(No Model.) 2 Sheets—Sheet 1.

G., J. G. & M. O. REHFUSS.

MATCH SPLINT COILING MACHINE.

No. 507,843. Patented Oct. 31, 1893.

FIG. 1.

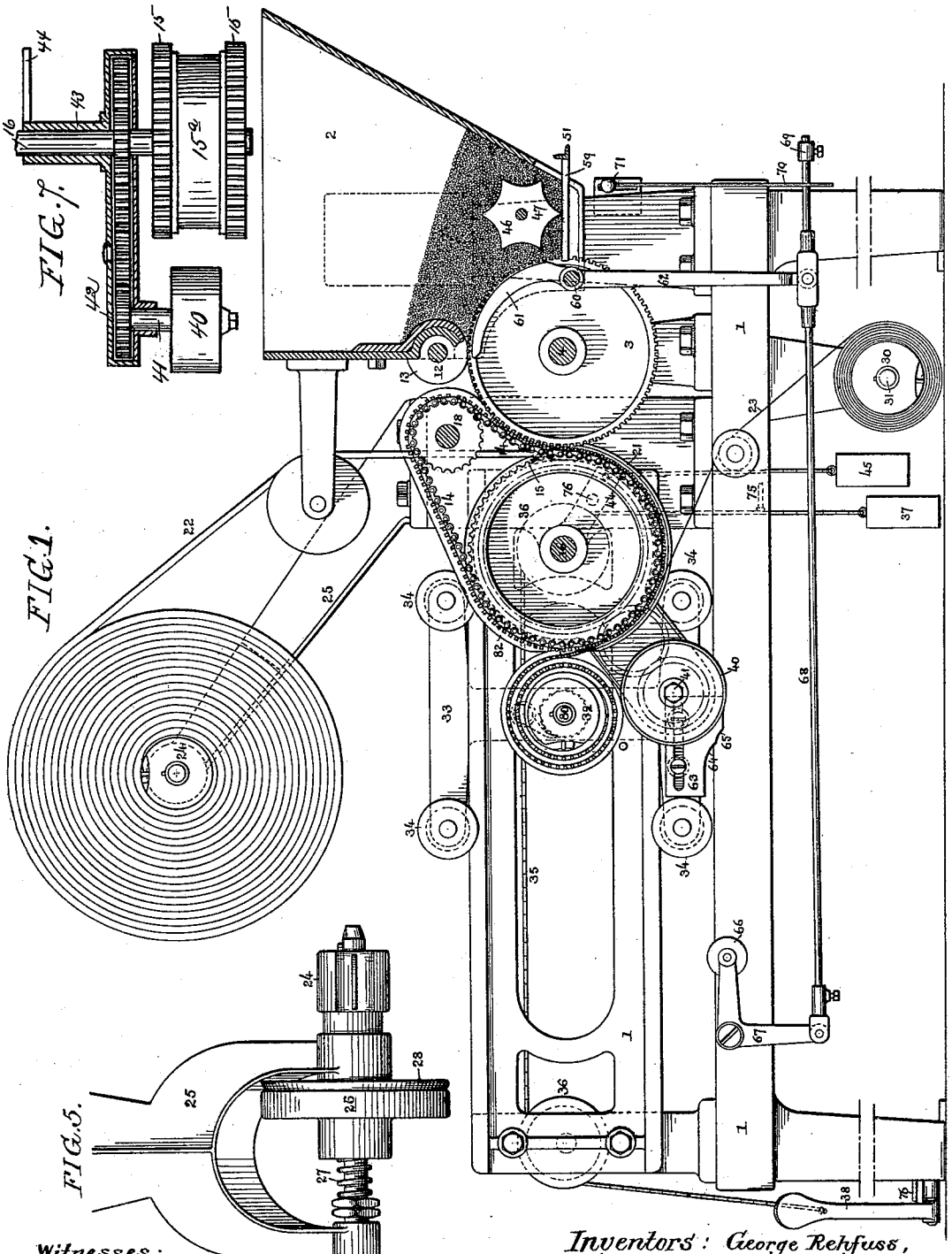

FIG. 5.

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(No Model.) 2 Sheets—Sheet 2.

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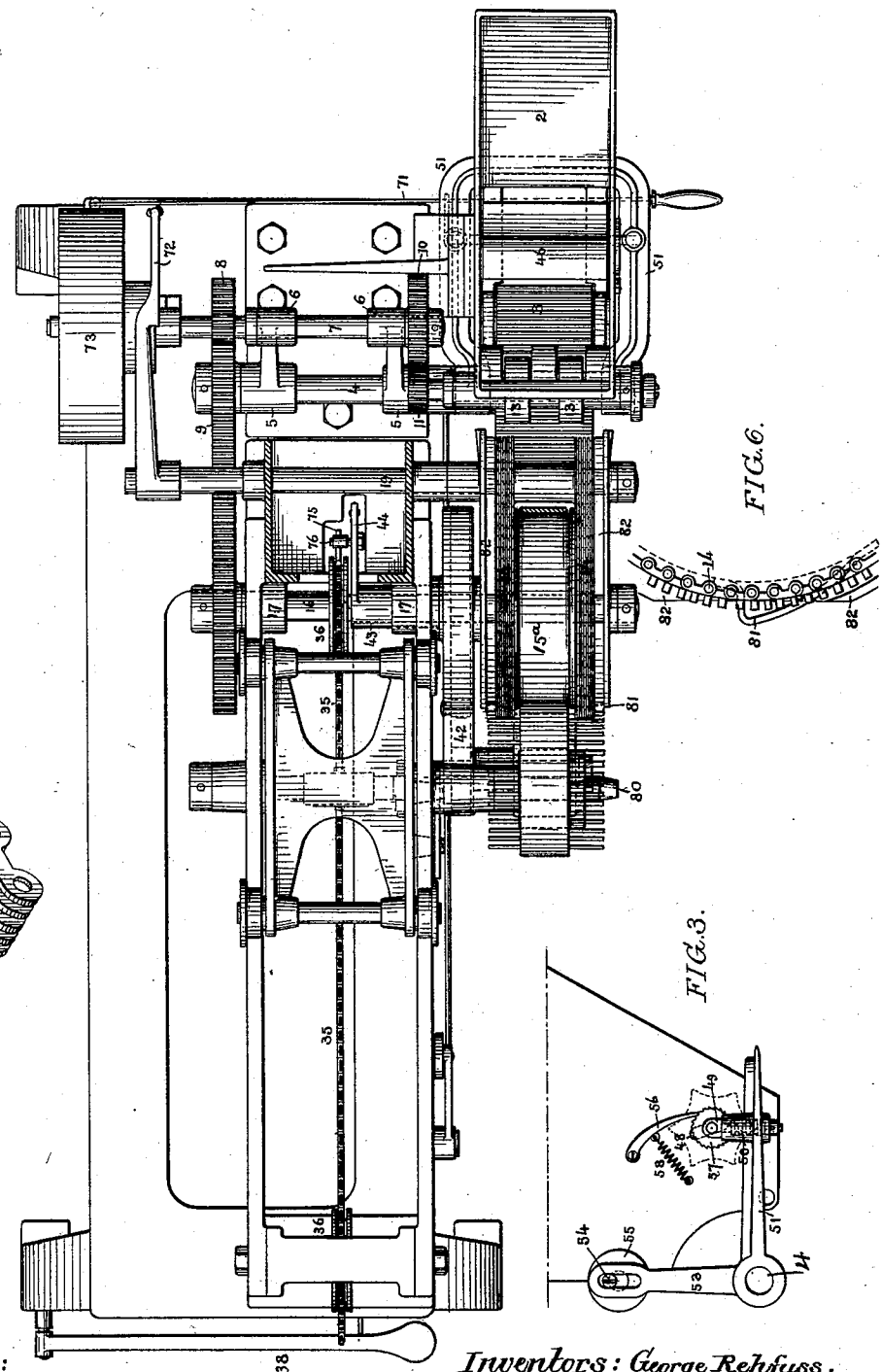

FIG. 2.

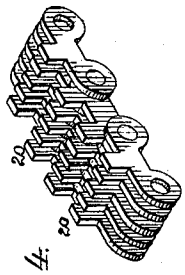

FIG. 4.

FIG. 3.

FIG. 6.

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UNITED STATES PATENT OFFICE.

GEORGE REHFUSS, JOHN GEORGE REHFUSS, AND MARTIN O. REHFUSS, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNORS TO W. IRVING STEEL, OF SAME PLACE.

MATCH-SPLINT-COILING MACHINE.

SPECIFICATION forming part of Letters Patent No. 507,843, dated October 31, 1893.

Application filed December 30, 1892. Serial No. 456,802. (No model.)

To all whom it may concern:

Be it known that we, GEORGE REHFUSS, JOHN GEORGE REHFUSS, and MARTIN O. REHFUSS, citizens of the United States, and residents of Philadelphia, Pennsylvania, have invented certain Improvements in Match-Splint-Coiling Machines, of which the following is a specification.

One object of our invention is to construct a match splint coiling machine in such manner that the splints will be uniformly spaced and will be held with uniform pressure throughout the entire coil, further objects being to provide for the automatic cessation of the feed at the proper time and to insure the automatic stoppage of the machine when the coiling operation has been completed. These objects we attain in the manner hereinafter set forth reference being had to the accompanying drawings, in which—

Figure 1, is a view partly in longitudinal section and partly in elevation of a match splint coiling machine constructed in accordance with our invention. Fig. 2, is a plan view of the machine partly in section, and Figs. 3, 4, 5, 6 and 7 are detached views of parts of the machine.

The main frame 1 of the machine has at one end a hopper 2 in which the splints are deposited, this hopper having at the bottom a segmental opening for the reception of part of a notched or transversely grooved wheel 3 which is mounted upon a shaft 4 adapted to suitable bearings 5 on the frame or bed of the machine, these bearings carrying other bearings 6 in which is mounted the driving shaft 7, the latter being geared by spur wheels 8 and 9 to the shaft 4 and being also geared by spur wheels 10 and 11 to a shaft 12 which is mounted in suitable bearings on the hopper and is located above the grooved wheel 3, said shaft 12 carrying disks or rollers 13 which rotate in contact, or almost in contact with the ribs of the wheel 3, the adjoining faces of the wheel and disks moving in reverse directions so that said disks serve to sweep back into the hopper all of the splints except those contained in the grooves of the wheel, the latter thus carrying forward one splint in each groove to the next element of the feeding mechanism. This element is a pair of endless belts 14 which are driven by sprocket wheels 15 at the ends of a drum 15^a which is mounted upon a shaft 16 adapted to suitable bearings 17 on the main frame, the chain belts 14 also running around idler wheels 18 mounted on a fixed spindle 19 at the upper portion of the frame.

The links of the chain belts 14 have projecting teeth 20 as best shown in Fig. 4, and the wheel 3 delivers the match splints into the spaces between these teeth so as to provide for the further carrying forward of the splints by the belts, suitable segmental guards 21 preventing the splints from falling out of the spaces between the teeth of the belts as shown in Fig. 1.

The matches are confined as usual between two coiling webs 22 and 23, the former being the thickest and being drawn from a spool 24 on a shaft which is free to turn in a bearing in an arm 25 projecting upward from the frame of the machine, suitable tension being imparted to said spool by means of a friction disk 26 acted on by a spring 27 and bearing upon a cone disk 28 on the spool shaft, as shown for instance in Fig. 5, so that the web 22 is maintained under constant tension. Said web 22 passes around the drum 15^a on the inner side of the series of splints carried around by the belts 14, the other web 23 passing up between the segmental guards 21 and bearing upon the outer faces of the series of splints so that when the latter leaves the belts 14 they are firmly clamped between the two webs.

The web 23 is drawn from a spool 30 carried by a shaft 31 mounted in depending bearings on the frame of the machine and intended to be acted upon by a frictional tension device in the same manner as the shaft of the spool 24 so that the web 23 is likewise maintained under proper tension. It will be evident that by continuing the guards 21 up to the point where the incoming web 22 reaches the outermost convolution of the coil, the web 23 might be dispensed with, and the coil formed from the single web 22.

The forward ends of the webs 22 and 23 are, at the commencement of the operation,

secured to a hub 32 which is grooved for adaptation to a splined shaft 80, the latter being free to turn forward in bearings in a carriage 33 having wheels 34 adapted to rails formed upon the fixed frame 1 of the machine, a suitable pawl and ratchet, such for instance as that shown by dotted lines in Figs. 1 and 2, preventing any back movement of the shaft 80 so as to prevent loosening of the convolutions of the coil by back movement of the shaft after the winding operation has been completed. As the winding operation proceeds the webs 22 and 23 with the match splints confined between them are coiled upon the hub 32, the carriage 33 receding as the coil increases in diameter.

The carriage 33 is connected to a chain 35 which passes around pulleys 36 and has at one end a weight 37 and at the other end a treadle 38, the weight tending to draw the hub 32 constantly toward the drum 15^a so that the rotation of the coil is effected by the contact of the said drum 15^a with that portion of the web 22 constituting the outermost convolution of the coil, but in order to insure the tight winding of the coil we prefer to employ also a supplementary frictional drive wheel 40 which acts upon the surface of the coil and is driven at a somewhat higher surface speed than the drum 15^a so that the constant tendency of the wheel 40 is to rotate the coil of splints at a slightly higher surface speed than the sprocket wheels; hence the two webs between which the splints are confined are constantly drawn taut and are wound tightly in forming the successive convolutions of the coil. Fingers 81 (Fig. 6) carried by guard frames 82 outside of the sprocket wheels 15 serve to act upon those portions of the splints which project laterally beyond the endless chains 14 and thereby press the splints from between the teeth of said endless chains 14 as the belt 22 leaves the drum 15^a. The frictional driver 40 is carried by a shaft 41 which is mounted in bearings at the end of a frame 42, the latter being hung to the shaft 16 of the sprocket wheel and carrying the gearing whereby the shaft 41 is driven so as to impart the slightly increased surface speed to the drive wheel 40. This gearing, in the present instance, comprises a series of spur wheels, such as shown by dotted lines in Fig. 1, but a belt, chain, or other means of transmitting the motion of the shaft 16 to the shaft 41 may be employed as desired. The frame 42 is carried by a hollow shaft or sleeve 43 which surrounds the shaft 16 and has an arm 44 to which is hung a depending weight 45, the tendency of the latter being to press the surface of the drive wheel 40 into contact with the coil, but permit said drive wheel to swing downward as the coil increases in diameter.

It will be observed that neither of the driving wheels has to support any part of the weight of the coil, the degree of pressure between the driving wheels and the coil being dependent wholly upon the weights 37 and 45 so that the bearings of said wheels are relieved from the pressure which is exerted upon them in that class of machines in which the coil is carried by swinging arms and rests upon the driving wheel.

In order to insure the straightening out of the splints in the hopper 2 so that said splints will lie parallel with the grooves in the feed wheel 3 and will properly enter said grooves it is necessary to effect constant agitation of the splints in the hopper, and this agitation is accomplished by the following means:— Within the lower portion of the hopper is a drum 46 having a fluted periphery and carried by a shaft 47 which passes through segmental slots 48 in the ends of the hopper as shown in Fig. 3, the ends of the shaft being mounted in blocks 49 which are supported upon springs 50 contained in suitable sockets in a yoke or frame 51 which embraces the lower portion of the hopper and is mounted so as to swing freely upon the shaft 4 of the feed wheel 3. The frame 51 has at one side an arm 53 which is slotted at the upper end for the reception of a crank pin 54 upon a disk 55 secured to the shaft 12 so that a constant rising and falling motion is imparted to the said frame 51 and hence a like rising and falling motion to the fluted drum 46. In addition to this rising and falling motion, said drum 46 has a slow movement of rotation imparted to it by a pawl 56 which is hung to the side of the hopper and acts upon a ratchet wheel 57 carried by the drum shaft 47 as shown in Fig. 3, the pawl being held in engagement with said ratchet wheel by means of a spring 58. The transverse portion of the frame 51 also has fingers 59 which project into the lower portion of the hopper and serve to lift the entire mass of splints contained therein as said frame 51 is vibrated so that by reason of this constant vertical agitation of the splints and the action of the rotating drum 46 the splints are properly lined up for presentation to the grooves of the feed wheel 3. To a rock shaft 60 at the front lower corner of the hopper are hung a pair of segmental arms 61 which flank the feed wheel 3, and said rock shaft 60 has another arm 62 so that by pulling the latter forward the arms 61 will be thrust above the periphery of the wheel 3 and will lift out of the grooves of said wheel the match splints contained in that portion of the wheel which projects into the hopper and will then serve as guards to prevent the farther entrance of splints into any of the grooves of the wheel so that the feeding of the splints will be arrested. In order that this operation may be automatically performed when the desired size of coil has been wound, the carriage 33 has a cam plate 63 which has two cam surfaces 64 and 65, these cam surfaces, as the carriage is pushed outward, successively acting upon an antifriction roller 66 carried by a bell crank lever 67 hung to the frame 1, the other arm of this bell crank lever being connected by a rod 68

to the arm 62. The outer end of the rod 68 also carries a toe 69 which is adapted to act upon a depending bar 70 connected to the stopping and starting lever 71 of the machine, this lever being connected to the arm 72 which operates the clutch whereby the driving pulley 73 is connected to or released from the driving shaft 7. This clutch is preferably similar to that forming the subject of Letters Patent No. 362,997, dated May 17, 1887, hence specific illustration or description of the same will not be necessary. When the cam surface 64 acts upon the roller 66 the rod 68 will be moved to such an extent as to project the arms 61 into the hopper and stop the further feeding of splints and when the cam surface 65 acts upon said roller 66 the rod 68 will be farther moved so as to trip the lever 71 and stop the machine.

In order to get the driving wheel 40 out of the way preparatory to the removal of the coil from the coiling shaft the carriage 33 is drawn slightly forward after the coiling operation is completed, such movement being effected by depressing the treadle 38 which is held in the depressed position by slipping it beneath a stud 76 on the frame. The forward movement of the carriage brings a pin 75 on the chain 35 into contact with a roller 76 on a stud projecting from the arm 44 so as to lift said arm and swing the hollow shaft or sleeve 43 which carries the frame 42 thereby carrying the drive wheel 40 downward and away from the surface of the coil.

The coil might be wound solely by reason of the frictional contact of the outer convolution of the coil with the positive driving drum 15^a, the coil being wound at the same rate of speed as that at which the splints are delivered into the tapes, but by the use of the supplementary frictional drive wheel 40 any slack in the coil which may be due to the slipping of the drive drum 15^a is taken up and all of the convolutions of the coil are consequently wound tightly the supplementary wheel 41 being driven at a somewhat higher surface speed than the positive drive wheel. On the other hand the drive wheel 40, or any equivalent wheel might be relied upon as the sole means of driving the coil.

Both the drum 15^a and the wheel 40 should have peripheral surfaces of such material as to provide a frictional grip upon the outer surface of the coil, and the hub 32 should have a like surface.

Having thus described our invention, we claim and desire to secure by Letters Patent—

1. A match splint coiling machine having a coiling hub, a driving device acting directly upon the outer convolution of the coil, a supplementary driver also acting upon said outer convolution of the coil and having a surface speed slightly in excess of that of the other driver, and yielding pressure devices for maintaining the coil in contact with the driving mechanism, substantially as specified.

2. A match splint coiling machine having a notched feeder, a hopper, a drum in said hopper for straightening the splints before they reach the notched feeder, and means for imparting a positive rising and falling movement, and a rotating movement to said drum, substantially as specified.

3. A match splint coiling machine having a notched feeder, a hopper, splint supporting fingers at the bottom of the hopper, a drum in the hopper above said fingers, and means for reciprocating the fingers and drum and for rotating the latter, substantially as specified.

4. A match splint coiling machine having a hopper, a drum therein, and a reciprocated frame carrying springs upon which the drum shaft is mounted so that the drum is free to yield when it meets with undue resistance, substantially as specified.

5. A match splint coiling machine having a hopper, a drum therein, a reciprocated frame carrying the drum shaft, and a pawl and ratchet whereby as the drum shaft is raised and lowered, intermittent movements of rotation are imparted thereto, substantially as specified.

6. A match splint coiling machine in which are combined a coiling drum mounted upon a movable carriage, a driving wheel carried by a swinging frame and acting upon the outer convolution of the coil to rotate the same, and a chain connected to the carriage and having a projection to act upon a portion of the swinging frame structure and carry the driving wheel out of contact with the outer convolution of the coil, substantially as specified.

7. A match splint coiling machine having a coiling drum upon a movable carriage, a notched feeder, a stop plate which, when lifted, prevents access of the splints to the notches in the feeder, a driving shaft having a clutch, a duplex cam upon the movable carriage, and means whereby as said carriage moves outward, said cam is caused to effect first the operation of the stop plate, and then the operation of the clutch, and the stoppage of the machine, substantially as specified.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

GEORGE REHFUSS.
JOHN GEORGE REHFUSS.
MARTIN O. REHFUSS.

Witnesses:
FRANK E. BECHTOLD,
JOSEPH H. KLEIN.