Oct. 21, 1941. K. MILLER 2,259,959

MACHINE AND METHOD FOR MAKING PAPER-WRAPPED PENCILS

Filed Dec. 12, 1940 6 Sheets-Sheet 1

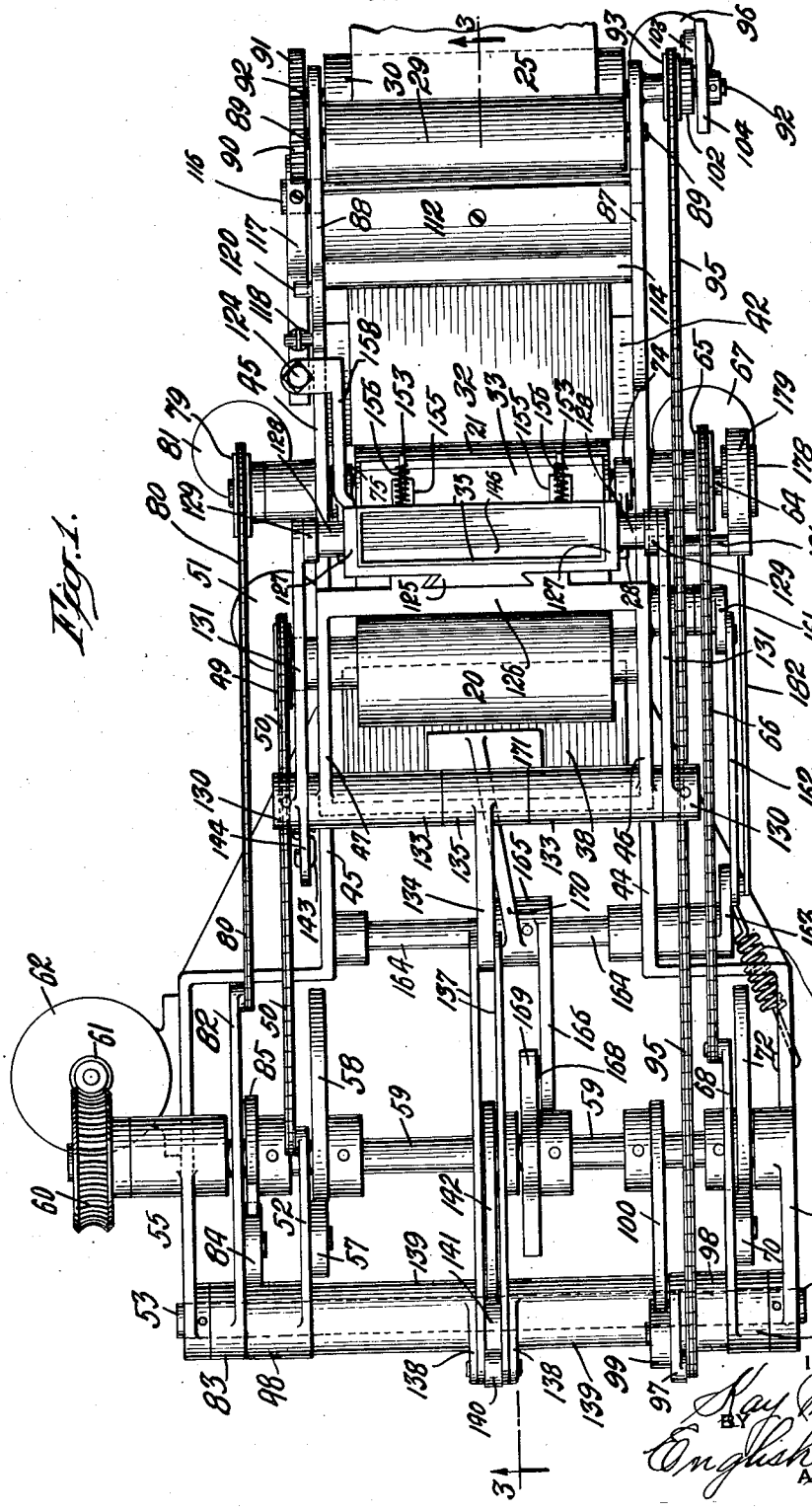

Fig. 1.

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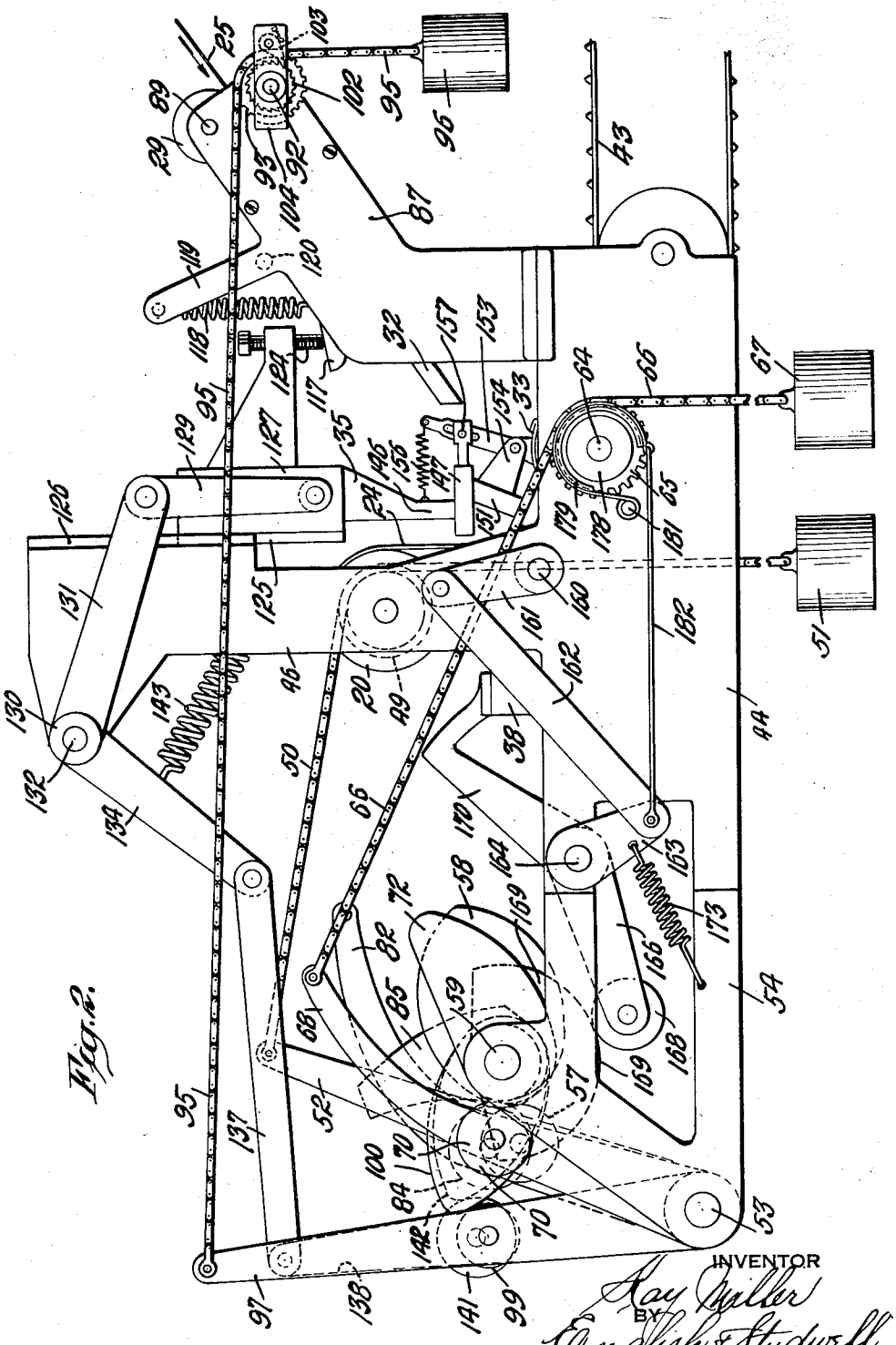

Fig. 2.

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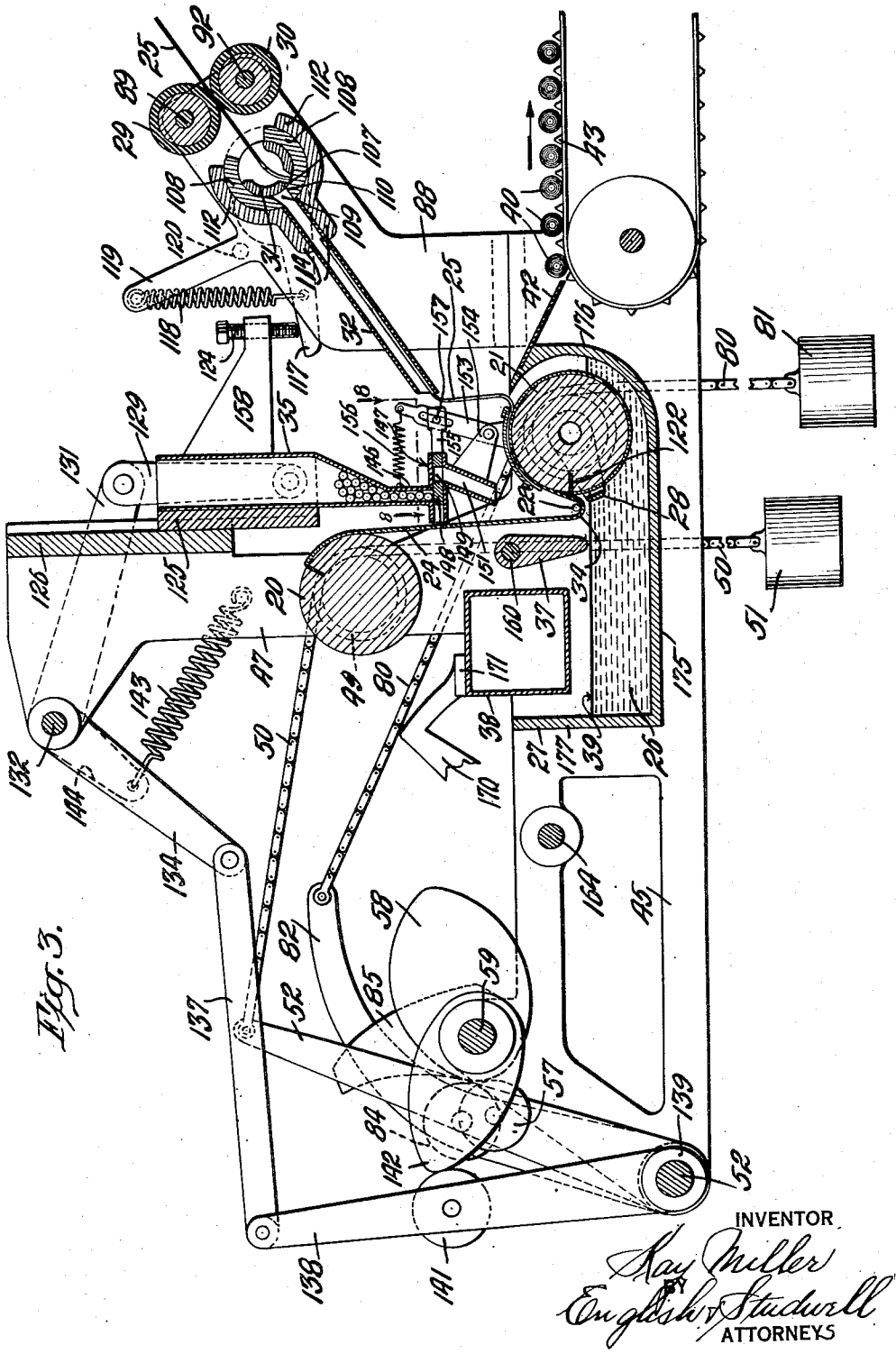

Fig. 3.

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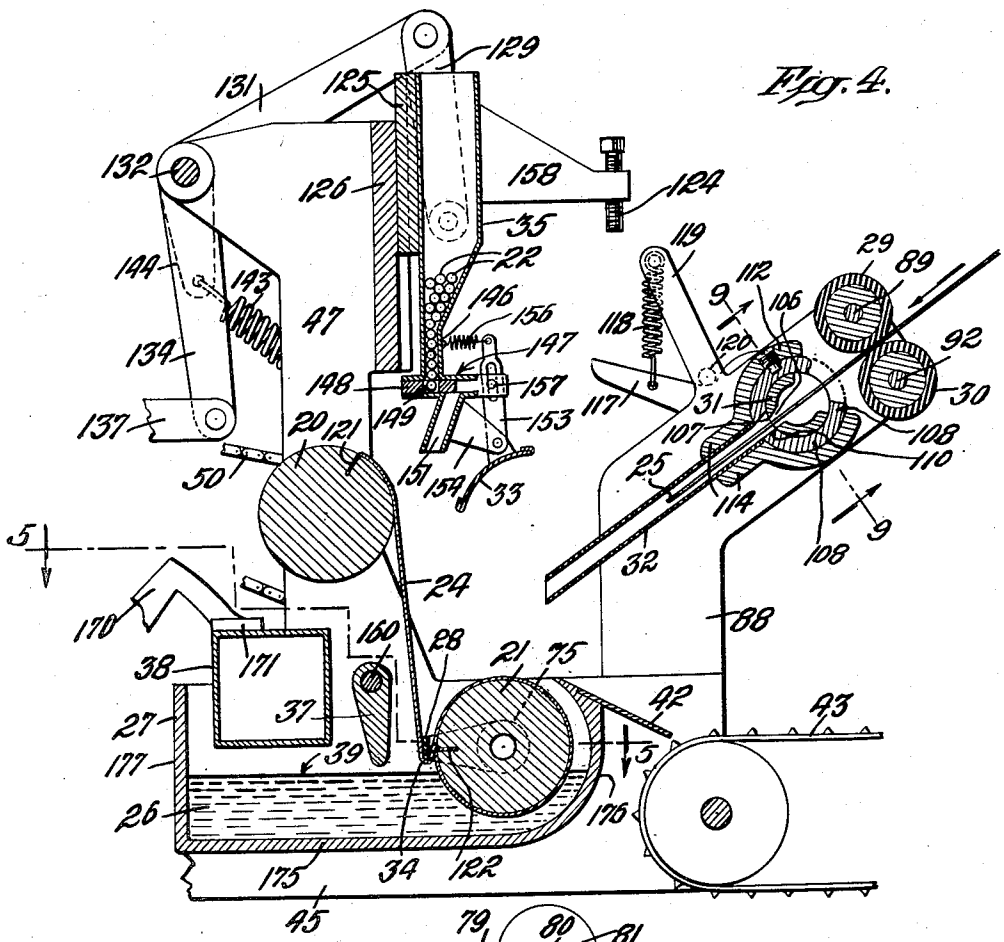
Fig. 4.



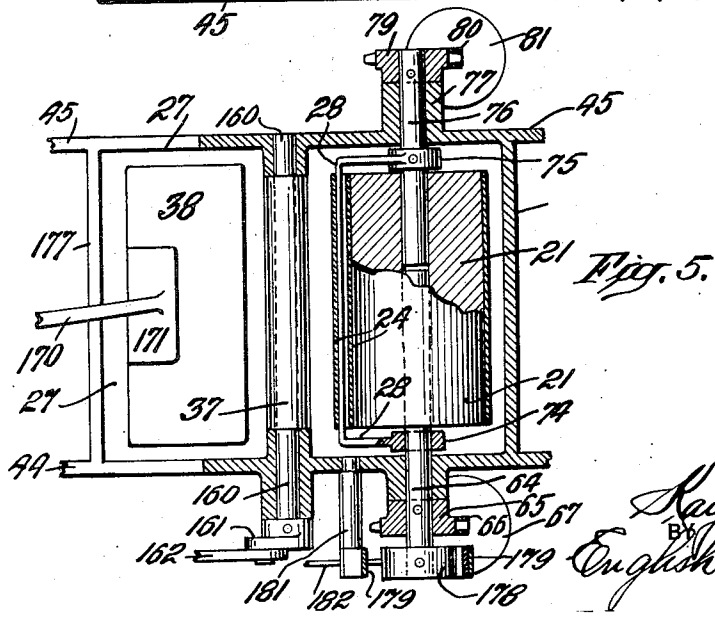


Fig. 5.

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Fig. 6.

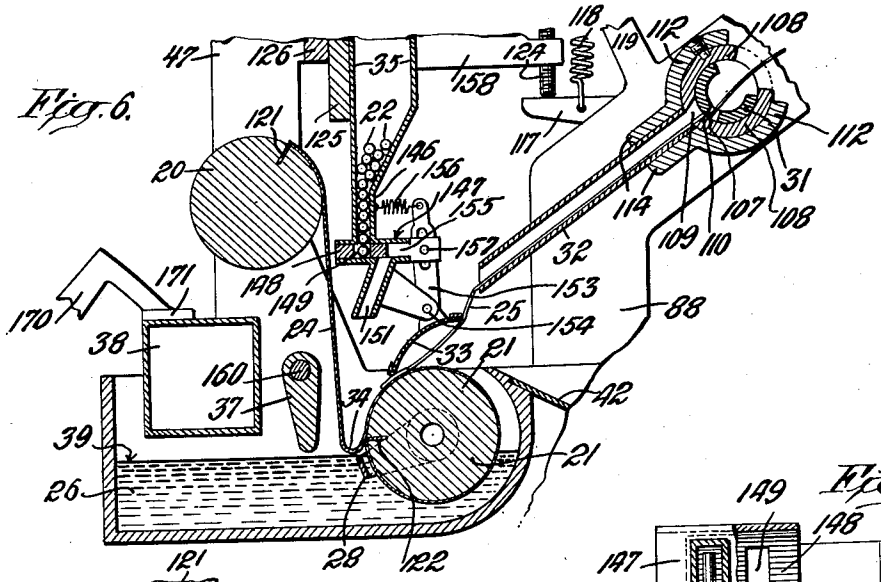

Fig. 7.

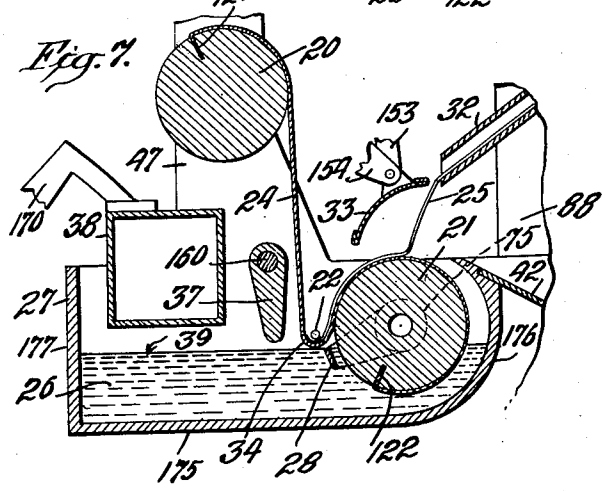

Fig. 8.

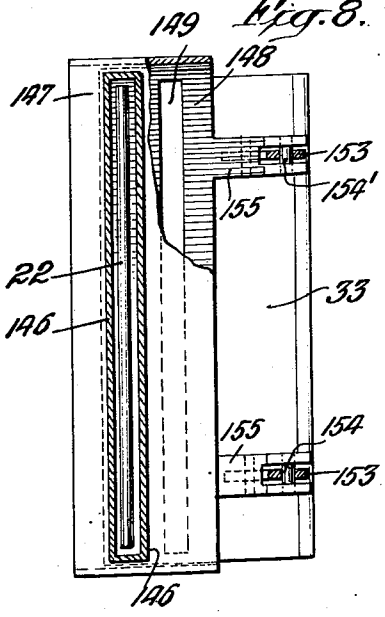

Fig. 9.

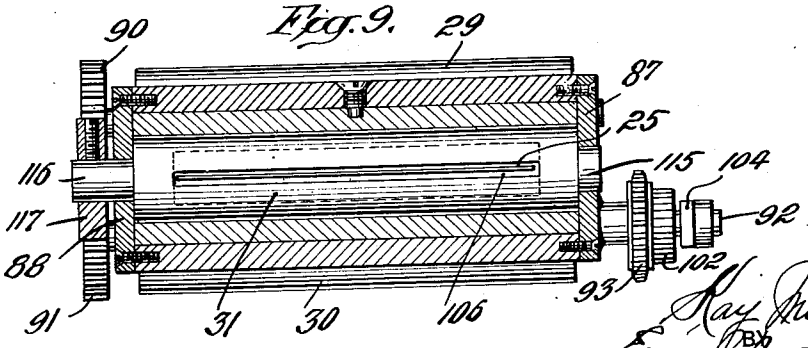

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Fig. 14.

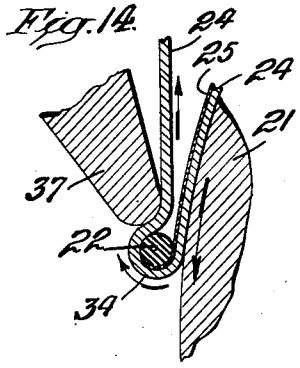


Fig. 15.

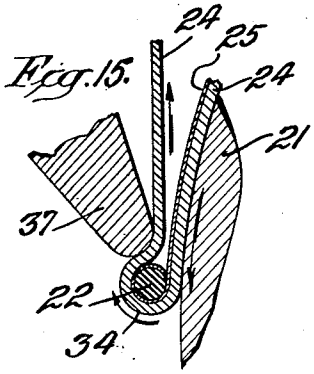


Fig. 16.

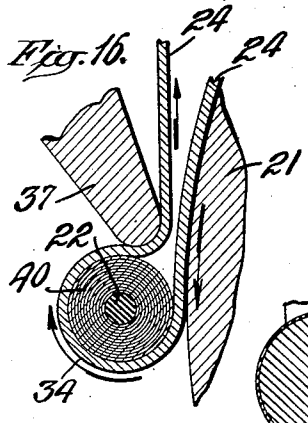


Fig. 10.

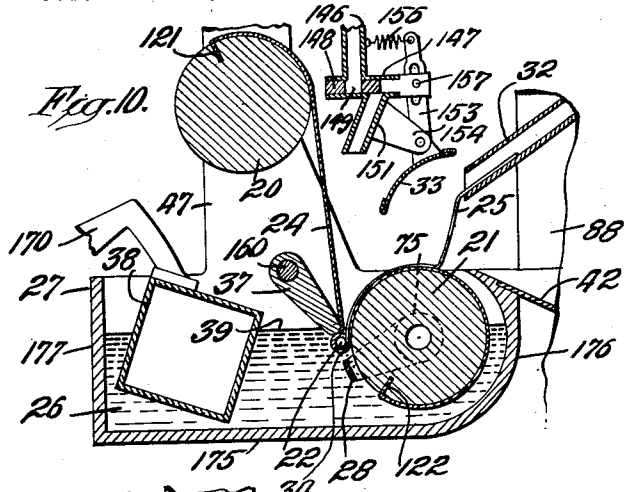


Fig. 11.

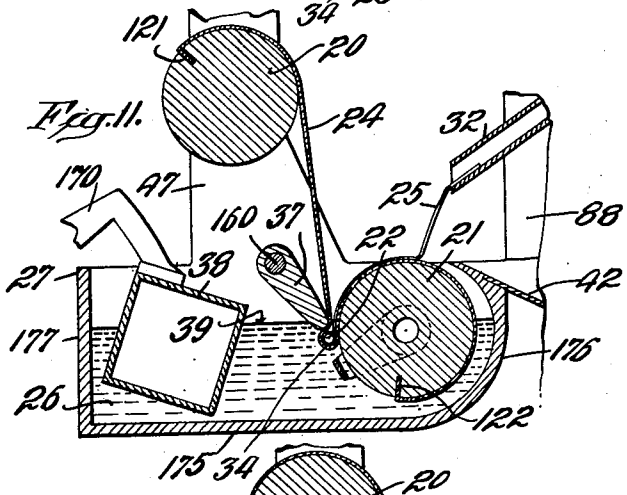


Fig. 12.

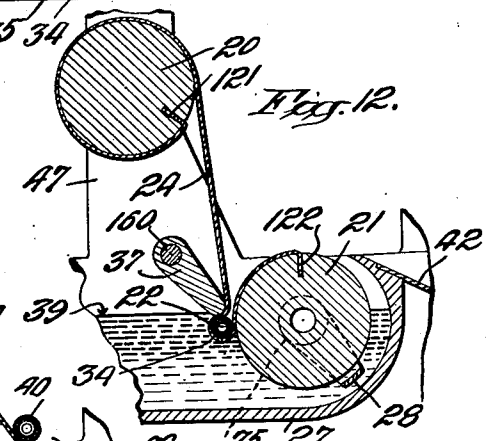
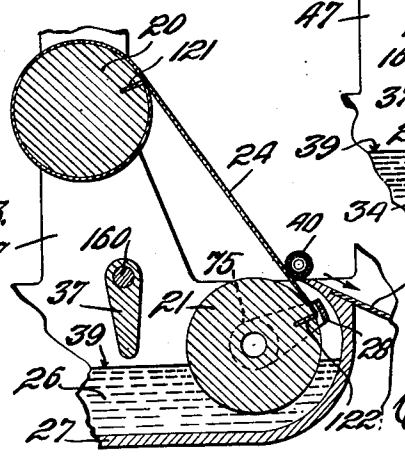


Fig. 13.



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Patented Oct. 21, 1941 2,259,959

UNITED STATES PATENT OFFICE

2,259,959

MACHINE AND METHOD FOR MAKING PAPER-WRAPPED PENCILS

Kay Miller, New Brunswick, N. J., assignor to Joseph Dixon Crucible Company, Jersey City, N. J., a corporation of New Jersey

Application December 12, 1940, Serial No. 369,789

6 Claims. (Cl. 93—81)

The invention relates to an improved machine for and a novel method of wrapping a straight, elongated implement in a sheath composed of a spiral of flexible material, the coils of which are inseparably secured together. More particularly, the invention is an improvement in machines and methods for making paper wrapped pencils, having a core of fragile marking material, such as graphite or the like, enclosed in a substantially homogeneous sheath composed of coiled paper, with the convolutions of the paper inseparably glued together.

One object of the invention is to provide a machine of this character by which the fragile, elongated core of marking material may be rapidly enclosed, without liability of breakage, in a sheath composed of alternate coils of paper and glue, so tightly wound together that the paper and glue constitute a substantially homogeneous body so as to be amenable to cutting by a knife or mechanical rotary pencil sharpener. A further object of the invention is the provision of a novel method of wrapping tightly around a fragile elongated core without liability of breakage successive alternate coils of paper and glue so as to produce a sheath in which the successive coils of paper are substantially in contact with each other whereby there results a substantially homogeneous body resembling high grade wood commonly used as pencil sheaths. To these ends the invention consists in the improved method and pencil wrapping machine hereinafter fully described and particularly pointed out in the appended claims.

In the accompanying drawings illustrating a preferred form of wrapping machine by which the novel method may be expeditiously performed, Fig. 1 is a top plan view of the pencil wrapping machine; Fig. 2 is a front side elevation of the parts shown in Fig. 1; Fig. 3 is a longitudinal, vertical section taken on the line 3—3 of Fig. 1; Fig. 4 is a detail of the right hand end of the parts shown in Fig. 3, but showing the core wrapping members in a different position of operation; Fig. 5 is a longitudinal section taken on the line 5—5 of Fig. 4; Fig. 6 is a detail section of the lower portion of the parts shown in Fig. 4, but showing the core wrapping members in the positions assumed by them following the feeding of a fresh strip of paper into the machine, with the toe of the wrapper holding shoe about to press the forward end of the wrapper against the lower wrapping drum; Fig. 7 is a detail of the lower portion of the parts shown in Fig. 6, but showing the position of the parts after the shoe has pressed the wrapper against the lower wrapping drum, a pencil core having been fed into the machine and the wrapper advanced to the core; Fig. 8 is a horizontal section on an enlarged scale, taken on the line 8—8 of Fig. 3; Fig. 9 is a transverse section on an enlarged scale, taken on the line 9—9 of Fig. 4, through the paper cutting blades; Fig. 10 is a detail section similar to Fig. 7, but showing the wrapping members in the position assumed by them in the next step of the core wrapping operation; Fig. 11 is a view similar to Fig. 10, but showing the position of the wrapping members when the forward end of the wrapper has been coiled once around the core; Fig. 12 is a view similar to Figs. 10 and 11, but showing the position of the wrapping members at the completion of the core wrapping operation; Fig. 13 is a view similar to Fig. 12, but showing the completely wrapped core in the act of being discharged from the wrapping members; and Figs. 14, 15 and 16 are enlarged details taken from Figs. 10, 11 and 12, respectively, to show more clearly the successive steps in the coiling of the wrapper around the core.

The improved pencil wrapping machine, as illustrated in the drawings, comprises an upper roll or drum 20 and a lower roll or drum 21. The drums 20 and 21 are somewhat longer than the pencil core or other straight, elongated implement, indicated at 22, to be wrapped in a plurality of convolutions of alternate layers of paper and glue or other adhesive. The wrapping of the core is performed by the drums 20 and 21 by means of a belt or web 24, substantially as long as the drums, one end of which is secured to the upper drum 20 and the other end of which is secured to the lower drum 21. The sheath to be formed around the core consists of a strip of suitable, flexible material 25, such as paper, coiled spirally around the core with interposed spirals of glue taken from a glue supply 26 contained in a tank 27.

The strip of paper 25 is fed into the machine from a convenient source by means of the paper advancing rolls 29 and 30. When the proper length of the paper wrapper has been advanced by the rolls 29 and 30, the paper is cut by the rotatable cutter 31. The length of paper constituting the wrapper to be coiled about the pencil core 22 is fed down to a position above the lower drum 21 through a chute 32, as indicated in Fig. 6. The advancing forward end of the paper wrapper may, or may not, depending on the flexibility of the paper, fall downwardly onto the upper surface of the lower drum 21. But in either case, when the requisite length paper has been fed into the machine and is in the act of being cut by the rotatable blade 31, the toe end of an arcuate, pivotally mounted shoe 33 descends upon the section of the wrapper above the lower drum 21, as indicated in Fig. 6, to hold the forward end of the wrapper. Immediately thereafter the whole shoe descends upon the forward end of the wrapper against the portion of the web 24

then uppermost on the drum 21, as indicated in Fig. 3.

Just previous to these movements, a bail 28 is swung in counter-clockwise direction to draw the web tightly about the lower drum 21 and by pulling downwardly on the part of the web extending from the upper drum 20, complete the forming of a core-receiving loop or pocket 34 therein, as shown in Fig. 4. The bail is then swung out of the way and the pocket assumes the condition shown in Fig. 6, ready to receive the pencil core 22. Since the lower part of the drum 21 and the web 24 thereon rotates in the bath 26 of glue, the under surface of the forward end of the wrapper 25 adheres to the glue-bearing surface of the web 24 when the shoe 33 rises, so that the advancing edge of the wrapper will be moved under the core 22, which in the meantime has been fed into the pocket 34 from a hopper 35.

After the core 22 has been fed into the pocket 34 of the web 24 and the forward edge of the wrapper 25 has been moved forward so as to come under and lift the core, as indicated in Fig. 7, an elongated pocket closing blade 37 is swung against the web 24 just above the core 22 so as to fold the web loop 34 about the forward advancing edge of the paper wrapper and the core, as indicated clearly in Figs. 10 and 14. The pocket closing position of the blade 37 is fixed, and the space between the upper section of the web 24 and the wrapper 25 adhering to the portion of the web in contact with the lower drum 21 is just sufficient to permit the paper 25 to pass between the two sections of the web during the wrapping of the paper around the core. Substantially simultaneously with the moving of the blade 37 into contact with the outer side of web 24, a glue displacer or raiser in the form of an elongated rectangular box 38 descends into the supply of glue 26 and raises the level 39 thereof above the pocket 34 enclosing the core 22 and the portion of the paper being wrapped around it, so that throughout the core wrapping operation, the successive layers or coils of paper have glue applied to both sides thereof. The paper, preferably partially charred newsprint, being porous and the pocket 34 enclosing the core 22 and the spirals of paper wound around it, being as tight as it is possible physically to tighten the web 24, it will be understood that all surplus glue is squeezed out from between the successive coils or spirals of the paper and that the glue left between them is that which sinks into the pores of the paper and a hardly perceptible coating on the surface of the paper, with the result that there is substantially only a paper to paper contact in the successive coils or spirals of paper, it being understood, of course, that the glue left on the surface of the paper is just sufficient to cause the coils to inseparably adhere together.

The tight closing of the web and the coiling of the paper wrapper about the core is accomplished by the travel of the web 24 from the drum 21 to the drum 20, the web being unwound from the drum 21 and wound around the drum 20, as clearly indicated in Figs. 10, 11 and 12. Upon the completion of the wrapping operation, as shown in Figs. 12 and 16, the glue displacer 38 rises, the blade 37 swings out of contact with the web 24 and the drums 21 and 20 move in such fashion relatively to each other that the web 24 is straightened out, carrying with it the completely wrapped pencil indicated at 40 in Fig. 13, and depositing it upon an inclined platform 42 discharging onto a conveyor 43 which carries the wrapped pencils or other implements to the next point in the series of operations to be performed upon them.

The web 24 by means of which the paper wrapper 25 is wound or coiled tightly around the fragile pencil core 22 is preferably composed of a flexible material capable of being formed into a loop small enough to engage snugly the relatively small pencil core and a single coil of paper, as shown in Figs. 14 and 15. It is essential, however, that the frictional engagement between the glue covered paper and the pencil core be greater than the friction between the paper and the web 24 so that when the advancing forward edge of the paper during the travel of the web on the lower drum and around the core reaches the point (Fig. 14) where the web leaves the core, the paper remain in adherence with the core rather than with the web. This mode of operation is secured by choosing the proper material for the web, such as a good quality of "duck" fabric.

During the winding of the paper wrapper around the pencil core in the pocket 34 by means of the travel of the web from drum 21 to drum 20, as shown in Figs. 10 to 12, and more clearly in Figs. 14 to 16, the blade 37 maintains a fixed relation to the lower drum 21, leaving only enough opening into the pocket 34 to permit the paper to enter the pocket while preventing the exit of the core therefrom during the winding operation which is carried out by keeping the pocket tight upon the paper by the upper drum pulling the web from the lower drum, which is put under a retarding brake pressure as soon as the blade 37 closes the pocket. Accordingly, as successive coils of paper are applied to the sheath being built up around the core and the sheath progressively grows in size, the loop or pocket must grow in size to accommodate itself to the growing sheath; all as clearly shown in Figs. 14 to 16. At the same time, the web must not stretch longitudinally and contract laterally during the wrapping operation since this action might result in the formation of wrinkles in the web and in the paper. But the web being composed of textile fabric is necessarily slightly stretchable, I therefore put the web under somewhat greater pulling force as the pocket is being closed upon the core and before the first coil of paper is completely around the core than is exerted during the wrapping operation. This action results in a prestretching of the web, so that it will remain at the same width during the building up of the sheath.

The construction of the machine parts and the driving mechanism therefor by which this series of steps or operations is performed will now be described in detail:

The core wrapping elements and their actuating mechanism are mounted on a frame consisting of two vertical, longitudinally extending walls, a front side wall 44 and a rear side wall 45. The upper drum 20 is journaled at its ends in uprights 46 and 47 rising from the frame walls 44 and 45, respectively. On the rear end of the shaft of drum 20 which projects beyond the upright 47 is mounted a sprocket 49 over which passes a chain 50, one end of which extends downwardly and carries at its extremity a counterweight 51. The other end of the chain 50 is pivotally connected with the upper end of an arm 52, the hub 48 of which is pivoted on a rod 53 fixed at its outer ends in the frame extensions 54 and 55. The arm 52 carries a cam roll 57 which is held against the working periphery of a cam

58 by means of the counterweight 51. The cam 58 is secured to a cam shaft 59 journaled at its ends in the frame extensions 54 and 55, and the rear projecting end of the cam shaft 59 carries a worm gear 60 driven by a worm 61 actuated by a motor, the outline of which is indicated at 62 in Fig. 1. The cam shaft 59 is driven in constant rotation by means of the motor 62.

The lower drum 21 is fixedly mounted at one end on a shaft 64 which projects about two-thirds of the way into the drum 21, as shown in Fig. 5. The shaft 64 is journaled in a boss carried by the front wall 44. On the projecting forward end of the shaft 64 is mounted a sprocket 65 over which passes a chain 66, the free lower end of which carries a counterweight 67. The other end of the chain 66 is pivotally connected with the upper end of an arm 68, the hub 69 of which is pivoted on the rod 53. The arm 68 carries a cam roll 70 which is held against the working periphery of a cam 72 fixedly mounted on the cam shaft 59 by the counterweight 67.

The bail 28 is a straight member somewhat longer than the lower drum 21 and is provided at one end with an offset arm 74 which is loosely mounted on the shaft 64 and at the other end with an offset arm 75 which is fixed to a shaft 76 journaled in a boss 77 projecting from the rear frame wall 45. The inner end of the shaft 76 is loosely received in the drum 21. The rear projecting end of the shaft 76 carries a sprocket 79 over which passes a chain 80, the downwardly extending end of which carries a counterweight 81. The other end of the chain 80 is pivotally connected with the upper end of a curved arm 82, the hub 83 of which is pivoted on the rod 53. The arm 82 carries a cam roll 84 which is held against the working periphery of a cam 85 by means of the counterweight 81.

The paper feeding rolls 29 and 30 are journaled in the upper offset ends of uprights 87 and 88 extending upwardly from the right hand ends of the frame walls 44 and 45, respectively. The rear end of the shaft 89 of the upper feed roll 29 projects beyond the upright 88 and carries a spur gear 90 which meshes with and is driven by a spur gear 91 mounted on the rear end of the shaft 92 of the lower feed roll 30. On the forward end of the shaft 92 is loosely mounted a sprocket wheel 93 over which passes a chain 95, the free downwardly extending end of which carries a counterweight 96, the other end of the chain 95 is pivotally connected with the upper end of an arm 97, the hub 98 of which is pivoted on the rod 53. The arm 97 carries a cam roll 99 held against the working periphery of a cam 100 mounted on the cam shaft 59 by the counterweight 96. On the outer forward end of the feed roll shaft 92 is loosely mounted a ratchet wheel 102, fixed to the sprocket 93, and which is engaged by a spring pressed pawl 103 pivoted on the outer end of an arm 104 fixed on the forward extremity of the feed roll shaft 92.

The arrangement is such that when the arm 97 is swung to the left, facing Fig. 2, under the action of the cam 100, the chain 95 turns the sprocket 93 and the ratchet wheel 102 in a counterclockwise direction and through the pawl 103 turns the arm 104 in a counterclockwise direction, thereby turning the lower feed roll 30 in counterclockwise direction and the upper feed roll 29 in clockwise direction to feed a length of paper into the paper chute 32. When the requisite length of paper has been fed into the machine, which is when the high point of the cam 100 passes over the cam roll 99, and the counterweight 96 then functions to pull the chain 95 and the arm 97 to the right, the frictional engagement between the paper and the rolls 29 and 30 being greater than the frictional engagement between the teeth on the ratchet wheel 102 and the spring-pressed pawl 103, the teeth 102 of the ratchet pass under the pawl while the weight 96 returns the sprocket 93 and ratchet 102 to initial or normal position.

When the requisite length of paper has been fed down into the chute 32, it is cut transversely at its upper end. The paper cutting devices are arranged transversely of the length of paper and comprise the rotary cutter 31 which in general form is a hollow cylinder, solid at its two ends (as seen in Fig. 9) and having a wide opening or mouth in its front side, that is, the side toward which the paper advances, and a narrow slot 106 in the opposite side, the upper outer edge 107 of which constitutes a cutting blade (see Fig. 4). The cylindrical cutter member 31 is arranged to oscillate in a hollow cylindrical stationary cutter member 108, which like the cutter 31 has a wide opening in its front side and a narrow slot 109 in its other side. The inner edge 110 of the lower section of the cutter member 108 serves as the stationary cutter edge with which the movable cutter edge 107 cooperates to shear the paper. The hollow cylindrical cutter member 108 is secured in a housing 112 which in general form is a hollow cylinder mounted in the upper ends of the uprights 87 and 88. The housing 112 has a wide opening in its front side and on its other side a pair of downwardly extending lips 114 spaced apart to receive the upper end of the paper chute 32.

The solid ends of the rotary cutter 31 are provided with the trunnions 115 and 116 journaled in the uprights 87 and 88. On the outer end of the trunnion 116 is secured an arm 117. The contraction spring 118 attached at its lower end to the arm 117 and at its upper end to the upper extremity of a finger 119 rising from the upright 88 turns the rotary cutter 31 in clockwise direction, which movement is limited by the stop pin 120, thereby holding the rotary cutter in normal, uncutting position with its slot 106 in alinement with the slot 109 in the stationary cutter member and the passageway through the chute 32, as shown in Fig. 4. When the outer end of the arm 117 is depressed, as will be presently explained, the rotary cutter is turned in counterclockwise direction to bring its cutting edge 107 against the paper and against the edge 110 of the stationary cutter 108 so as to sever the paper as shown in Figs. 3 and 6.

A completely wrapped core having been discharged by drawing the section of web extending between the drums 20 and 21 taut (through the turning of the drums), the upper and lower drums are not turned in counterclockwise direction through the action of their respective cams until they are initial positions, as shown in Figs. 4 and 6. The upper end 121 and the lower end 122 of the web are let into slots in the drums and the positions of these ends make it convenient to follow the movements of the drums during the steps of the core wrapping operation. While the drums are assuming the positions shown in Figs. 4 and 6, the bail 28 is swung counterclockwise into contact with the section of web extending between the drums to form the pocket or loop 34 therein. The bail then returns to normal position as the paper is being fed down the chute 32

and before the forward end thereof reaches a position over the lower drum so as not to strike the paper in case its forward end should decline onto the lower drum.

While the bail 28, having formed the loop, is returning to inoperative position (Fig. 6) and the next wrapper length of paper is being fed down the chute 32, the hopper 35, carrying at its lower end the shoe 33 and also from its forward side the adjustable screw 124, is descending, with the result that when the forward end of the wrapper is above the web covered upper surface of the lower drum 21, the toe of the shoe descends upon the forward end of the wrapper to hold it against the drum and substantially simultaneously therewith, the screw 124 strikes the free end of the arm 117, thereby depressing it and turning the rotary cutter to sever the paper (Fig. 6), immediately after which the heel of the shoe 33 is brought down against the rest of the forward end of the wrapper and presses it against the portion of the web 24 uppermost on the drum 21, as shown in Fig. 3. The hopper then rises to the position shown in Fig. 4. The disengagement of the screw 124 from the arm 117 permits the spring 118 to return the rotary cutter to the position shown in Fig. 4, with its slot 106 in alinement with the slot 109 and the opening through the chute 32 to permit the next length of paper to pass down the chute. As the rotary cutter 31 returns to inactive position, the lower side of the slot 106 moves the forward end of the new length of wrapper into position to be fed down the chute.

The hopper 35 is a vertically and transversely arranged rectangular box-like structure somewhat wider than the length of the cores 22 it contains. The hopper 35 is fixed in a U-shaped frame 125 which slides vertically by means of a dove-tail connection with the forward side of the transversely-extending vertical plate 126 supported from the forward upper edges of the uprights 46 and 47. The side walls 127 of the U-shaped frame 125 are each provided with an outwardly extending stud 128 on the outer end of which is pivoted the lower end of a link 129, the upper end of which is connected with the forward end of a lever arm 131 secured at its rear hub end 130 to an end of a shaft 132 rotatably mounted in bearings 133 (Fig. 1) supported from the upper end of the uprights 46 and 47. The shaft 132 is oscillated in one direction by means of an arm 134 the hub 135 of which is fixed on the shaft 132 between the bearings 133. The free end of the arm 134 is connected with the forward ends of two links 137, the rear ends of the links being pivotally connected with the upper ends of upright twin arms 138, the hubs 139 of which are loosely mounted on the rod 53. A collar 140 is interposed between the rear ends of the links 137. The arms 138 carry betwen them a cam roll 141 which bears against the working periphery of a cam 142. The hopper 35 is positively lowered into the position shown in Fig. 3 by means of the cam 142, and is raised into the position shown in Fig. 4 by means of a contraction spring 143 one end of which is secured to the upright 47 and the other end of which is secured to an arm 144 extending outwardly from the rear arm 131.

The lower end 146 of the hopper 35 is contracted so as to permit of the passage therethrough of the cores in single file only, as shown in Figs. 3, 4 and 6. The lower end of the contracted hopper neck 146 discharges into a horizontally disposed guide-way 147 in which reciprocates a flat slide 148 slightly thicker than a core and having a transversely arranged core-receiving slot 149. When the hopper is in raised position, as shown in Fig. 4, the slot 149 in the slide 148 is in alinement with the passageway in the hopper neck and receives from it the lowermost core. When the hopper is lowered to the position shown in Fig. 3 with the shoe 33 pressing the forward end of the wrapper against the upper surface of the drum 21, the slide 148 is pulled forward to aline the slot 149 with a core chute 151 extending downwardly from the under side of the guide 147 so that the core in the slot 149 is discharged down into the loop 34, as shown in Fig. 3.

The shoe 33 is a concave member substantially as long as the lower drum 21 and is provided on its upper surface with two upwardly extending arms 153 pivotally connected just above the upper surface of the shoe 33 with the outer ends of two supports 154 extending downwardly from the forward side of the core chute 151. The upper ends of the arms 153 are loosely articulated by a pin and slot connection 157 with the arms 155 extending forwardly from the front side of the slide 148. The upper extremities of the arms 153 are connected with the hopper neck 146 by contraction springs 156 which normally hold the parts governed thereby in the positions shown in Fig. 4, with the slot 149 in slide 148 under the opening of the hopper neck 146 and with the shoe 33 canted, that is to say, with the rear or toe end of the shoe at a lower level than the forward or heel end. By reason of this arrangement, when the shoe descends upon the wrapper on the lower drum 21, as shown in Fig. 6, the toe end of the shoe strikes the wrapper first; then as the hopper continues to descend the shoe 33 is caused to pivot on the supports 154, with the result that the slide 148 is pulled outwardly, bringing the slot 149 into alinement with the core chute 151 so as to discharge a core into the loop 34. The pulling of the slide 148 forwardly brings the rear end thereof under the open mouth of the hopper neck 146 to hold back the cores in the neck until the slide is again returned to the position shown in Fig. 4. The adjustable screw 124 is carried on the outer end of an arm 158 extending forwardly from the rear wall 127 of the U-shaped hopper support.

While the shoe 33 is pressing the forward end of the wrapper against the web on the upper side of the lower drum 21, there is a temporary pause in the turning of the upper and lower wrapping drums, but immediately the shoe 33 rises from contact with the wrapper, the drums start to rotate in counter clockwise direction. When the turning of the lower drum brings the forward edge of the wrapper under the core 22, as shown in Fig. 7, the loop closing blade 37 is swung into contact with the web to form a narrow-mouthed pocket around the forward end of the wrapper and the core, as shown in Figs. 10 to 14. The blade 37 is about as long as the web is wide, as seen in Fig. 5, and is fixed on a shaft 160 journaled in the frame walls 44 and 45. On the forward end of the shaft 160 is fixed an upright arm 161 with the upper end of which is connected the forward end of the link 162 the other end of which is connected with the lower end of an arm 163 secured to the outer end of a shaft 164 journaled at its ends in the frame walls 44 and 45. To the shaft 164 is secured the hub 165 of a rearwardly

extending arm 166, the outer end of which carries a cam roll 168 which bears against the working periphery of cam 169 (having the shape of a gibbous moon) fixed on the cam shaft 59.

The hub 165 also serves as the hub of a forwardly extending arm 170, the forward offset end of which terminates in a shoe-like extremity 171 secured to the upper surface of the box-like glue raiser or displacer 38. The engagement of the round part of the periphery of the cam 169 with the cam roll 168 serves to hold the blade 37 and box 38 in inactive positions. When the flat part of the cam 169 moves opposite the cam roll 168, a contraction spring 173 connected at one end with the arm 163 and at the other end with the frame extension 54 acts to move the blade 37 and the box 38 into active positions, as shown in Figs. 10 to 12. It will thus be understood that the blade 37 and the glue displacer 38 move simultaneously into and out of active and inactive positions.

The glue reservoir 27 is a trough-like structure having a bottom 175, front end 176 and rear end 177, all of which extend transversely from the frame wall 44 to the frame wall 45 which constitute the two lateral sides of the reservoir, as will be understood by reference to Fig. 5.

To assist in exerting sufficient tension on the web as it passes around the working edge of the blade 37 in coiling the paper in successive convolutions around the core 22 in the pocket 34 and to assure the squeezing out of all surplus glue from between the successive convolutions, brake friction is imposed on the drum 21. On the outwardly extending end of the shaft 64 is fixed a brake drum 178 surrounded by a brake band 179 secured at one end by a pin 181 to the frame wall 44. The other end of the brake band is fastened to one end of a rod 182 the other end of which is connected with the link 162 at the point at which it is connected with the arm 163. The arrangement is such that when the link 162 is pulled to the left (viewing Fig. 2) by the arm 163 through the action of the spring 173 to swing the blade 37 against the web, the rod is simultaneously pulled to the left to tighten the brake band on the brake drum and thereby impose the necessary drag on the lower wrapping drum.

The improved machine described above is a preferred form, although other forms have proved satisfactory for carrying out the novel method. The important feature seems to be the exertion of sufficient pressure on one end of a glue smeared paper wrapper and the graphite core to cause the glue to enter not only the pores of the paper but also the pores of the graphite core so that the glue between these surfaces is in its maximum sticky state, causing the paper to adhere to the core rather than to the sides of the pocket as the paper is coiled by the pocket around the core, and then continuing the pressure on the successive coils of paper to squeeze out the surplus glue from between paper coils, so that there is produced a sheath composed of a substantially solid mass of paper. By properly treating the paper, preferably newsprint, before wrapping it around the core, as by partially charring it, the resulting sheath closely resembles the usual wood sheath, but is cheaper to produce and of more uniform quality. The glue employed may be any preferred kind. Satisfactory results are obtained by using sodium silicate of an alkali-silicate ratio of about 1 to 3.22 diluted with water to a specific gravity of 1.3.

The novel method herein disclosed of wrapping successive and alternate coils of paper or other flexible sheet material and glue about an elongated core consists in providing a web of flexible material substantially as wide as the length of the core and the width of the wrapper to be coiled around it, forming a transverse, open-mouthed pocket in the web, introducing the core into the pocket, introducing the forward end of a wrapper into the pocket and under the core, closing the mouth of the pocket sufficiently to prevent exit of the core but permitting the feeding of the wrapper into the pocket, drawing the two ends of the web taut to cause the inner sides of the pocket to embrace the core and wrapper tightly, immersing the pocket and core into glue and then causing the web to travel in the direction in which the forward end of the wrapper entered the pocket while exerting a drag on the other end of the web so that the successive coils of paper will be wrapped so tightly on the preceding coils as to cause the glue to enter the pores of the paper while the successive coils of paper are brought into substantially paper to paper contact, whereby the coils of paper are caused to adhere inseparably together, thereby producing a substantially homogeneous body resembling straight-grained wood easily cut by a knife or rotary sharpener.

Having thus described the invention, what I claim as new is:

1. In a machine for winding successive, alternate coils of paper wrapper and glue around an elongated core, a first drum, a second drum, a textile fabric web substantially as wide as the core is long extending from one drum to the other, means for turning the first drum in both directions, means for turning the second drum in both directions, said drum turning means acting independently of each other so that the section of web extending between the drums is sometimes taut, and at other times loose with a transverse open-mouthed core-receiving pocket therein, means for depositing a core in the pocket, means for feeding a wrapper to the first drum, the partial turning of the first drum bringing the forward edge of the wrapper under the core therein, a blade arranged transversely of the web at a point to one side of the mouth of the pocket, means for moving the blade toward the first drum to act in conjunction therewith to partially close the mouth of the pocket to prevent the exit of the core from the pocket but permitting the continued passage of the wrapper thereinto, means for immersing the pocket, and the core with the part of the wrapper in contact with the core in glue, the means for turning the second drum serving to pull the web over the edge of the blade to tighten the pocket upon the core and the portion of wrapper thereon so that the travel of the web will cause the core and the portion of wrapper thereon to rotate to wind the wrapper in successive coils around the core, and means for braking the turning of the first drum so as to exert a pull on the web in the direction opposite to its travel.

2. In a machine for winding successive, alternate coils of paper wrapper and glue around an elongated core, a textile fabric web substantially as wide as the length of the core, means for moving the web in the two directions of its length so that the web is sometimes taut, and at other times loose, forming a transverse open-mouthed

core-receiving pocket therein, means for introducing a core into the pocket, means for feeding a wrapper to the pocket to bring its forward edge under the core therein, means for partially closing the mouth of the pocket to prevent the exit of the core therefrom but permitting the continued passage of the wrapper thereinto, means for immersing the pocket, and the core with the part of the wrapper in contact with the core in glue, the web moving means serving to exert a pull on the web in the direction of the feed of the wrapper to close the sides of the pocket about the core and the part of the wrapper in contact therewith, the travel of the web in the direction of the feed of the paper serving to cause the core and the wrapper in contact therewith to be rotated to wind the wrapper in successive coils around the core, and brake means acting on the web in the opposite direction to tighten the sides of the pocket upon the core and the coils of wrapper wound thereon.

3. In a machine for winding successive, alternate coils of paper wrapper and glue around an elongated core, a textile fabric web substantially as wide as the core is long, means for forming a transverse open-mouthed core-receiving pocket in the web, means for depositing a core in the pocket, means for feeding a wrapper to the pocket to bring the forward edge of the wrapper under the core therein, means for partially closing the mouth of the pocket to prevent the exit of the core therefrom but permitting the continued feeding of the wrapper thereinto, means for immersing the pocket, and the core with the part of the wrapper on the core in glue, means for moving the belt in the direction of the feed of the wrapper to bring the inner sides of the pocket tightly upon the core with the wrapper thereagainst, the travel of the web serving to rotate the core and cause the wrapper to be wound in successive coils about it, and means for exerting a retarding drag on the web to increase the pressure of the pocket upon the core and coils of paper.

4. In a machine of the character described, two drums spaced apart, a web extending from one drum to the other, means for turning the drums independently of each other in both directions to make the section of web extending between them sometimes taut, and at other times loose to form a transverse open-mouthed core-receiving pocket therein, means for depositing an elongated core in the pocket, means for feeding a wrapper to the first drum to bring its forward edge into contact with the portion of web thereon, the partial turning of the first drum introducing the forward edge of the wrapper into the pocket and below the core, means for partially closing the mouth of the pocket to prevent the exit of the core therefrom but permitting the continued passage of the wrapper thereinto, the drum turning means when moving the web in the direction of the feed of the wrapper serving to tighten the sides of the pocket upon the core and the part of the wrapper thereon to wind the wrapper in successive coils around the core, and means for immersing the pocket in glue during the coiling of the wrapper around the core.

5. The method of winding alternate coils of paper and glue around an elongated core to form a sheath thereon, which consists in forming a transverse open-mouthed core-receiving pocket in a traveling web substantially as wide as the core is long, smearing the upper surface of the portion of the web advancing to the pocket with glue, introducing a core and the forward end of a paper wrapper into the pocket with the forward margin of the paper between the core and the inner wall of the pocket, the remainder of the paper wrapper temporarily adhering to the glue-smeared surface of the web, closing the mouth of the pocket sufficiently to prevent the exit of the core from the pocket but permitting the passage of the paper into the pocket, immersing the pocket and its contents in glue, exerting a drag on the part of the web traveling toward the pocket while exerting a pull on the part of the web leaving the pocket so as thereby to cause the inner surface of the pocket to embrace tightly first the core and the first coil of paper and glue thereon and thereafter the successive coils of paper and glue until the wrapper is completely wound around the core.

6. A machine for wrapping successive, alternate coils of paper and glue around an elongated core to form a sheath therefor comprising, a hopper for containing the cores, a web substantially as wide as the core is long, a first drum to which one end of the web is attached, a second drum spaced apart from the first drum and to which the other end of the web is attached, means for turning the drums in both directions independently of each other so that at times the section of the web extending from one drum to the other is taut, and at other times loose with a full coil of web wrapped around the first drum, the loose section of web between the drums forming an open-mouthed core-receiving pocket adjacent the first drum, means for feeding a strip of paper substantially as wide as the web at an angle to the first drum so that the advancing edge of the paper is above the first drum, a tilted clamping shoe pivotally mounted on the hopper, means for lowering the hopper so that the toe end of the shoe presses the forward edge of the wrapper against the portion of the web on the upper part of the first drum, means for cutting the paper, the continued descent of the shoe bringing the full length thereof against the wrapper and drum, means for raising the hopper, means controlled by the shoe as it contacts against the wrapper for releasing a core from the hopper to permit it to drop into the pocket in the web, the partial turning of the first drum bringing the advancing edge of the wrapper into the pocket and under the core therein, a blade movable toward the first drum for contacting the web to close the mouth of the pocket to less than the diameter of the core but greater than the thickness of the wrapper, means for immersing the pocket in glue, means for exerting a retarding drag on the first drum, the turning of the second drum serving to tighten the section of web between the drums as the web unwinds from the first drum, passes over the edge of the blade and winds up on the second drum, thereby causing the portion of the web forming the pocket to wind the wrapper and glue tightly around the core and around the successive coils of paper so that there is substantially paper to paper contact in the sheath.

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