rolls 65 are employed to roll the expanded strip out flat, these rolls being secured to shafts 66 journaled in box bearings 67 fitting housings 68. Set screws 69 entered through caps 70 of said housings and engaging said shafts serve to hold said rolls in proper relation to each other. The expanded strip passes directly from the second set of rolls to this set of flattening or finishing rolls as shown in Fig. 4 and the latter not only operate in rotation to flatten the strip but also exert a pull thereon, being speeded somewhat beyond the said second set of rolls. The shafts 66 carry gear wheels 70 meshing with each other and one of them meshing with an idler 71 which in turn engages the gear wheel 54. The number of teeth in this gear wheel 70 is slightly in excess of the number of teeth in the gear wheel 54 so that in rotation the rolls 65 which are of the same diameter as the rolls 46 and 47 have a sur-

face speed in excess of the latter. The rolls 65 thus exert a drag or pull on the strip to keep it taut and assist in feeding it through the several sets of rolls.

It will now be seen that the above described apparatus is well calculated to thoroughly fulfil the object primarily stated. At the same time it is to be understood that the construction here shown may be modified in various ways without departing from the spirit and scope of the invention.

10 What is claimed is:

1. In a machine of the character described the combination of means for scoring the blank strip at intervals on both sides, and means for expanding the strip in the scored lengths thereof.

15 2. In a machine of the character described, the combination of means for scoring the blank strip at intervals on both sides, means for expanding the strip in the scored lengths thereof and means for flattening the expanded strip.

20 3. In a machine of the character described, the combination of rolls carrying pairs of scoring tools to act on opposite sides of the strip, and means for expanding the strip in the scored lengths thereof.

25 4. In a machine of the character described, the combination of rolls carrying pairs of scoring tools to act on opposite sides of the strip and a roll carrying expanding tools to pass through the scored parts of the strip.

30 5. In a machine of the character described, the combination of rolls carrying pairs of scoring tools to act on opposite sides of the strip, a roll carrying expanding tools to pass through the scored parts of the strip and a companion roll carrying dies to receive the said expanding tools.

35 6. In a machine of the character described, the combination of rolls carrying pairs of scoring tools to act on opposite sides of the strip, means for expanding the strip in the scored lengths thereof and means for flattening the expanded strip.

40 7. In a machine of the character described, the combination of rolls carrying pairs of scoring tools to act on opposite sides of the strip, means for expanding the strip in the scored lengths thereof and rolls for flattening the expanded strip.

45 8. In a machine of the character described, the combination of rolls carrying pairs of scoring tools to act on opposite sides of the strip, a roll carrying expanding tools to pass through the scored parts of the strip and means for flattening the expanded strip.

50 9. In a machine of the character described, the combination of rolls carrying pairs of scoring tools to act on opposite sides of the strip, a roll carrying expanding tools to pass through the scored parts of the strip and rolls for flattening the expanded strip.

55 10. In a machine of the character described, the combination of rolls carrying pairs of scoring tools to act on opposite sides of the strip, a roll carrying expanding tools to pass through the scored parts of the strip, a companion roll carrying dies to receive the said expanding tools, and means for flattening the expanded strip.

60 11. In a machine of the character described, the combination of rolls carrying pairs of scoring tools to act on opposite sides of the strip, a roll carrying expanding tools to pass through the scored parts of the strip, a companion roll carrying dies to receive the said expanding tools and rolls for flattening the expanded strip.

65 12. In a machine of the character described, the combination of means for scoring the blank strip at intervals on both sides, and a roll carrying expanding tools to pass through the scored parts of the strip.

70 13. In a machine of the character described, the combination of means for scoring the blank strip at intervals on both sides, a roll carrying expanding tools to pass through the scored parts of the strip and a companion roll carrying dies for said expanding tools to enter.

75 14. In a machine of the character described, the combination of means for scoring the blank strip at intervals on both sides, a roll carrying expanding tools to pass through the scored parts of the strip and means for flattening the expanded strip.

15. In a machine of the character described, the combination of means for scoring the blank strip at intervals on both sides, a roll carrying expanding tools to pass through the scored parts of the strip and rolls for flattening the expanded strip. 80

16. In a machine of the character described, the combination of means for scoring the blank strip at intervals on both sides, a roll carrying expanding tools to pass through the scored parts of the strip, a companion roll carrying dies for said expanding tools to enter and means for flattening the expanded strip. 85

17. In a machine of the character described, the combination of means for scoring the blank strip at intervals on both sides, a roll carrying expanding tools to pass through the scored parts of the strip, a companion roll carrying dies for said expanding tools to enter and rolls for flattening the expanded strip. 90

18. In a machine of the character described, the combination of a roll carrying expanding tools to pass through the strip, rolls for flattening the expanded strip, and gearing connecting said rolls with the expanding tool roll with provisions for increased surface speed of the flattening rolls. 95

19. In a machine of the character described, the combination of means for scoring the blank strip at intervals, a roll carrying expanding tools to pass through the scored parts of the strip, rolls for flattening the expanded strip, and gearing connecting said rolls with the expanding tool roll with provisions for increased surface speed of the flattening rolls. 100

20. In a machine of the character described, the combination of a roll carrying expanding tools to pass through the strip, a companion roll carrying dies for said expanding tools to enter, rolls for flattening the expanded strip, and gearing connecting said rolls with the expanded tool and die rolls with provisions for increased surface speed of the flattening rolls. 105

21. In a machine of the character described, the combination of means for scoring the blank strip at intervals, a roll carrying expanding tools to pass through the scored parts of the strip, a companion roll carrying dies for said expanding tools to enter, rolls for flattening the expanded strip, and gearing connecting said rolls with the expanding tool and die rolls with provisions for increased surface speed of the flattening rolls. 110

22. In a machine of the character described, the combination of means for scoring the blank strip at intervals on both sides, a roll carrying expanding tools to pass through the scored parts of the strip, rolls for flattening the expanded strip and gearing connecting said rolls with the expanding tool roll with provisions for increased surface speed of the flattening rolls; substantially as and for the purpose described. 115

23. In a machine of the character described, the combination of means for scoring the blank strip at intervals on both sides, a roll carrying expanding tools to pass through the scored parts of the strip, a companion roll carrying dies for said expanding tools to enter, rolls for flattening the expanded strip and, gearing connecting said rolls with the expanding tool and die rolls with provisions for increased surface speed of the flattening rolls; substantially as and for the purpose described. 120

24. In a machine of the character described, a strip guide comprising a fixed block, a movable block and a pair of bars interposed between said blocks and adapted to be clamped in place by adjustment of the movable block, a guideway for the strip being formed between said bars. 125

25. In a machine of the character described, the combination of a pair of peripherally recessed rolls, slotted tool holders occupying the recesses thereof, means for securing said holders in the recesses, scoring blades occupying the slots of the holders, wedges in the latter for determining the amount of projection of the blades from the peripheries of the rolls, and means for preventing outward movement of the blades after adjustment. 130

26. In a machine of the character described, a strip guide comprising a block with a dovetail channel, and a pair of grooved bars occupying said channel and formed with lugs to prevent longitudinal movement. 135

27. In a machine of the character described, a strip

guide comprising a block with a dovetail channel, and a pair of grooved bars occupying said channel and formed with lugs to prevent longitudinal movement, said bars being bifurcated at the ends from which the strip issues.

- 5 28. In a machine of the character described, the combination with a roll carrying expanding tools, of a companion roll recessed in its periphery, and dies occupying the recesses and each composed of a pair of sliding blocks spring-pressed towards each other.
- 10 29. In a machine of the character described, the combination with a roll carrying expanding tools, of a companion roll recessed in its periphery, and dies occupying the recesses and each composed of a pair of sliding blocks spring-pressed towards each other with provisions for
- 15 varying the spring pressure.
30. In a machine of the character described, the combination

with a roll carrying expanding tools, of a companion roll recessed in its periphery, dies occupying the recesses and each composed of a pair of sliding blocks, collars compounded with said companion roll, screws 20 carried by the collars, and springs interposed between said screws and the die-slides.

31. In a machine of the character described the combination of means for scoring the blank strip at intervals 25 on both sides, and means for expanding the strip in the scored lengths thereof, with provisions for continuously advancing the strip.

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Witnesses:

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