Oct. 31, 1939. J. R. NOLAN 2,177,739

MACHINE FOR MAKING WIRED TAGS

Filed Dec. 20, 1938 8 Sheets-Sheet 1

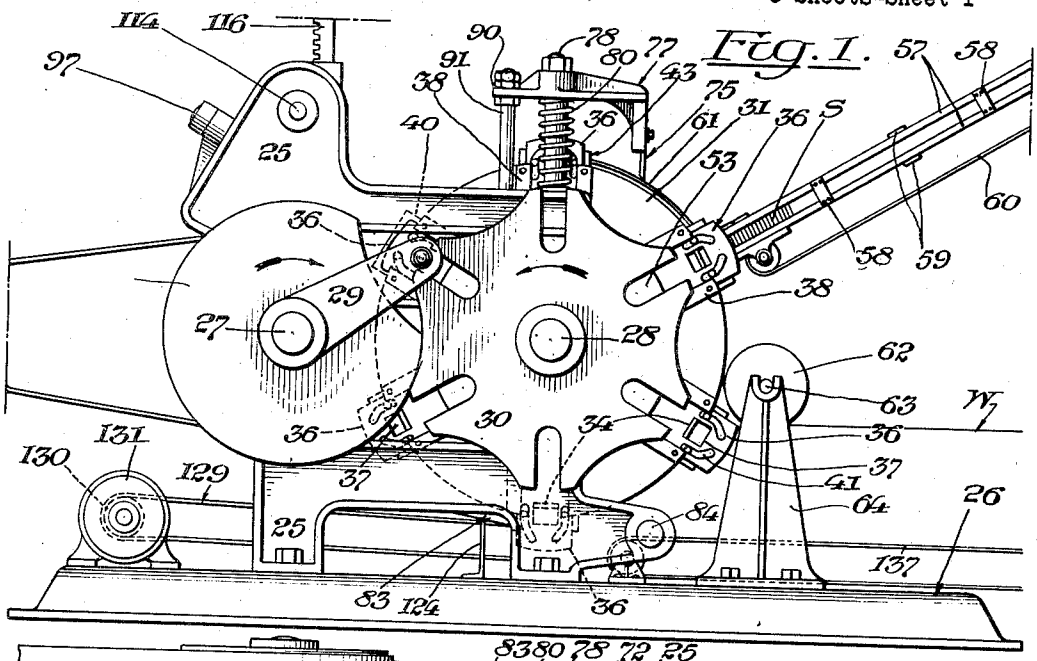


Fig. 1.

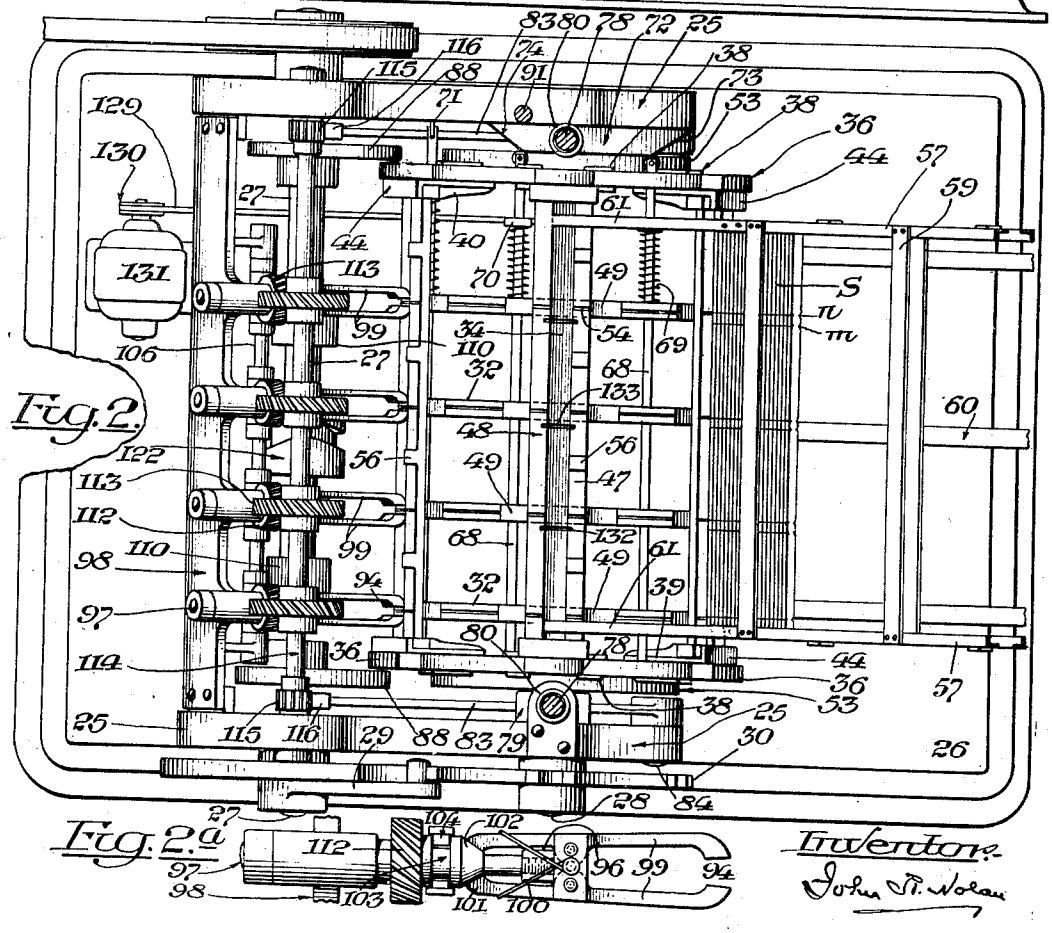


Fig. 2.

Fig. 2a

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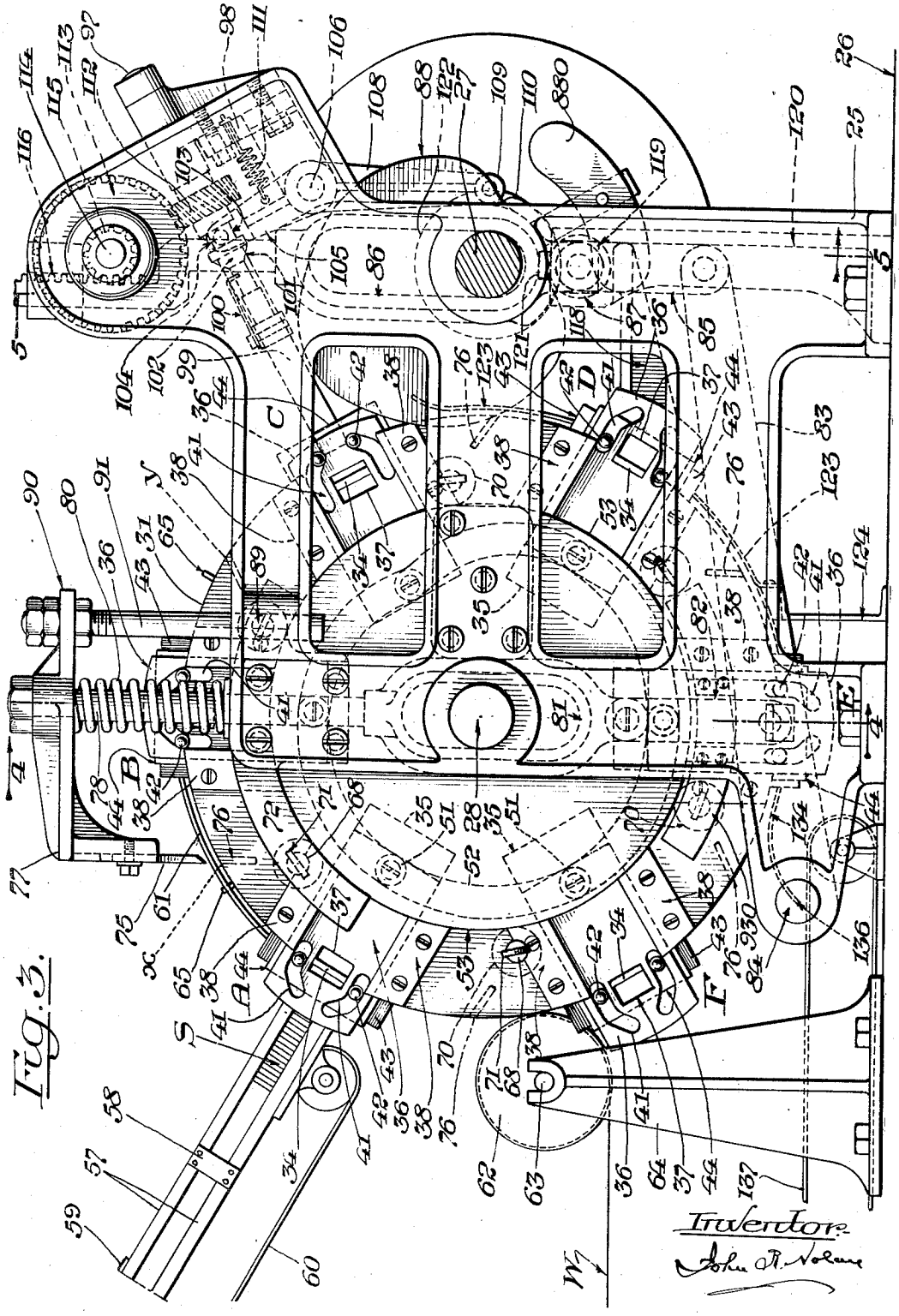


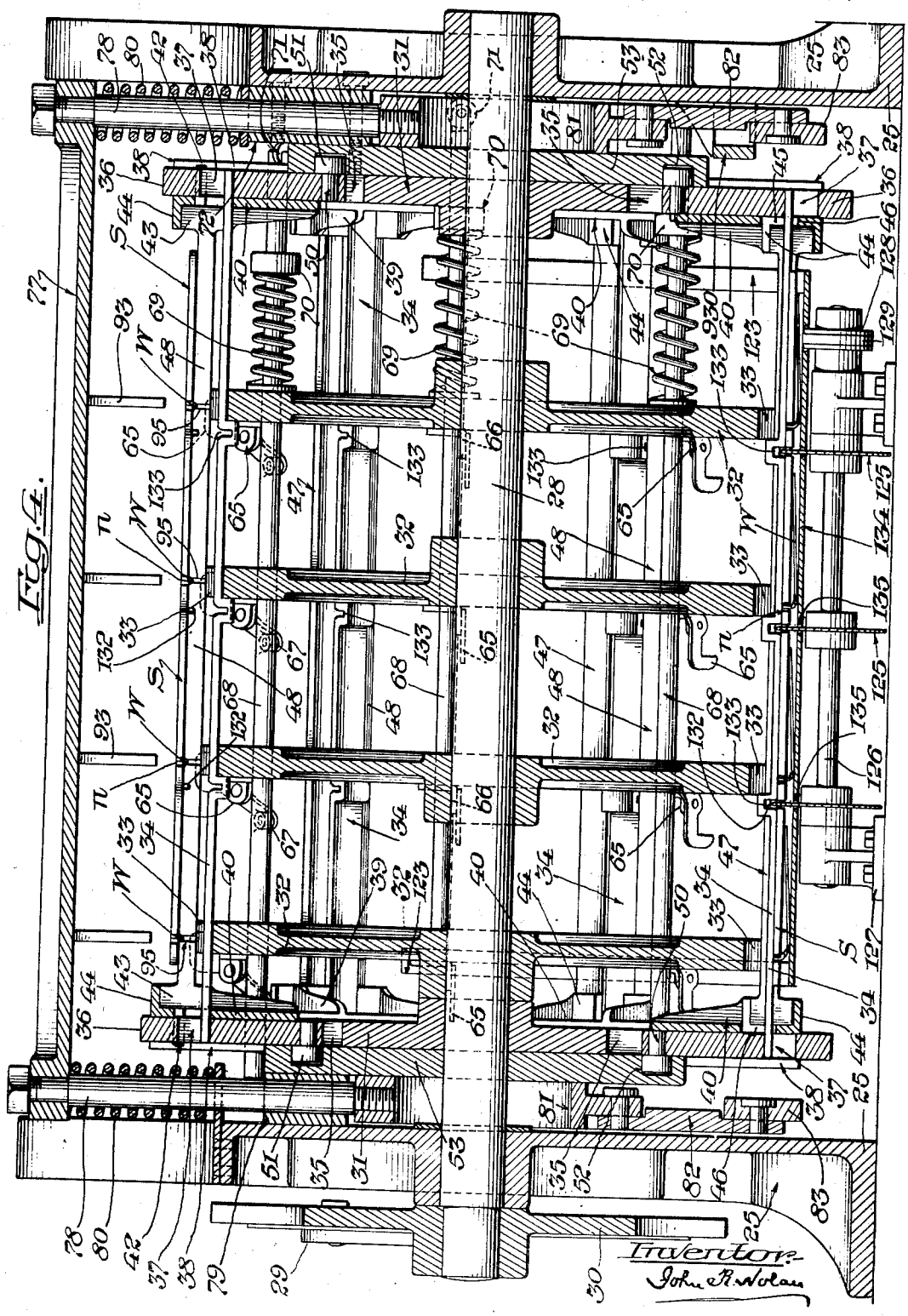
Fig. 3.

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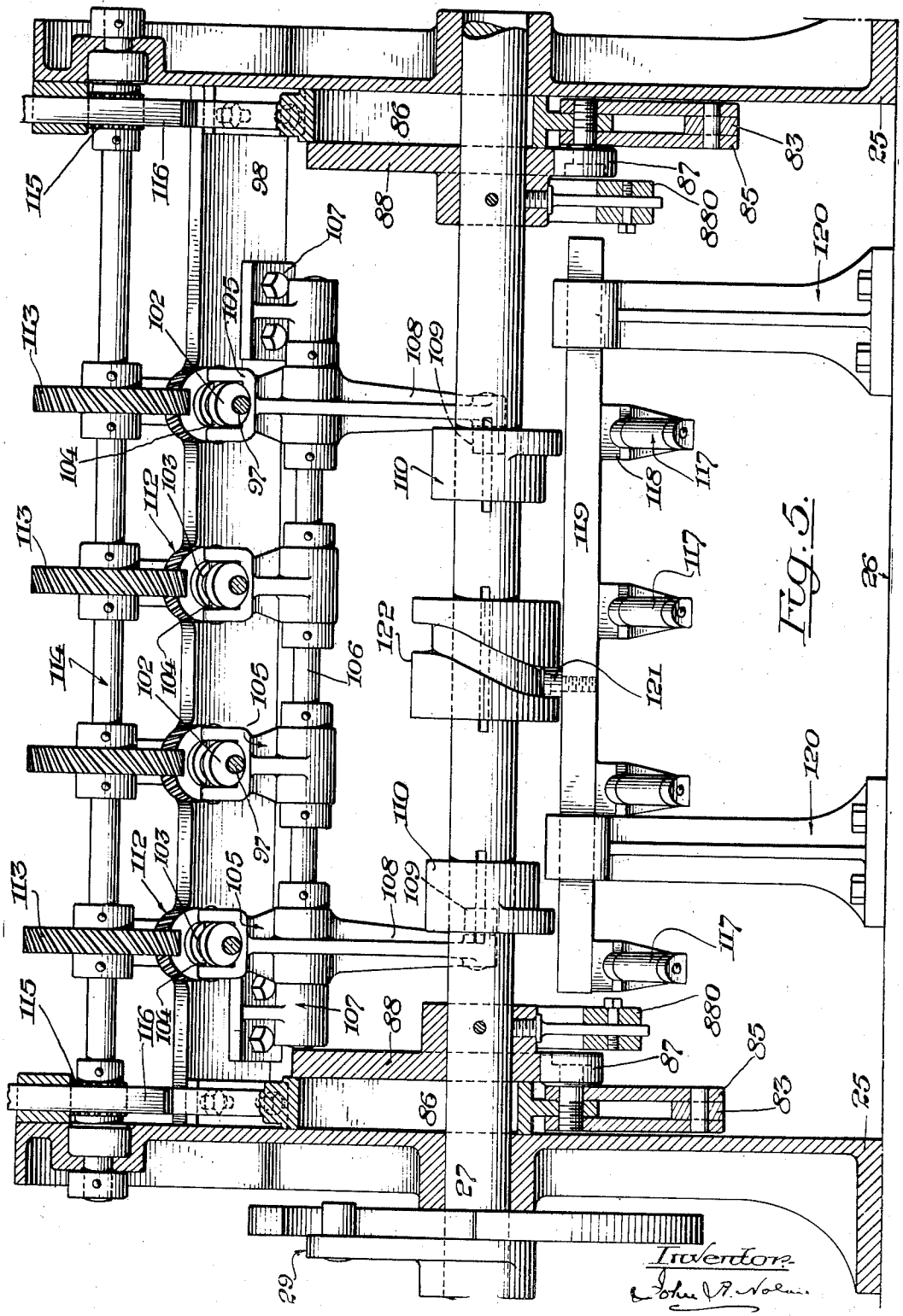


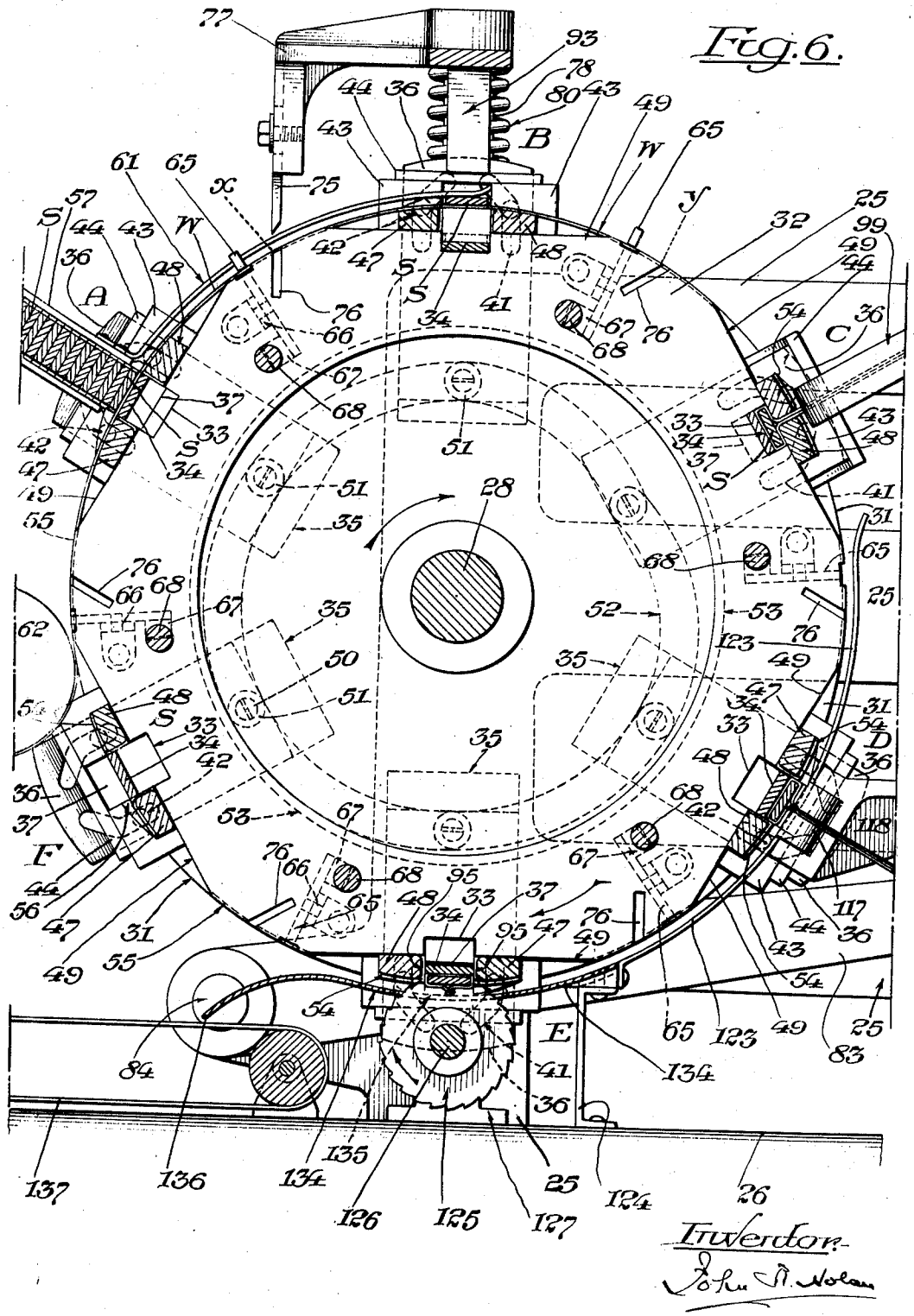
Fig. 5.

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Fig. 6.



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Fig. 2.

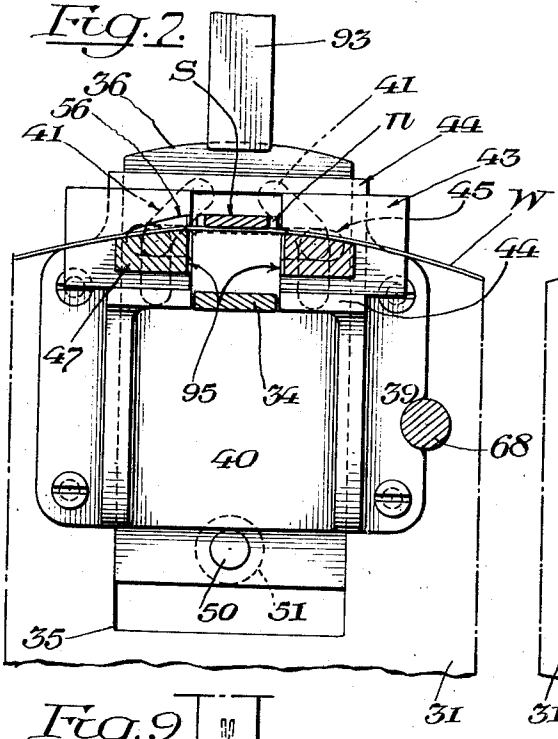


Fig. 8.

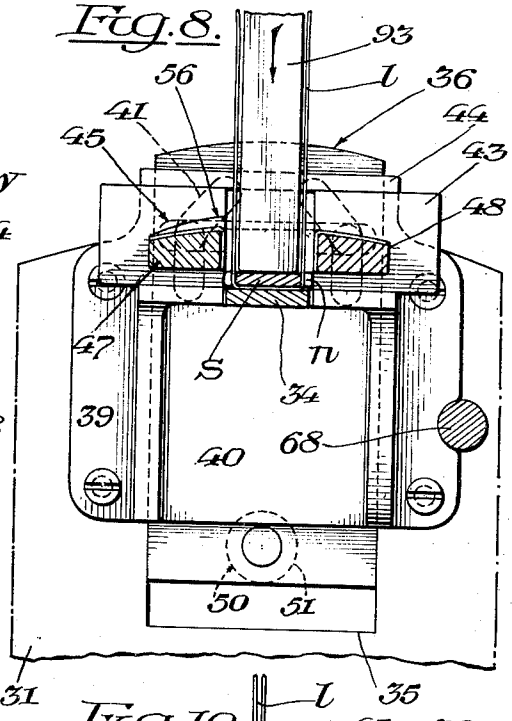


Fig. 9.

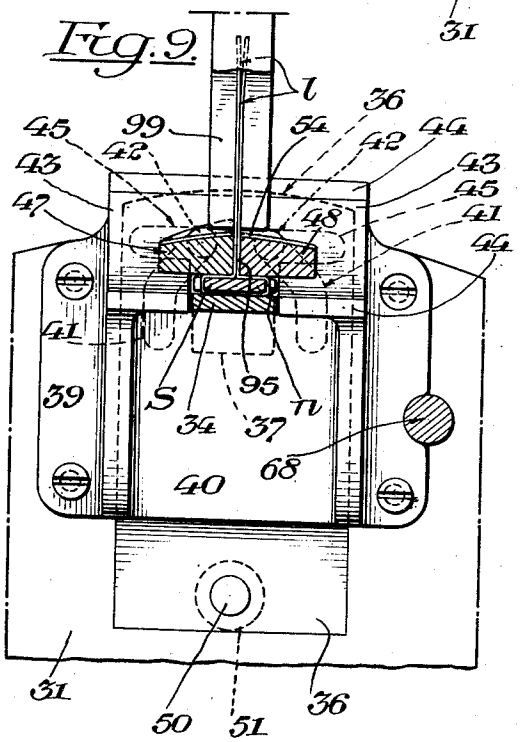
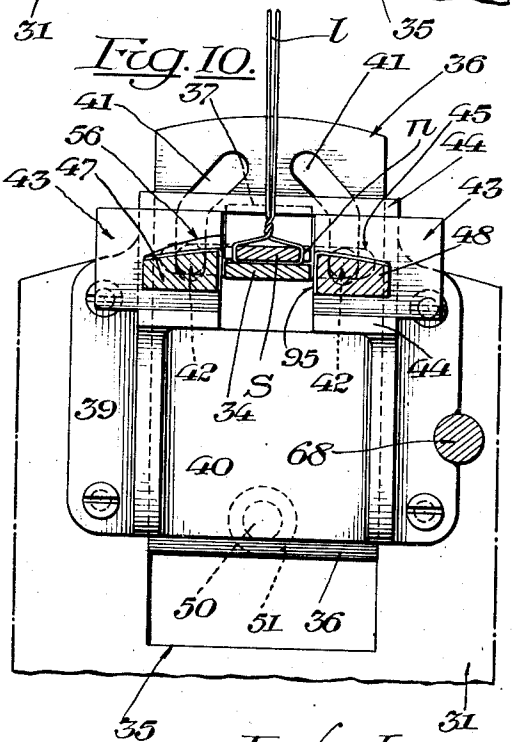


Fig. 10.



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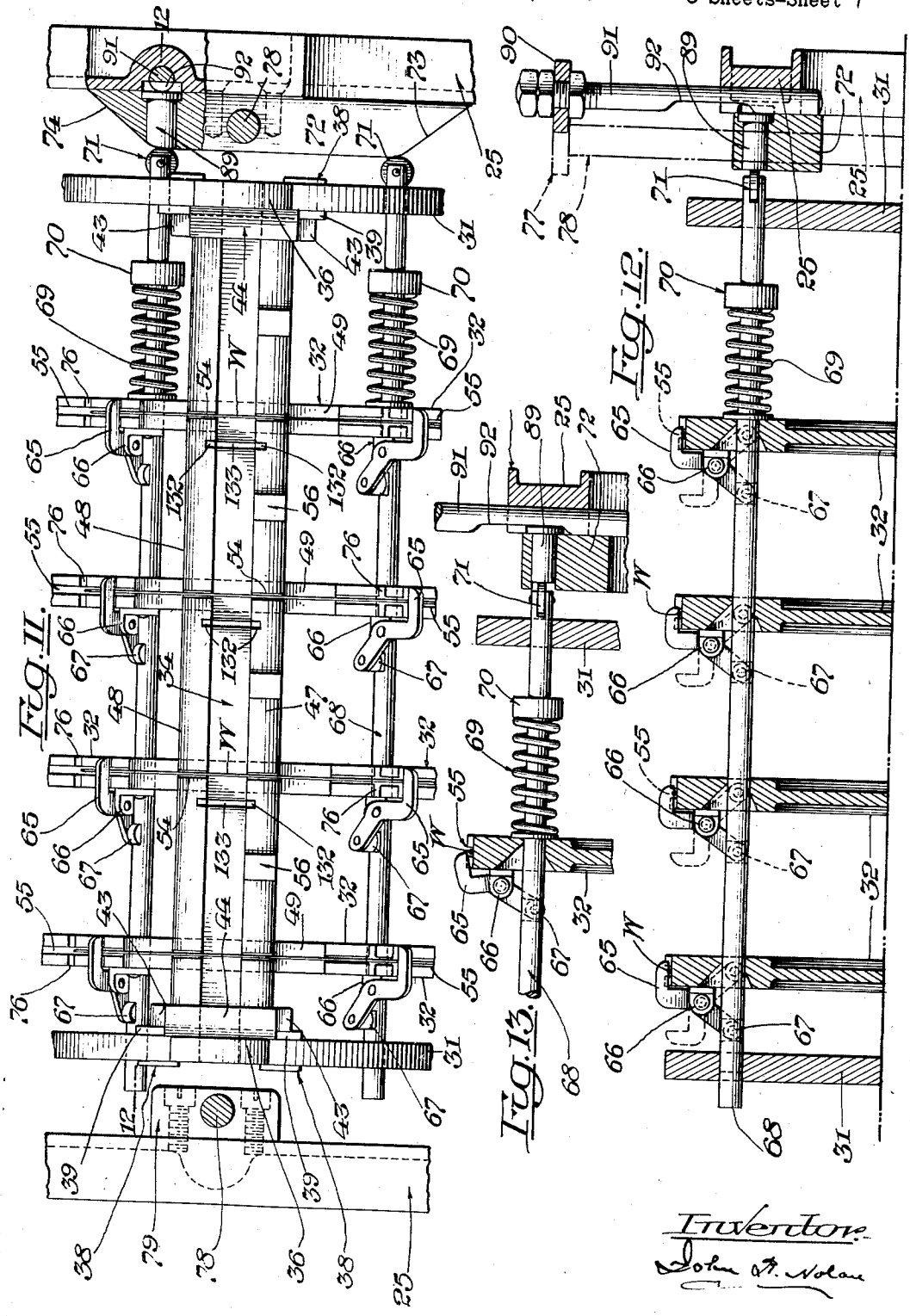


Fig. 11.

Fig. 12.

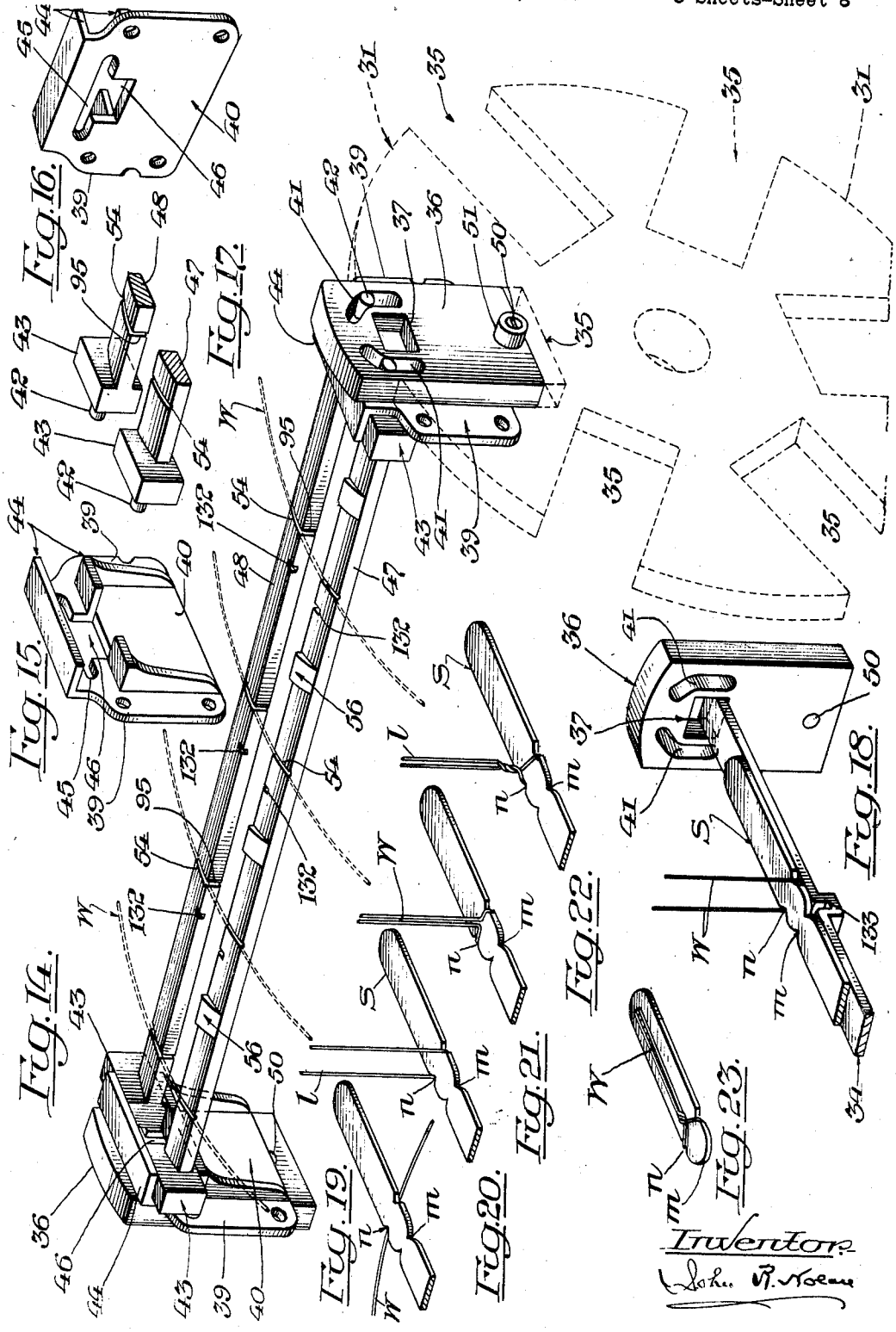
Fig. 13.

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Patented Oct. 31, 1939 2,177,739

UNITED STATES PATENT OFFICE

2,177,739

MACHINE FOR MAKING WIRED TAGS

John R. Nolan, Larchmont, N. Y.

Application December 20, 1938, Serial No. 246,768

19 Claims. (Cl. 140—93)

This invention relates to machines for making wired tags, more especially the conventional identification tags, or markers, that are applied to plants and the like. Such plant tags are each composed of a rectangular strip of thin wood about which is looped the midsection of a suitable length of wire whereof the legs are twisted together at their basal portions and are folded against and longitudinally of the tag.

The principal object of my invention is the provision of a machine of simple and efficient construction and operation whereby tie wires are rapidly and uniformly produced and at the same time are securely applied to the tag material. Other objects will hereinafter appear.

The machine herein illustrated as an embodiment of my invention includes an element constituting a strip and wire carrier which is arranged in co-operative relation to a series of spaced stations at which the respective steps for the production of the wired tags are successively performed, namely, a station having means for applying strips in succeeding order to and upon a series of spaced parallel wires which are supported and lengthwise impelled by the carrier; a station having means for cutting the leading ends of the wires to provide tie lengths at intervals along each succeeding strip, and also having means for bending such lengths about the strip; a station having means for twisting together the projecting portions of the respective tie wire lengths; a station having means for folding the twisted projecting portions against and longitudinally of one side of the strip, and a station having means for subdividing each strip transversely between the adjacent tie wires so as to provide a plurality of wired tags.

The invention also comprises features of construction and combinations of parts which in a preferred form will be hereinafter described; the scope of the invention being expressed in the appended claims.

In the annexed drawings—

Figure 1 is a side elevation of a machine embodying the principle of my invention.

Fig. 2 is a plan of the machine.

Fig. 2ª is a plan of one of the wire twisters.

Fig. 3 is a side elevation of the machine opposite to that shown in Fig. 1.

Fig. 4 is a transverse vertical section of the machine, as on the line **4—4** of Fig. 3.

Fig. 5 is a similar section, as on the line **5—5** of Fig. 3.

Fig. 6 is a vertical section through the strip and wire carrier and its associated mechanisms, showing their successive operations upon the strip and wire.

Fig. 7 is a view of a portion of the carrier and adjuncts at the station where the strip and the leading end of the wire are positioned preparatory to the severance of a tie-wire length and the looping thereof about the strip.

Fig. 8 is a similar view at the same station showing the wire length as severed and looped about the strip.

Fig. 9 is a similar view of a portion of the carrier and adjuncts at the next succeeding station, showing the looped wires as pressed against the top of the strip and with the projecting legs of the wire in close relation and positioned between the jaws of a twister.

Fig. 10 is a similar view of a portion of the carrier and adjuncts at the next succeeding station showing the strip with its twisted tie-wire in position to be folded against and longitudinally of the strip.

Fig. 11 is a plan of a portion of the carrier at the wire-looping station, showing the adjacent sets of wire clamps and the actuating devices therefor.

Fig. 12 is a vertical section in a plane through one set of clamps, as on the line **12—12** of Fig. 11.

Fig. 13 is a sectional detail of one of the clamps and its actuating rod showing a cam actuated stud for partially opening the clamp.

Fig. 14 is a perspective view of a pair of wire bending jaw bars and the cam plates for opening and closing the bars.

Figs. 15 and 16 are perspective views from opposite sides of one of the end guide brackets for the jaw bars.

Fig. 17 illustrates the guide blocks of the respective jaw bars at one end of the latter.

Fig. 18 is a perspective view of one of the cam slides for the jaws, showing one end of a backer bar seated in the slide and supporting a portion of a strip with a tie-wire looped on the latter.

Figs. 19 to 23, inclusive, illustrate the strip and the wire in their relative positions during succeeding steps in the operation of the machine.

Referring to the drawings, **25** designates spaced frame standards and **26** designates a base therefor. **27** and **28** designate two spaced parallel shafts having their bearings in the standards. The rear shaft **27**, which is the main drive shaft, is operatively connected with the forward shaft **28** by suitable intermittent motion mechanism, such, for example, as a Geneva stop motion whereof the driving and driven elements **29** and **30** are fast on the respective shafts.

Fast on the shaft 28 and intermittently rotatable therewith, is a strip and wire support constituting a carrier by means of which associated strips of wood S and wires W are moved step by step to a series of succeeding stations hereinafter described.

In the present instance each strip S is of sufficient length for subdivision into four uniform tags, its longitudinal edges having at suitably spaced points notches *n* adapted to receive and retain the respective tie wires when they are applied to the strip, and such edges being also suitably shaped, as at *m*, adjacent the notches, to afford chamfered or rounded ends for the respective tags which are severed from the strip. In pursuance of my invention the strip may be preformed to provide a single tag or any desired number of tags.

The carrier in the form illustrated comprises a pair of circular end heads 31 and therebetween a plurality of equally spaced disks 32, in the present instance four. In the periphery of each of the disks are a plurality of equally spaced rectangular recesses 33, in the present instance six. The recesses of the assembled disks are in longitudinal alignment with each other and each set of aligning recesses has loosely seated therein a radially movable bar 34 with extending end portions. This bar constitutes a strip backer member between the respective end heads 31.

Each end head has a series of equally spaced guide openings 35 corresponding in number and relation with the recesses in each of the disks. In each opening is mounted a radially movable plate 36 whereof the outer end extends beyond the periphery of the head and has a suitably-disposed rectangular opening 37 into which the end of the adjacent backer bar 34 extends. Thus the respective ends of the bar are seated within the aligning rectangular openings of a pair of slide plates mounted in the two end heads for limited radial movement therein. The openings 37 are of such form and dimensions that in the outward movement of the end plates 36 the bottoms of the openings bear against the respective ends of the backer bar 34 and push the bar uniformly outward a determined extent, and that in the succeeding inner movement of the end plates the bar is free to resume its position at the bottoms of the recesses of the disks.

Each plate 36 is slidably maintained in the proximate end head by means of gibs 38 which are affixed to the outer face of the head, and also by the flanges 39 of a bracket structure 40 which is fastened to the inner face of the head. The outer end portion of each plate 36 has formed therein adjacent the sides and top of the opening 37, a pair of oppositely disposed angular cam slots 41 in which are slidably fitted studs 42 on the outer faces of a pair of complementary slide blocks 43. These blocks are mounted to slide in an open transverse guideway formed by and between spaced parallel ribs 44 on the inner face of the bracket 40, the body of the latter having therein at the back of and parallel with the guideway a suitable slot 45 through which the studs 42 freely extend, and having also an opening 46 in register with the opening 37 in the adjacent end plate 36.

When the plate is radially shifted the companion blocks 43 are moved endwise a limited extent toward or away from each other by the action of the inclined portions of the cam slots 41 on the studs. The blocks are formed on or secured to the adjacent ends of a pair of complementary parallel bars 47 and 48 which are slidably mounted on flattened peripheral portions 49 of the disks 42, and therefore as the two pairs of blocks 43 are actuated by virtue of the concurrent movement of the companion end plates 36 the bars 47 and 48 are simultaneously moved in parallelism toward or from each other. These bars constitute complementary wire bending jaws.

The respective slide plates 36 are provided adjacent their inner ends with lateral studs 50 for rolls 51 which run in the races 52 of stationary face cams 53 located adjacent the respective end heads 31 and secured to and supported by the respective frame standards. The cam races are of corresponding contour which is such that during the intermittent rotation of the carrier structure the plates 36 are radially actuated in a manner to effect the periodical closing and opening of the respective pairs of wire bending bars. In the outer faces of these bars are transverse peripheral grooves 54 in alignment with circumferential wire guiding grooves 55 in the respective disks 32. The outer face of each trailing bar 47 has a series of projections 56 spaced from the respective grooves 54, which projections are constructed and arranged to encounter each opposing strip S presented thereto at the station (A) and then advance the strip step by step to succeeding stations.

In the present instance is provided strip-supplying means comprising a skeleton magazine which inclines downwardly to the front of the carrier. The magazine includes upper and lower longitudinal side members, 57, of angle iron, connected at intervals by side pieces 58 and cross-bars 59. The strips S are slidably stacked, face to face, in and between the side members of the magazine and are gradually fed toward the carrier, the lowermost strip being in advance of the adjacent bar 47 during each dwell of the carrier. The downward feeding of the strips contained in the magazine is preferably contributed to by underlying feed belts 60. In each succeeding step of the carrier the lowermost strip in the magazine is advanced by the contiguous projections 56 of the adjacent trailing jaw bar 47 until the strip is in horizontal position at the station B directly above and parallel with the axis of rotation of the carrier. Curved guard bands 61, which are supported by the magazine, overlie the ends of the strip during its travel to the station B, thus preventing outward displacement of the strip.

When the carrier is at rest, immediately preceding its step movement, the complementary bars 47 and 48 which are located at the foot of the magazine are open, and the lowermost strip S in the magazine is supported by the portions of the spaced wires W which span the gap between the bars, the edge notches *n* of the strip directly overlying the spans of wire. (See Fig. 6.)

The wires, which are drawn from suitable reels (not shown), are directed to the peripheral grooves 55 of the respective disks by means of grooved wheels 62 loose on a shaft 63 which is supported at the front of the carrier and below the delivery end of the magazine. The shaft 63 is supported at its respective ends by suitable pedestals 64 rising from the bed 26. The series of wires as they pass from the wheels 62 are drawn upward within the grooves 55 of the respective disks; thence under and past the delivery end of the magazine to a determined circumferential location (*x*) on the respective disks

where the free ends of the wires are temporarily gripped and held by a set of clamps **65**. Hence the series of wires as they span the delivery end of the magazine are seated under tension in the transverse grooves **54** of the adjacent bending bars **47** and **48**. In the present instance there are six sets of equally spaced clamps **65** which sets are arranged around the disks in alternation with the pairs of wire bending bars. Each set comprises four aligning members arranged laterally of and in co-operative relation to the peripheries of the respective disks. Each clamp member **65** consists of an angle lever pivoted on a suitably-disposed bracket **66** on one side of the adjacent disk **32**, so that the lever can be actuated to swing its outer arm upon or away from and below the periphery of the disk in a manner to clamp or release the opposing wire, as desired.

The inner arms of each set of clamp levers are pivoted, as at **67**, to a rod **68** which is parallel to the axis of rotation of the carrier. This rod freely extends through aligning openings in the disks and is slidably supported at its ends in the respective end heads **31** of the carrier. (See Figs. 11, 12 and 13.) A spring **69** encircling the rod **68** and having its ends bearing against one of the end disks **32** and a collar **70** on the rod, normally urges such rod endwise in a manner to maintain the clamp levers open or in unclamping position.

One end of the rod **68** projects outwardly through the adjacent end head **31** and is provided with a roll **71** which at a determined interval in the rotation of the carrier rides against a suitably-disposed cam **72** which is fixed on the adjacent frame standard in spaced relation to the magazine. In the present instance the body of this cam is constituted by a guide block having inclined end faces **73** and **74**, respectively. The inclined face **73** is so arranged as to force each succeeding roll **71** and its rod **68** inwardly against the action of the proximate spring **69** immediately preceding the dwell of the adjacent pair of open wire bending bars at the strip supply magazine, thus simultaneously swinging to clamping position upon the respective disks and their wires the set of clamps which are pivotally connected to such rod. Thereupon in the step of the carrier to advance the strip S from station A to station B the wires W are drawn along by and with the carrier, thus positioning the strip in horizontal position and with the leading extremities of the respective underlying wires extending to a determined location *y* beyond the strip. (See Figs. 3, 6 and 7.) Coincident with the completion of this step of the carrier, the roll **71** of the next succeeding clamp actuating rod **68** encounters the cam **72** and is thereby lengthwise shifted to effect the clamping of the wires at the location *x*. Hence the lengths of wire underlying the strip and extending between the points *x* and *y* are securely held under tension upon the respective disks by means of the adjacent clamps **65**.

While they are thus held the wire lengths are severed from the bodies of the respective wires, at points adjacent the location *x*, by means of vertically reciprocating cutter blades **75** which are arranged and adapted to co-act with the walls of a row of suitably-disposed transverse slots **76** formed in the peripheries of the respective disks. The severed lengths constitute tie-wires. In the present instance the blades **75** are carried by a cross-head **77** which is supported at its ends on a pair of vertically reciprocating rods **78**. One of these rods extends through and is guided in the cam block **72** and the other through a guide block **79** which is supported by the opposite frame standard. Encircling the rod **78**, in the space between the respective members **72** and **79** and the cross-head, are compression springs **80**, which maintain the cross-head and its cutters normally raised a suitable distance above the carrier. The lower ends of the rods **78** are fixed to vertically movable slotted bars **81** which freely embrace and depend below the driven shaft **28** and are jointed at their lower ends by means of links **82** to a pair of levers **83** fulcrumed on suitably-disposed studs **84** on the forward lower ends of the adjacent frame standards. The levers **83** extend to the rear of the standards and are there pivotally connected by means of links **85** to vertically movable slotted bars **86** which also embrace and extend below the shaft **27**. The lower ends of the bars **86** are equipped with rolls **87** that are yieldingly held by virtue of the springs **80** in operative contact with a pair of corresponding cams **88** fast on the drive shaft **27**. The cams **88** are of such contour that during each dwell of the carrier the bars **86** and **81** and the levers **83** are concurrently actuated to effect the downward and upward strokes of the cross-head **77** and its appurtenances. Preferably suitably disposed counterweights **880** (Figs. 3 and 5) for the cams **88** are fastened to the hubs of the cams.

In the step of the carrier from station A to station B the effective straight face of the cam block **72** maintains the proximate rod **68** in its wire clamping position. At the end of the step the roll **71** of this rod bears against the opposing end of a reciprocable stud **89** which is mounted in and transversely of the cam extension **74**, which stud, being then temporarily held, maintains the rod **68** in clamping position during the dwell of the carrier at station B and until the stud has been released as will now be described.

Depending from a lug **90** on that end of the cross-head **77** adjacent the cam block **72** is a laterally recessed rod **91** which is slidably fitted in the adjacent frame standard so as to co-act with the outer end of the stud **89**. The recess **92** of the rod is so located that in the downward stroke of the cross-head, immediately after the wires have been severed by the cutters **75**, such recess is positioned at the outer end of the stud **89**, thus permitting slight outward retraction of the stud by the resilient pressure thereon of the opposing roll **71** of the rod **68**, and consequently releasing the pressure of the clamps **65** on the leading ends of the wire lengths previously severed. Depending also from the cross-head **77** are a series of presser rods **93** which, corresponding in number and spaced relation with the disks **32**, overlie the strip S at station B when the carrier is at rest. The relation of the presser rods **93**, cutters **75** and the cam rod **91** is such that in the downward stroke of the cross-head immediately following the release of the leading ends of the wire lengths, the presser rods **93** impinge against the opposing strip in a manner to press it and the underlying midsections of the respective wire lengths into the space between the adjacent open wire bending bars, and also into the underlying recesses **33** of the respective disks and upon the backer bar **34**, thus bending upward and into the adjacent edge notches *n* of the strip the respective end portions of the wires, as seen in Fig. 8, it being noted that the top of the strip thus depressed is slightly below the level of the under faces of the bending bars **47** and **48**.

In the upward stroke of the cross-head **77** by

virtue of the springs 80 the cutters 75, the presser rods 93 and the cam rod 91 are raised, the latter rod thus camming the opposing stud 89 to and temporarily maintaining it in its inner or active position in relation to the path of the roll 71 of the next succeeding clamp actuating rod 68.

In Fig. 19 of the drawings are illustrated a portion of a strip and a length of tie-wire as they are relatively disposed at station B before the up-bending of the ends of the wire, and in Figs. 18 and 20 are shown a portion of the strip and the wire length after the bending operation at the same station.

In the initial movement of the carrier in its next following step to the station C the roll 71 of the clamp actuating rod 68 adjacent the stud 89 rides upon the opposing inclined extension 74 of the cam block 72, thus permitting the set of clamps to return to their fully open condition. They remain in this state until such roll 71 rides upon and is temporarily moved inward by a suitably disposed bridge-cam 930 on the adjacent frame standard. This cam bridges the proximate depending link 32 between the slotted bar 81 and the side lever 83, so that when the roll escapes the bridge-cam the set of clamps resume their fully open condition, thus remaining until the roll 71 impinges against the inclined face 73 of the cam block 72.

The station C constitutes a wire twisting station to which the strip S with its looped wire associated therewith is advanced by the carrier. In such travel of the carrier the plates 36 adjacent the ends of the strips are gradually moved inward by the action of the stationary cams 53 on the rolls 51, thus causing the inclined portions of the cam slots 41 of the slides to draw the complementary bars 47 and 48 toward each other. In consequence the bars simultaneously bend the basal portions of the upstanding ends of the tie wires toward each other and closely about the notched portions of the strip, as seen in Figs. 6 and 9. Hence when the strip is positioned at the station C the outwardly extending legs 1 of the tie wires are in close substantially parallel relation and the body of the strip is held between the closed bending bars and the backer bar 34, which latter at this period rests upon the underlying floors of the aligning recesses 33 of the respective disks.

In Fig. 21 are illustrated a portion of a strip and the tie wire having its up-standing legs inwardly bent upon the strip and extending outwardly in close relation preparatory to the twisting operation at station C.

Mounted at the station C are a series of inclined pincers corresponding in number and spaced relation with the disks 32, the jaws 94 of which pincers are arranged and adapted to receive the outwardly extending legs of the respective tie wires, and then clamp and tightly twist the basal portions of the legs which are embraced by the leading bars. The inner faces of the bars are appropriately grooved, as at 95, to permit the free twisting of the portions of the wires therebetween. The complementary members of each of the pincers are pivoted at points between their ends to the foot 96 of an inclined spindle 97 whereof the upper end has its bearings in a cross-bar 98 which is bolted to the upper rearward end portions of the respective frame standards. The jaws 94 on the lower legs 99 of the pincers are maintained normally open by means of a suitable spring, such as the hair-pin spring 100, which is secured to the foot 96, the limbs of the spring extending to and bearing against the upper legs 101 of the pincers. These legs embrace the tapering face of a cone head 102 slidably fitted on the spindle. Hence when the cone head is forcibly depressed the opposing legs 101 are spread against the action of the spring 100 in a manner to close the pincer jaws, and when such head is again raised the spring returns the jaws to their normal or open condition.

In the present instance the cone head for each of the pincers is provided with a circumferential groove 103 which slidably receives the coupling studs 104 of a bifurcated arm 105 fast on a rock shaft 106 having its bearings in forwardly extending brackets 107 supported by the cross-bar 98. The respective end arms 105 of the series are provided with depending arms 108 having at their lower ends rolls 109 that are held in operative contact with counterpart cams 110 on the drive shaft 27 by means of suitably-disposed springs 111. The contour of the cams 110 is such that the rock shaft 106 and its arms are actuated to effect the closing and permit the opening of the pincers at determined intervals during the dwell of the carrier, the pincers being closed to grip the tie wires presented thereto, and being opened to release the wires after they have been twisted by a series of rotations of the pincers. In Fig. 22 are illustrated a portion of the strip and the tie-wire with its twisted projecting legs.

In the present instance the means for rotating the pincers is as follows: Fast on each of the spindles 97 is a spiral gear 112 with which meshes a similar gear 113 fast on an upper shaft 114 which has its bearings in the respective frame standards. Mounted on the shaft 114 adjacent the respective standards are pinions 115 in mesh with vertically reciprocative gear racks 116 rising from the slotted bars 86 hereinbefore referred to. Hence while the carrier is at rest, the bars 86 and gear racks 116 are vertically reciprocated. In their upward stroke the racks rotate the pinions 115 and therewith the shaft 114, which latter in turn transmits the motion through the gears 113 and 112 to the spindles, thereby simultaneously rotating the spindles. In the downward stroke of the racks following the opening of the pincers the pincer spindles are idly rotated reversely and the pincers positioned to receive the next succeeding tie wires presented thereto.

In the next following step of the carrier the strip, with the twisted tie wires, is advanced to a station D constituting a wire folding station where the twisted wires are efficiently bent against and longitudinally of the outer face of the strip.

In the initial movement of the carrier to advance its strip from station C to station D the slide plates 36 adjacent the respective ends of the strip are moved outwardly by the action of the stationary cams 53 on the studs 50 of the plates 36 thereby effecting the opening of the wire bending bars. In this movement the bottoms of the openings 37 of the slide plates gradually approach the opposing surface of the backer bar 34 and are in contact therewith when the wire bending bars are fully opened. In the remainder of the movement the cams 53 force the slides farther outward, and as a result the bottoms of such openings 37 similarly move the backer bar and the superposed strip into the space between the open wire bending bars until the outer face of the strip is flush, or substantially so, with the outer faces of the bars. (See Figs. 6 and

10.) At this time the carrier is at rest and the bending of the twisted legs of the wires is effected by the action thereon of a series of inclined rolls 117 which are supported for reciprocation longitudinally of the strip and in proximity to the peripheries of the respective disks 32. These rolls are illustrated as journalled in the bifurcated forward ends of a series of horizontal arms 118 which are secured at their rearward ends to a slide bar 119 arranged below and parallel with the drive shaft. The slide bar, which is supported and guided in standards 120 on the bed 26, is provided midway of its ends with an upstanding stud roll 121 operatively fitted in the peripheral groove of a cam 122 fast on the drive shaft. The contour of the cam groove is such that during each movement of the carrier the rolls 177 lie laterally of the paths of the legs of the respective tie wires, and during each dwell of the carrier the slide bar 119 is shifted endwise so as to move the rolls longitudinally of the strip and against the opposing wires, thereby folding the respective legs of the wires against the strip. This done the cam 122 returns the slide bar and the rolls to their previous positions.

In the next succeeding step of the carrier, the strip with the series of spaced tie wires applied thereto is advanced to a station E constituting a cutting station where the strip is subdivided transversely into a series of separate tags each equipped with a folded tie wire. One of the tags is shown in Fig. 23. Suitable guard bands 123 to prevent the outward displacement of the strip in its travel are supported adjacent the ends of the carrier and in the space between the twisting and cutting stations, the lower ends of the bands being supported by posts 124 on the bed 26.

In the present instance the strip cutters comprise a series of thin circular saws 125 fast on a shaft 126 located directly beneath and longitudinally of the carrier, which shaft has its bearings in brackets 127 on the bed. This shaft is provided with a pulley 128 which is connected by a belt 129 with the pulley 130 of a small electric motor 131 conveniently located on the bed. The teeth of the saws rotate in the path of the strip S as the carrier approaches and reaches the end of its step, the saws being arranged in such spaced relation as to sever the strip in the spaces between the adjacent tie wires, as seen in Fig. 4, thus subdividing the strips to provide a plurality of wired tags. The outer surfaces of the wire bending bars and the backer bar are appropriately grooved, as at 132 and 133, respectively, to afford clearance for the teeth of the saws at the cutting station.

The sections of the strip when they have been severed by the saws 125 are supported by and upon a plate 134 which is located under the carrier and supported by the posts 124. This plate which is slotted, as at 135, for the passage of the saws has a forwardly and downwardly deflected portion 136 which overlies a suitable take-off belt 137. In the initial movement of the carrier in its step to the following station F the wired tags resting on the plate 134 are advanced until they overlie the deflected portion 136, whereupon the action of the superposed backer bar 34 on the wired tags ejects them flatwise from the carrier, and they fall upon the take-off belt, thence being transported to a suitable point of discharge.

Upon leaving station F the empty strip receiving portion of the carrier progresses to the delivery end of the magazine at station A in readiness to engage and remove the lowermost strip preparatory to a succeeding strip advancing step of the carrier.

The use and operation of the exemplifying form of machine hereinbefore described are as follows: The magazine at station A is supplied with the preformed strips S, and the series of wires W, drawn from suitable reels, are seated in the circumferential grooves 55 of the disks 32 and also in the transverse grooves 54 of the wire bending bars which are located in close relation to the delivery end of the magazine, the free ends of the wires extending upward to the effective path of the cutters and being held on the disks by the adjacent clamps 65. The motor 131 for driving the saws is energized and power is applied to the drive shaft 27. Intermittent rotary motion is transmitted through the Geneva stop motion to the shaft 28 and the strip and wire carrier thereon. During each dwell of the carrier in its intermittent rotation the sets of complementary wire bending bars are located at the respective stations around the carrier, and in each step of the carrier each set is progressively advanced to the next station. The bars at the delivery end of the magazine are in open condition, the projections 56 of the trailing bar 47 abutting the opposing edge of the lowermost strip in the magazine, and the strip being supported upon the portions of the wires that span the gap between the two bars.

In the first step of the carrier the projections 56 of the bar 47 advance the opposing strip to station B (as seen in Figs. 6 and 7), the series of wires which underlie the strip and are clamped at their leading ends, being concurrently drawn with the strip by the carrier. During this step the clamps 65 which are gripping the leading ends of the wires are maintained in clamping relation therewith by the action of the stationary cam 72 and its temporarily held stud 89 on the end roll of the rod 68 for actuating such clamps. As the carrier approaches the end of this step the succeeding clamps, which are now adjacent the vertical path of the cutters 75, are swung over upon the disks so as to grip the opposing wires through the action of the stationary cam 72 against the end roll of the clamp actuating rod 68. Thus the lengths of wire between the two sets of clamps are held under tension. In the dwell of the carrier with the associated strip and tie wires at station B, the cross-head 77 is lowered by the action of the counterpart cams 88 on the side levers 83 to which the cross-head is connected, thus causing the descending cutters 75, the cam rod 91 and the presser rods 93 to act in successive order, that is to say, (1) the cutters intersect and sever the tensioned wire lengths, (2) the depending cam rod presents its recessed portion to the stud 89 and so permits sufficient outward movement of the stud and the clamp actuating rod to release the leading extremities of the wires, and (3) the presser rods impinge the underlying strip in a manner to press the strip and the mid-sections of the respective severed tie-wire lengths into and slightly below the space between the wire bending bars 47 and 48. The strip in its descent bears upon the underlying backer bar 34, which is seated in the openings 37 of the end plates 36 and also in the aligning recesses 33 of the disks, the inner vertical faces of the bars 47 and 48 acting to bend the opposing extending portions of the severed wire lengths upwardly and in substantial parallelism, as seen in Figs. 8, 18 and 20. This done the cross-head 77 and its appurtenances are raised, and so temporarily held by the cam actuated levers 83 and their adjuncts. The

carrier is then moved to advance the strip and the associated wires to station C. In this step the roll of the leading clamp actuating rod 68 escapes the cam 72 and the clamps which are connected with the rod are swung fully open. So also the pair of slide plates 36 adjacent the ends of the strip are moved radially inward by the action of the stationary cams 53 on the stud rolls 51 of the respective plates, thus causing the inclined portions of the cam slots 41 of the plates to force the complementary bars 47 and 48 toward each other. In their closing movement the bars bend the opposing upstanding legs of the wires toward each other and in embracing relation to the strip, the legs thus lying in close relation and extending outwardly from the median longitudinal line of the strip, as seen in Figs. 6, 9 and 21. When the strip and associated wires reach and dwell at the station C the legs of the wires extend between the open jaws of the pincers, whereupon such jaws, being closed by the spreading of the upper legs of the pincers by the respective cone heads 102 through the agency of the cam 110 and intermediate connections described, grip the interposed portions of the legs. Several rotations are then imparted to the respective pincers through the gearing and cam operated connections, thus twisting in the space between the pincers and the strip the respective pairs of wire legs and tightly binding the loops of the wires about the notched portions of the strip. The cone heads are then raised to permit the pincer jaws to open and release the interposed wires.

In the next step of the carrier the strip with the legs of its tie-wires extending outwardly, are advanced to the station D, thus positioning the twisted basal portions of the legs laterally of the respective folding rolls 117. In the first part of this step the end plates 36 through which the respective ends of the backer bar 34 extend, are moved outwardly by the action of the stationary cams 53 on the rolls 51 of the plates, thus opening the wire-bending bars. In the rest of the step the bending bars remain open and the backer bar 34, together with the strip S thereon, is pushed into the space between the proximate bending bars until the strip is flush, or substantially so, with the outer surfaces of such bars.

In the dwell of the carrier at station D the slide bar 119 which supports the arms 118 for the folding rolls is longitudinally reciprocated by means of the cam 122 on the drive shaft 27, which rolls closely fold and iron the legs of the wires against and longitudinally of the strip and then return to their previous positions.

The strip with its attached tie wires are next advanced to the station E and in the effective path of the teeth of the saws 125, the backer bar 34 with the wired strip thereon remaining in its outer position by virtue of the action of the stationary cams 53 on the stud rolls 51 of the end plates 36, thus serving as a rigid backer for the strips during the sawing operation. The saws sever the strip transversely at the shaped portions *m* of the strip, thus producing a plurality of uniform short strips to which the respective tie wires are effectually secured. The thus completed tags rest upon the underlying plate.

In the beginning of the next step of the carrier the tags as they are being advanced toward the station F are moved along the supporting plate 134 until they pass therefrom and fall upon the take-off belt 137. The bending bars remain in open condition until they progress to the delivery end of the magazine at the station A, whereupon the succession of operations hereinbefore described are repeated with respect to each succeeding lowermost strip in the magazine.

It is to be understood that the invention is not limited to the particular exemplifying form thereof herein disclosed, as the mechanisms may be modified within the principle of the invention and the scope of the appended claims.

I claim—

1. In a machine for making wired tags, a strip and wire supporting element, complementary relatively movable wire bending jaws across which a wire on said element extends and serves to support a strip imposed upon and transversely of the wire at the mouth of the open jaws, means for bodily pressing the strip and therewith the opposing portion of the wire between and slightly beyond the open jaws, thus bending the wire in loop form about the strip and beyond the jaws and strip, means for opening said jaws preparatory to the placing of the strip on the wire and for closing said jaws after the pressure therebetween of the associated strip and wire, whereby the projecting legs of the wire are bent towards each other and against the opposing face of the strip, and means for twisting together the portions of said legs adjacent the strip.

2. In a machine for making wired tags, a strip and wire supporting element, complementary relatively movable wire bending jaws across which a wire on said element extends and serves to support a strip imposed upon and transversely of the wire at the mouth of the open jaws, means for bodily pressing the strip and therewith the opposing portion of the wire between and slightly beyond the open jaws, thus bending the wire in loop form about the strip and beyond the jaws and strip, means for opening said jaws preparatory to the placing of the strip on the wire and for closing said jaws after the pressure therebetween of the associated strip and wire, whereby the projecting legs of the wire are bent towards each other and against the opposing face of the strip, means for twisting together the portions of said legs adjacent the strip, and means for bending the twisted legs longitudinally of the strip.

3. In a machine for making wired tags, a strip and wire supporting element, complementary relatively movable wire bending jaws across which a wire on said element extends and serves to support a strip imposed upon and transversely of the wire at the mouth of the open jaws, means for bodily pressing the strip and therewith the opposing portion of the wire between and slightly beyond the open jaws, thus bending the wire in loop form about the strip and beyond the jaws and strip, means including a cam element and connections therebetween and the jaws for opening said jaws preparatory to the placing of the strip on the wire and for closing said jaws after the pressure therebetween of the associated strip and wire, whereby the projecting legs of the wire are bent towards each other and against the opposing face of the strip, and means for twisting together the portions of said legs adjacent the strip.

4. In a machine for making wired tags, a strip and wire supporting element, complementary relatively movable wire bending jaws across which a wire on said element extends and serves to support a strip imposed upon and transversely of the wire at the mouth of the open jaws, means for bodily pressing the strip and therewith the opposing portion of the wire between and slightly beyond the open jaws, thus bending the wire in loop

form about the strip and beyond the jaws and strip, means for opening said jaws preparatory to the placing of the strip on the wire and for closing said jaws after the pressure therebetween of the associated strip and wire, whereby the basal portions of the projecting legs of the wire are bent towards each other and against the opposing face of the strip, means for twisting together the portion of the legs adjacent the strip, and means including a reciprocating presser member for bending the twisted legs longitudinally of the strip.

5. In a machine for making wired tags, a strip and wire supporting element, complementary wire bending jaws across which a wire on said element extends and serves to support a strip imposed upon and transversely of the wire at the mouth of the open jaws, means for bodily pressing the strip and therewith the opposing portion of the wire between and slightly beyond the open jaws, thus bending the wire in loop form about the strip and beyond the jaws and strip, means for opening said jaws preparatory to the placing of the strip on the wire and for closing said jaws after the pressure therebetween of the associated strip and wire, whereby the projecting legs of the wire are bent towards each other and against the opposing face of the strip, means for twisting together the portions of the legs adjacent the strip, and means for bending the twisted legs of the wire longitudinally of the stick, said last named means including a presser roll, a support therefor, and a cam for reciprocating said support.

6. In a machine for making wired tags, a strip and wire supporting element, complementary relatively movable wire bending jaws across which a wire on said element extends and serves to support a strip imposed upon and transversely of the wire at the mouth of the open jaws, means for bodily pressing the strip and therewith the opposing portion of the wire between and slightly beyond the open jaws, thus bending the wire in loop form about the strip and beyond the jaws and strip, means for opening said jaws preparatory to the placing of the strip on the wire and for closing said jaws after the pressure therebetween of the associated strip and wire, whereby the basal portions of the projecting legs of the wire are bent towards each other and against the opposing face of the strip, said opening and closing means comprising slidable cam members, connections therebetween and the jaws, and other cam members for operating said slide, and means for twisting together the portions of said legs adjacent the strip.

7. In a machine for making wired tags, a strip and wire supporting element, complementary relatively movable wire bending jaws across which a wire on said element extends and serves to support a strip imposed upon and transversely of the wire at the mouth of the open jaws, means for bodily pressing the strip and therewith the opposing portion of the wire between and slightly beyond the open jaws, thus bending the wire in loop form about the strip and beyond the jaws and strip, means for opening said jaws preparatory to the placing of the strip on the wire and for closing said jaws after the pressure therebetween of the associated strip and wire, whereby the projecting legs of the wire are bent towards each other and against the opposing face of the strip, said opening and closing means comprising slidable cam plates, connections therebetween and the jaws, and cam means for operating said plates, a member under the influence of the said cam plates and operative to serve as a backer for the strip, and means for twisting together the opposing portions of said legs adjacent the strip.

8. In a machine for making wired tags, a strip and wire supporting carrier, means for directing wire to said carrier, a succession of wire bending elements arranged on said carrier in spaced relation, each element comprising complementary relatively movable wire bending jaws, wire clamps arranged on the carrier in alternation with said elements, means for actuating the carrier to present said wire bending elements progressively to a succession of locations, strip supply means at one of said locations, means for operating the clamps at determined intervals whereby the leading end of a wire which extends on the carrier to and across the bending element at the strip supply means is clamped on the carrier and is thereby advanced, in association with the strip, to a second location, and whereby also the adjacent trailing clamp is actuated to clamp the wire on the carrier, means for severing the wire at a point adjacent the latter clamp, releasing the leading clamp and bodily pressing the strip and the opposing portion of the severed wire length between and slightly beyond the open jaws at the said second station, thereby bending the severed wire in loop form about the strip and with the legs of the loop extending outwardly beyond the jaws, means for opening said jaws preparatory to their passage to the strip supply means and for closing said jaws during the travel of the carrier from the second to the third station, the closing action of the jaws pressing the legs toward each other and against the opposing face of the strip, and means for thereafter twisting together the portions of said legs adjacent the strip.

9. In a machine for making wired tags, a strip and wire supporting carrier, means for directing wire thereto, a succession of wire bending elements arranged on said carrier in spaced relation, each element comprising complementary relatively movable wire bending jaws, wire clamps arranged on the carrier in alternation with said elements, means for actuating the carrier to present said wire bending elements progressively to a succession of locations, strip supply means at one of said locations, means for operating the clamps at determined intervals whereby the leading end of a wire which extends on the carrier to and across the bending element at the strip supply means is clamped on the carrier and is thereby advanced, in association with the strip, to a second location, and whereby also the adjacent trailing clamp is actuated to clamp the wire on the carrier, means for severing the wire at a point adjacent the latter clamp, releasing the leading clamp and bodily pressing the strip and the opposing portion of the severed wire length between and slightly beyond the open jaws at the said second station, thereby bending the severed wire in loop form about the strip and with the legs of the loop extending outwardly beyond the jaws, means for opening said jaws preparatory to their passage to the strip supply means and for closing said jaws during the travel of the carrier from the second to the third station, the closing action of the jaws pressing the legs toward each other and against the opposing face of the strip, means for thereafter twisting together the portions of said legs adjacent the strip, and means for thereafter bending the twisted legs of the wire longitudinally of the strip.

10. In a machine for making wired tags, a car-

rier for strips, each of sufficient length for subdivision into a plurality of tags, said carrier constructed to support a like plurality of wires extending transversely of the strips and spaced correspondingly with the number of tags to be produced from a strip, wire bending elements arranged on said carrier and at spaced intervals in proximity to the paths of the respective wires, each element comprising elongated normally open bars, sets of wire clamps arranged in alternation with the wire bending elements, means for actuating said carrier to present the wire bending elements progressively to a succession of locations, strip supply means at one of said locations, means for operating the set of clamps at determined intervals whereby the leading ends of the wires which extend across the bending elements at the strip supply means are clamped on the carrier and thereby, in association with the strip, are advanced to a second station, and whereby the adjacent trailing clamp is actuated to clamp the wires on the carrier, means for severing the wire lengths at points adjacent the latter clamps, releasing the leading clamps and bodily pressing the strip and the opposing portions of the severed wire lengths between and slightly beyond the open jaws at the second station, thereby bending the respective wires to loop form about the edges of the strip and with the legs of the wires extending outwardly beyond the jaws and the strip, means for closing said jaws and thereby pressing toward and against the opposing face of the strip the basal portions of the legs, and means for thereafter twisting together the outwardly extending portions of said legs adjacent the strip.

11. In a machine for making wired tags, a carrier for strips, each of sufficient length for subdivision into a plurality of tags, said carrier constructed to support a like plurality of wires extending transversely of the strips and spaced correspondingly with the number of tags to be produced from a strip, wire bending elements arranged on said carrier and at spaced intervals in proximity to the paths of the respective wires, each element comprising elongated normally open bars, sets of wire clamps arranged in alternation with the wire bending elements, means for actuating said carrier to present the wire bending elements progressively to a succession of locations, strip supply means at one of said locations, means for operating the sets of clamps at determined intervals whereby the leading ends of the wires which extend across the bending elements at the strip supply means are clamped on the carrier and thereby, in association with the strip, are advanced to a second station, and whereby the adjacent trailing clamp is actuated to clamp the wires on the carrier, means for severing the wire lengths at points adjacent the latter clamps, releasing the leading clamps and bodily pressing the strip and the opposing portions of the severed wire lengths between and slightly beyond the open jaws at the second station, thereby bending the respective wires to loop form about the edges of the strip and with the legs of the wires extending outwardly beyond the jaws and the strip, means for closing said jaws and thereby pressing toward and against the opposing face of the strip the basal portions of the legs, means for thereafter twisting together the outwardly extending portions of said legs adjacent the strip, and means for thereafter bending the twisted legs of the wires against and longitudinally of the strip.

12. In a machine for making wired tags, a carrier for strips, each of sufficient length for subdivision into a plurality of tags, said carrier constructed to support a like plurality of wires extending transversely of the strips and spaced correspondingly with the number of tags to be produced from a strip, wire bending elements arranged on said carrier and at spaced intervals in proximity to the paths of the respective wires, each element comprising elongated normally open bars, sets of wire clamps arranged in alternation with the wire bending elements, means for actuating said carrier to present the wire bending elements progressively to a succession of locations, strip supply means at one of said locations, means for operating the set of clamps at determined intervals whereby the leading ends of the wires which extend across the bending elements at the strip supply means are clamped on the carrier and thereby, in association with the strip, are advanced to a second station, and whereby the adjacent trailing clamp is actuated to clamp the wires on the carrier, means for severing the wire lengths at points adjacent the latter clamps, releasing the leading clamps and bodily pressing the strip and the opposing portions of the severed wire lengths between and slightly beyond the open jaws at the second station, thereby bending the respective wires to loop form about the edges of the strip and with the legs of the wires extending outwardly beyond the jaws and the strip, means for closing said jaws and thereby pressing toward and against the opposing face of the strip the basal portions of the legs, means for thereafter twisting together the outwardly extending portions of said legs adjacent the strip, means for thereafter bending the twisted legs of the wires against and longitudinally of the strip, and means for thereafter severing the strip transversely in the spaces between the adjacent wires.

13. In a machine for making wired tags, a strip and wire supporting element, complementary wire bending bars movable toward and from each other, said bars being so arranged that the wire extends across the bars and serves as a support for a strip imposed upon the wire at the mouth of the separated bars, a backer bar underlying the bending bars and movable therebetween when the bars are open, means for operating said bending bars and the backer bar in timed relation, and means for bodily pressing between and slightly beyond the open bending bars the strip, the opposing portion of the wire and the backer bar, whereby the wire is bent in loop form between the open bending bars and about the strip, and whereby when the bending bars are subsequently closing the projecting legs of the wire are bent toward each other and against the opposing face of the strip.

14. In a machine for making wired tags, a strip and wire supporting element, complementary wire bending bars movable toward and from each other, said bars being so arranged that the wire extends across the bars and serves as a support for a strip imposed upon the wire at the mouth of the separated bars, a backer bar underlying the bending bars and movable therebetween when the bars are open, means for operating said bending bars and the backer bar in timed relation, means for bodily pressing between and slightly beyond the open bending bars the strip, the opposing portion of the wire and the backer bar, whereby the wire is bent in loop form between the open bending bars and about the strip, and

whereby when the bending bars are subsequently closed the projecting legs of the wire are bent toward each other and against the opposing face of the strip, and means for twisting together the portions of said legs adjacent the strip.

15. In a machine for making wired tags, a strip and wire supporting element, complementary wire bending bars movable toward and from each other, said bars being so arranged that the wire extends across the bars and serves as a support for a strip imposed upon the fire at the mouth of the separated bars, a backer bar underlying the bending bars and movable therebetween when the bars are open, means for operating said bending bars and the backer bar in timed relation, means for bodily pressing between and slightly beyond the open bending bars the strip, the opposing portion of the wire and the backer bar, whereby the wire is bent in loop form between the open bending bars and about the strip, and whereby when the bending bars are subsequently closed the projecting legs of the wire are bent toward each other and against the opposing face of the strip, means for twisting together the portions of said legs adjacent the strip, and means for bending the twisted legs longitudinally of the strip.

16. In a machine for making wired tags, a movable strip and wire supporting carrier, means for moving the carrier, complementary wire bending bars on said carrier, end slides mounted on said carrier and having cam connections with said bars, means including a stationary cam for relatively actuating said slides to open and close the wire bending bars during the travel of the carrier, means for bodily pressing a wire and a superposed strip between and slightly beyond the open bars so as to bend the wire in loop form about the strip and beyond the bending bars and the strip, and a backer bar on said slides for independent movement between and from the open wire bending bars.

17. In a machine for making wired tags, a movable strip and wire supporting carrier, means for moving the carrier, complementary wire bending bars on said carrier, end slides mounted on said carrier and having cam connections with said bars, means including a stationary cam for relatively actuating said slides to open and close the wire bending bars during the travel of the carrier, means for bodily pressing a wire and a superposed strip between and slightly beyond the open bars so as to bend the wire in loop form about the strip and beyond the bending bars and the strip, a backer bar supported by said slides for independent movement between and from the open wire bending bars, and means for twisting together the portions of the legs adjacent the strip.

18. In a machine for making wired tags, a movable strip and wire supporting carrier, means for moving the carrier, complementary wire bending bars on said carrier, end slides mounted on said carrier and having cam connections with said bars, means including a stationary cam for relatively actuating said slides to open and close the wire bending bars during the travel of the carrier, means for bodily pressing a wire and a superposed strip between and slightly beyond the open bars so as to bend the wire in loop form about the strip and beyond the bending bars and the strip, a backer bar supported by said slides for independent movement between and from the open wire bending bars, means for twisting together the portions of the legs adjacent the strip, and means for bending the twisted legs longitudinally of the strip.

19. In a machine for making wired tags, the combination of a strip and wire carrier, supporting members mounted on said carrier and movable relatively thereto, a backer bar having lost-motion coupling with said members, complementary wire bending bars parallel with said backer bar and co-operatively coupled to said supporting members, and means for actuating said members during the travel of the carrier to effect timed opening and closing movements of the bending bars and also reciprocable movement of the backer bar, the relation of the respective bars being such that when the bending bars are open the backer bar is movable therebetween.

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