

A. J. & H. A. FOULDS.
SPINNING AND WINDING MACHINE.
APPLICATION FILED MAY 29, 1906.

911,815.

Patented Feb. 9, 1909.

2 SHEETS—SHEET 1.

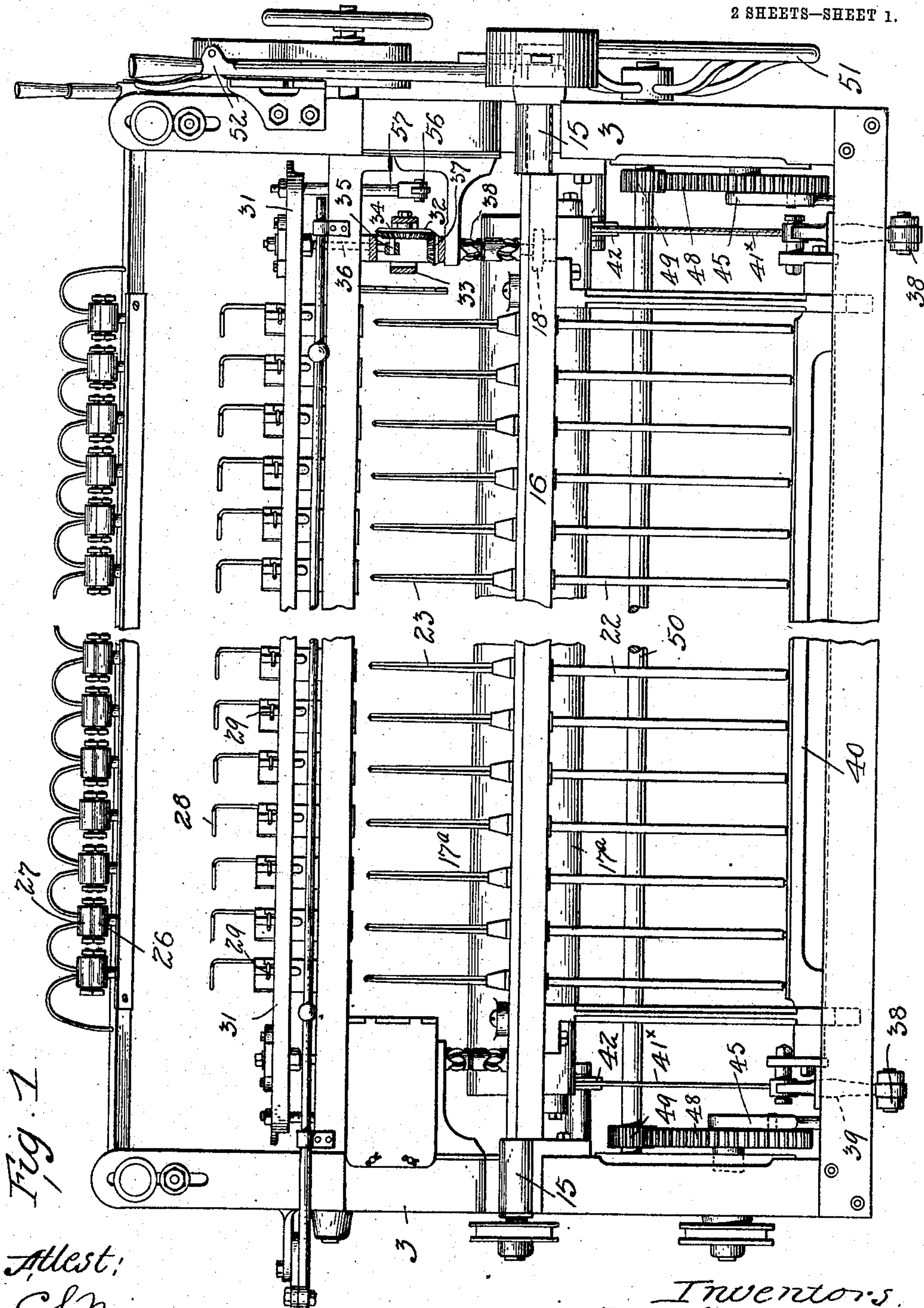


Fig. 1

Attest:

C. S. Maxwell
Edward N. Sarton

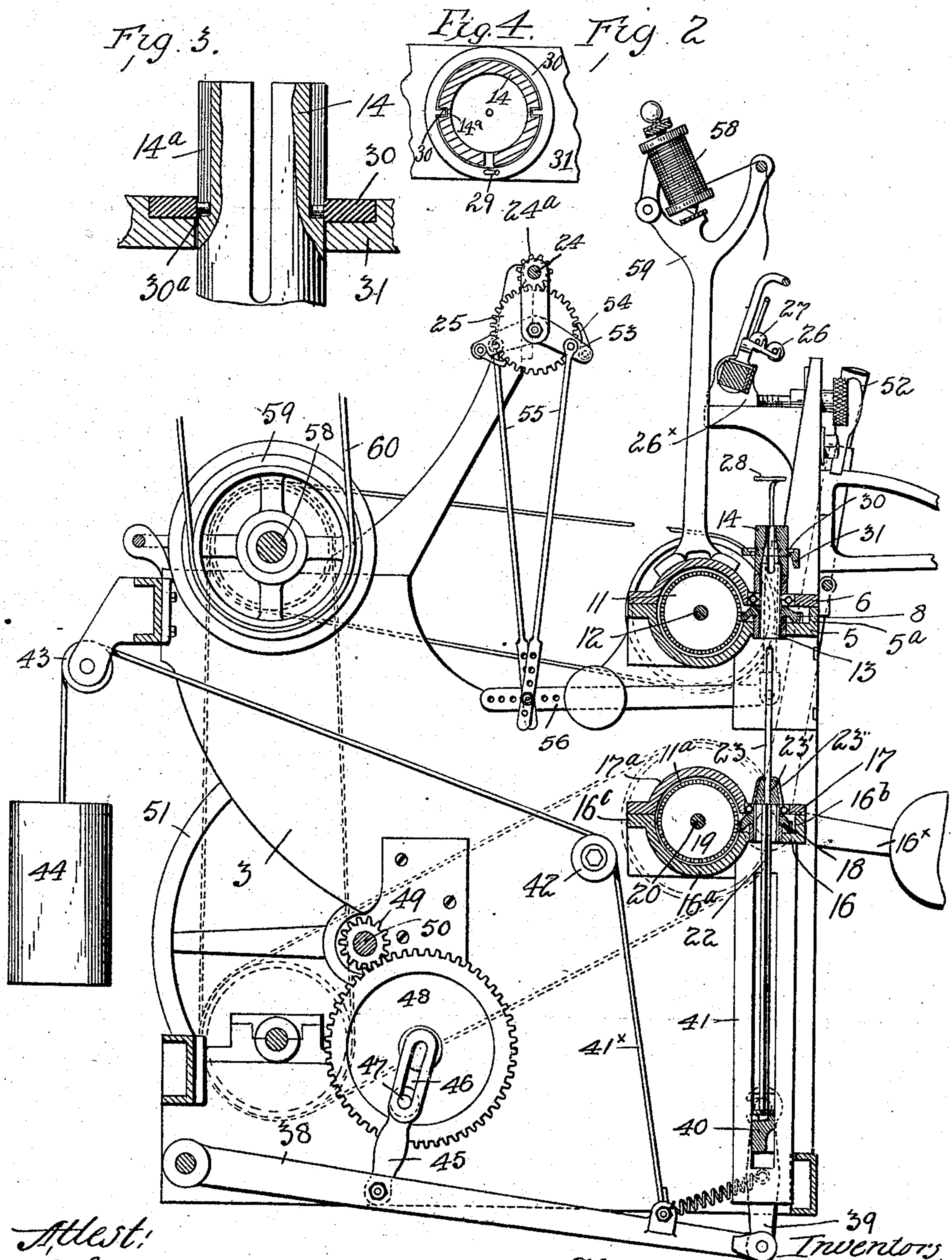
Inventors.
Alfred J. Foulds.
Henry A. Foulds.
By Spear, Kiddleton, Donaldson & Spear
Attys.

A. J. & H. A. FOULDS.
SPINNING AND WINDING MACHINE.
APPLICATION FILED MAY 29, 1906.

911,815.

Patented Feb. 9, 1909.

2 SHEETS—SHEET 2.



Attest:
C. S. Mearns
Edward N. Sarton

Inventors:
Alfred J. Foulds
Henry A. Foulds.
by
Spears, Middleton, Donaldson & Spears
Attorneys

UNITED STATES PATENT OFFICE.

ALFRED J. FOULDS AND HENRY A. FOULDS, OF LANSDOWNE, PENNSYLVANIA.

SPINNING AND WINDING MACHINE.

No. 911,815.

Specification of Letters Patent.

Patented Feb. 9, 1909.

Application filed May 29, 1906. Serial No. 319,390.

To all whom it may concern:

Be it known that we, ALFRED J. FOULDS and HENRY A. FOULDS, citizens of the United States, residing at Lansdowne, Pennsylvania, have invented certain new and useful Improvements in Spinning and Winding Machines, of which the following is a specification.

Our present invention relates to further improvements in the type of machine, for simultaneously twisting yarn and winding it into cops, which forms the subject matter of Letters Patent of the United States granted to us on the 29th day of November 1904 and numbered respectively 776,128 and 776,129 and also an application filed by us on the 2nd day of February 1905 Serial Number 246,132. In devising the present construction we have aimed to further simplify the construction and increase the efficiency, to reduce friction, to avoid as far as possible all danger of oil or lubricant from the bearings coming in contact with either the slubbing or cops, and to render the cop builders more accessible.

With these and other objects in view the invention includes the various features of construction and arrangement of parts hereinafter described and particularly pointed out in the claims.

The invention is illustrated in the accompanying drawings in which:—

Figure 1 is a longitudinal sectional elevation of a sufficient portion of the machine with a portion of the center broken away and, Fig. 2 is a vertical section taken at right angles to Fig. 1 looking towards the right. Fig. 3 is a side elevation of the upper portion of one of the top members on a larger scale with parts sectioned to show the splined grooves and with the thread guide carrying ring 30 and bar 31 in section. Fig. 4 is a horizontal section through the upper portion of the cop builder showing the ring 30 and bar 31 in plan.

In this drawing we have shown in Fig. 1 only the extremities of the machine with the central portion broken away, but it will be understood that the machine can be built of a length sufficient to accommodate any desired number of spindles, by making it of the appropriate length.

Referring by reference characters to the drawings the numerals 3 indicate the side frame members of the machine to which is

suitably secured, the lower member 5 of two cross bars or members 5 and 6 in which are journaled the cop builders and upper parts of the master controlling devices in a manner hereinafter described. The member 5 is provided with a vertical flange 5^a upon which the bar 6 rests leaving a space between in which are located the spiral gears 8 which operate respectively the master controlling devices and the cop builders. The portions of the members 5 and 6 which lie in rear of the cop builders are formed semi-circular in cross section, providing between them a cylindrical gear chamber in which are located the spiral gears 11 mounted upon the longitudinal drive shaft 12 and meshing with the spiral gears 8. The gear chamber forms also an oil chamber so that the gears may rotate in oil or grease effecting a great reduction in friction and consequent saving in wear and tear. Each gear 8 of the cop builders is secured to a barrel 13 which is rotatably mounted in suitable journals or bearings in the bars or members 5 and 6. The barrel 13 extends above the member 6 and to its upper end the cop builder 14 is connected in any suitable manner. Thus the cop builders project upward above their supporting and operating parts making them more readily accessible and holding the cops above the gearing and in such relative position that no oil or dirt from the machine can be thrown upon the thread or cops.

In suitable bearing brackets 15 in the lower part of the frame is journaled a horizontal member or bar 16 having a semi-circular channeled portion 16^a and flanges 16^b and 16^c upon which rests a top bar or member 17 having a corresponding semi-circular channeled portion 17^a forming a gear chamber 11^a similar to the upper chamber above described. These bars 16 and 17 carry suitable bearings in which are journaled the hubs of the spiral gears 18 which mesh with the spiral gears 19 on the longitudinal drive shaft 20. This drive shaft and the gears 19 thereon are located within the cylindrical oil and gear casing so that these gears, like the upper ones, rotate in oil.

The hubs of the end gears 18 are connected to the lower shafts of the master controlling devices. Through the intermediate tubular hubs of the gears 18 pass the spindle extensions 22 having each a suitable spline connection so as to be vertically movable

through the hubs while at the same time they are rotated thereby, the spindle extensions each carrying a spindle 23. The spindles are designed to be held elevated by suitable counter weights in substantially the manner hereinafter described.

The slubbing is led from suitable cams or containers which may be located at any convenient point and which are omitted from the drawing for clearness of illustration of other parts. Thence it passes over a feed roll 24 extending the entire length of the machine to which a positive movement is imparted in the manner hereinafter described. From this roll each sliver passes to and between a pair of guide rolls 26 and 27 carried by adjustable brackets 26^x and the latter of which is held in contact with the former preferably by gravity. From these guide rolls the slivers or slubbings are led downward through the rings 28 to and through thread guides 29 and thence through vertical slots in the cop builders 14 to the spindles 23, around which they are wound by the more rapid motion of the cop builders.

Each thread guide 29 is carried by a ring 30 which has one or more pins or projections 30^a engaging vertical grooves in the cop builder so that while the rings are capable of vertical movement with relation to the cop builders they are compelled to rotate in unison therewith. The rings 30 are rotatably mounted in a longitudinal bar 31 which is connected with thread guides and caused to rise and fall to impart the necessary vertical movement by the master devices 32 at the ends of the machine. Each master device is constructed in substantially the same manner as in my aforesaid patents and while a specific description thereof would seem unnecessary it may be briefly described as follows.

To an extension of the lower end of each upper end gear 8 is secured a frame or casing 33 in the side of which is journaled upon a horizontal pin or axis a vertical bevel gear 34 which has a crank pin 35 projecting into a horizontal bearing slot at the lower end of a shaft or rod 36. This shaft or rod projects up through the tubular hub and at its upper end is provided with a rotatable but non longitudinally movable connection with the bar 31 which carries the thread guides as above described. Thus as the gear 34 rotates the crank pin causes the shaft or rod 36 to reciprocate vertically and effect the rising and falling movement of the thread guides. The gear 34 is caused to rotate by the bevel gear 37 journaled in the lower part of casing 33 and connected by suitable flexible shafting 38 to a shaft section having a spline connection with the hub of the lower end gear 18. As the gears 8 and 18 are driven at different rates of speed it will be obvious that this differential

motion will, through the connections and bevel gearing above described, effect the reciprocation of rod 36 and consequently the vertical movement of all the thread guides.

As the horizontal member or bar 16 is mounted to rock in the bearings 15 it may be tilted to swing the upper ends of the spindles forward out of line with the cop builders after the cops are finished and the spindles depressed so that their upper ends clear the lower edges of the hubs of the upper gears, the tilting being assisted by weighted arm 16^x.

The particular means by which the spindles are normally yieldingly held elevated and the lowering to remove the cops will now be described.

In the lower part of the machine at each end is pivoted a lever 38 the free end of which is connected by a spring latch 39 with the bar 40 in which the lower ends of the spindle extensions are journaled. This bar is vertically movable in the swinging guides 41 which depends from the bar 16. A cord or band 41^x connected to each lever 38 passes upward over pulleys 42 and 43 and carries at its other end a weight 44 and thus these weights tend to draw the lever upward and through the latch 39 to press the bar 40 and consequently all the spindles upwardly. The weight of a large number of spindles is quite considerable and consequently the counter weights must be quite heavy. In order to enable them to be lowered conveniently and easily a link 45 is pivotally connected to each lever 38 and is provided with a slot 46 engaged by a crank pin 47 on a gear 48. Each of these gears 48 is in mesh with a smaller gear 49 carried by a shaft extending lengthwise of the machine and provided at one end with a hand wheel 51. By this hand wheel the gear 48 may be rotated to cause the crank pin to force the link 45 and lever 38 down into the position shown in Fig. 2, at which time the crank pin being in line with the pivot of the link and the axis of the gear the lever will be locked against upward movement. The guides 41 and slip rail or bar 40 may now be swung rearwardly to swing the upper ends of the spindles outwardly for removal of the cops, the latches being thereby disengaged from bar 40. A hand lever 52 is provided for effecting this swinging movement. After the cops have been doffed the spindles are swung back and the hand wheel 51 rotated to bring crank pin 47 into a diametrically opposite position, the weight raising the bar 38 so that the pin remains in the bottom of the slot. In this position the spindles will be in position to begin the formation of the cops and the length of the slots 46 is such as to permit the spindles to be lowered during the formation of the cops.

As a convenient means of operating the feed roll 24 we may provide the following mechanism. The roll has at each end a gear 24^a which meshes with a gear 25. Rocking arms 53 on opposite sides of this gear carry oppositely disposed pawls 54 which engage the teeth of the gear. These arms 53 are connected by rods 55 with a pivoted arm 56 which is connected by a rod 57 with the bar 31. Thus as the bar moves vertically to move the thread guides the feed roll will be rotated and at a speed corresponding to the speed of the feed guides.

When the machine is used for spinning asbestos covered wire the spools 58 carrying it will be mounted on a rack 59 as shown.

The main drive shaft is shown at 58 carrying step pulleys 59 over which passes belt 60 running to any convenient source of power. From this shaft the motion is transmitted to the shafts 12 and 20 by suitable belts and pulleys as indicated in dotted lines. The relative size of these is such that the shaft 12 as above explained, rotates faster than the shaft 20 and the system preferably includes a system of cone pulleys whereby the relative speed of the shafts 12 and 20 may be varied to impart more or less twist according to the requirements of the work.

Many mills desire to run a large number of spindles, but as only a certain number of spindles can with any degree of practicability be embodied in a single machine where a larger number are required a number of machines may be set up end to end. Where this is done we prefer to connect the operating shafting of the successive machines or sections by clutch mechanism and to control the relative speed of the upper and lower gear shafts by a single master or speed controlling device or differential gearing.

In our prior patents we have contemplated starting the wind on the bare spindle. Such an operation required an automatic speed changing device to vary the speed at starting until the thread had been wound on the spindle up to the full diameter of the cop. We find that such an automatic device can be dispensed with by the use of a starting cone 23' covered (preferably) by a removable cone 23'' of paper or like material which is removed with the cop and remains therein until the cop has been used, after which it may be brought back to the machine for use over again. With such a device the full length of thread is drawn at each lap at the beginning of the wind, and yet there is no danger of collapse of the base of the cops after removal from the spindles.

Having thus described our invention what we claim is:—

1. In combination, a main frame having a supporting member, tubular hub members journaled in said supporting member, cop builders carried by said tubular hubs, spiral

gears on the hub members, a longitudinal shaft having spiral gears meshing with said first named gears, a rocking frame pivoted in the lower part of the main frame, a plurality of spindles rotatably mounted in said rocking frame, and capable of vertical movement therein, spiral gears journaled in said rocking frame, and having a splined connection with the spindles, a drive shaft with spiral gears thereon meshing with the spiral gears of the spindles, and yielding means for normally holding the spindles elevated with their upper ends projecting through the cop builders, substantially as described.

2. In combination, a main frame, a plurality of cop builders journaled therein, means for driving said cop builders in unison, a rocking frame pivotally mounted below the cop builders, a horizontal bar mounted in the lower part of said rocking frame, means tending normally to elevate said bar, a plurality of spindles journaled at their lower ends in said bar and having their intermediate portions rotatably mounted in the upper part of said rocking frame and capable of vertical movement therein, and means acting on said vertically movable horizontal bar tending to keep all of the spindles elevated with their upper ends projected through the cop builders, and means for rotating the spindles in unison, substantially as described.

3. In a machine of the class described, upper and lower casings each having a cylindrical part and a lateral extension, a drive shaft journaled in the cylindrical part, a plurality of vertical spiral gears thereon, horizontal spiral gears journaled in the walls of each lateral extension and meshing with said vertical gears, cop builders supported above the upper casing and operatively connected with the upper horizontal gears, spindles extending through the gears of the lower casing and operatively connected therewith, thread guides cooperating with the cop builders, and means for moving the thread guides vertically and means for permitting the rocking of the lower casing to tilt the spindles, substantially as described.

4. In a machine of the class described, the combination with the spindles and cop builders with means for rotating them at different rates of speed and the vertically movable thread guide operating bar controlled by the said difference in speed, of feed mechanism also controlled by the said difference in speed, substantially as described.

5. In combination, a series of cop builders, a series of spindles cooperating therewith, means for rotating them in the same direction but at different rates of speed, a plurality of thread guides, a single bar for operating them, means controlled by the difference in speed of said parts for actuating said bar, a feed device and connections between said bar and feed device whereby the latter is actuated

ated from the former, substantially as described.

6. In combination, a plurality of cop
builders, a plurality of vertically movable
5 spindles, a swing guide for said spindles, lever
mechanism having detachable connections with the spindle support, yielding
means tending to draw said lever upward, a
10 crank pin engaging said slot and means for

rotating said wheel, substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

ALFRED J. FOULDS.
HENRY A. FOULDS.

Witnesses:

CHARLES JANVIER,
ALMA L. JANVIER.