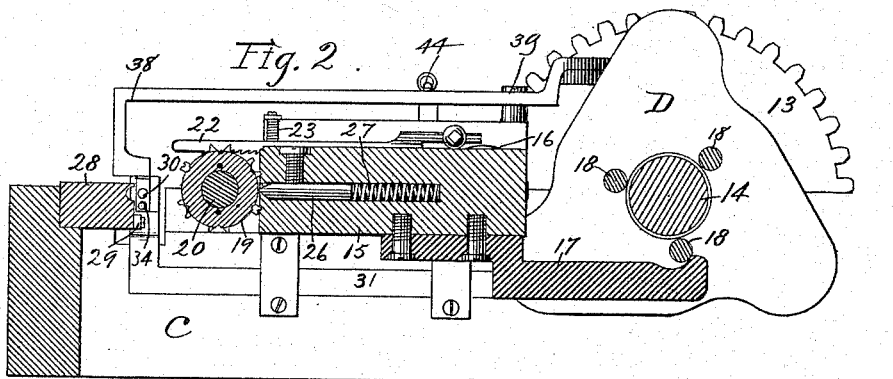


2 Sheets—Sheet 1.

No. 526,526.

Patented Sept. 25, 1894.



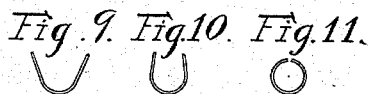
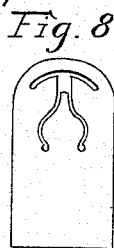
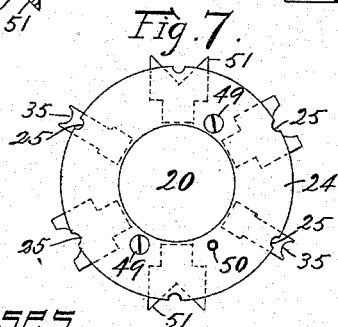
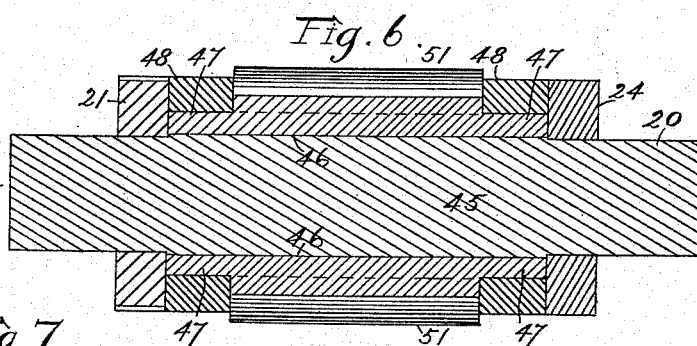
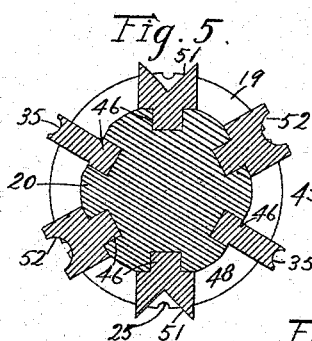
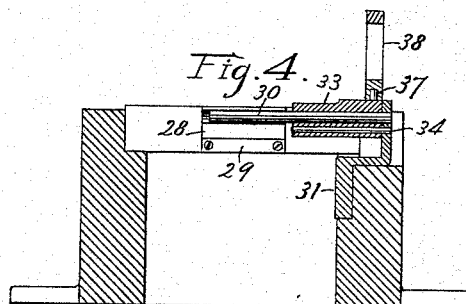
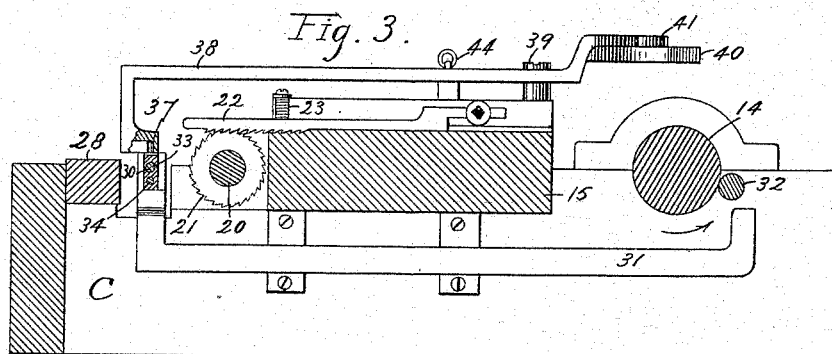
Q. M. Stiper
& Co. Soomer, Jr.

Wm. S. Grannis.
By James Shepard.
Atty.

2 Sheets—Sheet 2.

No. 526,526.

Patented Sept. 25, 1894.



Witnesses
A. M. Steper
O. C. Loomis Jr

Inventor
H. A. O'Grannel.
By James Shepard.
Atty.

UNITED STATES PATENT OFFICE.

HIAL S. GRANNIS, OF PLANTSVILLE, ASSIGNOR TO THE PECK, STOW & WILCOX COMPANY, OF SOUTHLINGTON, CONNECTICUT.

MACHINE FOR FORMING PENHOLDER-TUBES.

SPECIFICATION forming part of Letters Patent No. 526,526, dated September 25, 1894.

Application filed May 25, 1894. Serial No. 512,444. (No model.)

To all whom it may concern:

Be it known that I, HIAL S. GRANNIS, a citizen of the United States, residing at Plantsville, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Machines for Forming Penholder-Tubes, of which the following is a specification.

My invention relates to improvements in machines for forming tubes, and the main object of my improvement is to produce a machine for rapidly and efficiently performing this work, and one that is especially adapted for forming tubes of a small diameter.

In the accompanying drawings: Figure 1 is a plan view of my machine. Fig. 2 is a longitudinal section of the main portion of the same on the line *xx* of Fig. 1. Fig. 3 is a longitudinal section on the line *yy* of Fig. 1. Fig. 4 is a transverse section on the line *ww* of Fig. 1. Fig. 5 is an enlarged transverse section of the series of dies. Fig. 6 is a longitudinal section of the same. Fig. 7 is an end view of the same. Fig. 8 is a plan view of a blank for forming pen holder tubes. Fig. 9 is a transverse section of the same showing the result of the first step in the formation of said tube. Fig. 10 is a like view showing the result of the second step, and Fig. 11 is a like view showing the result of the third and final step in forming said blanks into a tube.

A designates the main shaft which may be provided with any suitable driving wheel B and the pinion or gear 12, which in turn engages the gear wheel 13 upon the cam shaft 14, which cam shaft is virtually the main shaft of the machine, the shaft A and gearing being employed for the better application of power to the shaft 14. C designates the frame of the machine upon which these parts are mounted and it is provided with a sliding gate 15 arranged in any suitable ways to move longitudinally in the frame. To avoid friction I provide this guide with a friction roller 16 which is engaged by the cam D on the shaft 14 to force said slide toward the opposite end of the machine, said cam, as shown, being provided with three projections for thus forcing the slide forward three times at each revolution of the shaft

14. Upon the under side of the slide is an arm 17 which extends rearwardly to a point near the shaft 14 and in the sides of the cam D there are three pins or projections 18 for engaging the arm 17 at the proper time and drawing the sliding gate 15 back after each forward movement. In the forward end of the slide 15 I arrange an intermittingly rotating head 19 carrying a series of dies, the same being mounted upon the shaft 20 upon which is a ratchet wheel 21, Fig. 3, that is engaged by the pawl 22 that is secured to a stationary part of the frame and which is forced into engagement with said ratchet wheel by any suitable spring pressure, as for example, the spring 23. When the sliding gate 15 is drawn backward, the head 19 is rotated a fractional part of a revolution which as shown is one sixth.

On the end of the shaft 20 which is opposite the ratchet wheel 21 is a holding disk or collar 24 having at its edge a series of notches 25 which is spaced to co-incide with the spacing of the dies in said head. In the gate 15 is a friction plunger 26 (see Fig. 2) which is pressed forward by means of the spring 27 so that its end engages the holding disk or collar 24 and entering the notches or recesses before described holds the intermittingly revolving head against accidental displacement during its periods of rest.

Immediately in front of the intermittingly rotating head is the stationary die 28, the same being fixed in any proper manner to the frame and having in its face a semi-circular groove. Underneath the die groove a suitable gage or stop 29 is employed to serve as a gage in putting in blanks. Immediately in front of the die groove in this die 28 is a mandrel 30, which is fixed in a sliding arm 31 that extends backwardly to the cam shaft 14, where it is engaged by the pin or projection 32 upon the side of the cam D which faces the same, as best shown in Fig. 3. Surrounding the mandrel 30 is a sliding block or knock-off 33 which is also provided with a guide pin 34 to prevent its accidental rotation on the mandrel, as shown in Figs. 3 and 4. This mandrel is drawn backward slightly into the position shown by means of the projection 32 on one side of the cam D and sliding arm 31 so that a blank

may be dropped between the die 28 and the mandrel and stopped by the gage or stop 29. The moving dies in the head 19 are represented as during the middle of their intermittent movement, the sliding gate not being drawn backward to its extreme limit. The full backward movement of the sliding gate will leave the intermittingly rotating head with one of the first dies 35 (Figs. 5 and 7) directly in front of the mandrel 30, so that as the sliding gate moves forward said die engages the mandrel and forces it forward into the cavity of the die 28. In order to prevent the mandrel from being bent, I also arrange a projecting screw 36, on a forward part of the sliding gate 15, so as to press upon the knock-off 33 and carry the mandrel forward evenly with the pressure thereon from the dies. By making this projection 36 in the form of a screw it may be adjusted so as to push evenly with the dies. In order to reciprocate the knock-off longitudinally of the mandrel I, connect it by means of the pin 37 with the knock-off lever 38, said lever being pivoted upon the frame, as at 39, and actuated by means of pallet like arms 40 and 41 which are engaged by cams or projections 42 and 43, the one being upon one side of the gear 13, while the other is upon one side of the cam D, the same operating to impart a quick movement to the knock-off lever at the proper time. If desired a spring may also be employed, as at 44, to hold this knock-off lever in the position shown. While I prefer to actuate this lever positively in both directions, it may be moved in one direction by a positive movement, as a cam, and in the opposite direction by a spring.

The movable dies consist of sets of two or more in each set and they may be secured so as to rotate with the shaft 20 in any proper manner. Inasmuch as the metal from which the pen holder tubes are formed is quite stiff and somewhat elastic, I have arranged the movable dies in sets of three for acting successively upon the blank. In order to show a proper way for securing these dies to the shaft 20, I have shown the same enlarged in Figs. 5, 6 and 7. The middle portion of the shaft, as at 45, is of a larger diameter and longitudinally through said enlargement I make grooves to receive the inner edges of the several dies. This base edge of the dies is extended longitudinally of the shaft beyond the body of the dies proper so as to form tenons 47 at each end, over which a ring or collar 48 is secured to hold them in place. Upon the outersides of these collars I arrange at one end the ratchet wheel 21 and at the other end the holding disk or collar 24. These may be secured in place in any proper manner, as for example, by means of screws 49 which extend through into the enlarged middle portion of the shaft 20. A dowel pin 50 may be employed to insure placing the collars in the proper position. The first die 35 is intended to act directly upon the man-

drel 30 and not upon the blank. The next die 51 is V shaped upon its face and acts upon the blank to partially form it around the mandrel. The finishing die 52 is concave on its face and completes the folding or forming of the tube. The blanks are dropped down into position between the spindle 30 and the stationary die when the machine is in the position shown in Figs. 1 and 2. A further movement of the main shaft will draw the sliding gate fully back and bring the first moving die 35 directly in front of the mandrel 30. As the parts continue their movement the sliding gate and the moving dies are carried forward until the first die 35 engages the mandrel 30 and forces it into the die 28, thereby bending the blank from its flat form into the shape shown in Fig. 9. The sliding gate then retreats leaving the blank and mandrel undisturbed and as the sliding gate moves backwardly the rotating head is again moved a fractional part of its revolution and the die 51 or second die is presented in alignment with the mandrel. As the gate with this die is moved forward again said die engages the spread out edges of the blank and changes said blank from the form shown in Fig. 9 to that shown in Fig. 10. The sliding gate again retreats leaving the mandrel and blank undisturbed. The next die 52 is brought into alignment with the mandrel and as it is forced forward it changes the blank from the form shown in Fig. 10 to that shown in Fig. 11.

In Fig. 1, the projection 43 on the side of the cam has just escaped the arm 41 and the projection 42 has forced the knockout lever 38 into the position shown. As this projection 43 passes forward and downward and makes nearly another complete revolution, its beveled end strikes the rear side of the arm 41 and operates the knockout lever 38 with a quick motion to move the knock-off 33 longitudinally on the mandrel 30 and discharge the tube therefrom. The projection 32 on the side of the cam D acts about this time so that, at the time the knock-off is thus operated it is drawn backwardly away from the face of the stationary die 28, as shown.

I have represented the knock-off as moving longitudinally on the mandrel while the mandrel is stationary relatively thereto, but it is evident that these parts may have their movement inverted without changing the general character of my improvement. While for some work it may be necessary or advisable to employ dies in sets of three or more, it is clearly evident that with other work, tubes may be formed with dies which consist of sets of only two. I have also shown the revolving dies or head as arranged with two sets, but it is obvious that this is not arbitrary. It is also obvious that longer tubes may be formed by my machine by simply making a greater length of mandrel and dies to operate thereon.

I consider it unnecessary to point out all the variations that may be made, reserving

the usual right to substitute equivalents and make changes in mechanical details.

I claim as my invention—

1. The combination of the sliding gate, 5
mechanism for moving said gate, an intermit-
tingly rotating head mounted on said gate
and carrying dies, the stationary die acting in
conjunction therewith, the intervening man-
drel working in connection with said station- 10
ary and movable dies and operating mechan-
ism, substantially as described and for the
purpose specified.

2. The combination of the sliding gate, 15
mechanism for moving said gate, an intermit-
tingly rotating head carrying dies, the sta-
tionary die acting in conjunction therewith,
the intervening mandrel working in connec-
tion with said stationary and movable dies, a
knock-off having a longitudinal movement 20
relatively to said mandrel, and operating
mechanism, substantially as described and
for the purpose specified.

3. The combination of the sliding gate, the

intermittingly rotating head mounted on said
gate and carrying dies the stationary die, the 25
mandrel 30, mechanism for moving said slid-
ing gate backward and forward once for each
die in its head, and mechanism for moving
said mandrel backwardly away from the sta-
tionary die once during the action of each set 30
of dies, substantially as described and for the
purpose specified.

4. The combination of the stationary dies, 35
the mandrel 30, the sliding gate, the inter-
mittingly rotating head carrying dies and
mounted in said sliding gate, the cam D for
moving said gate forward, and the arm 17 and
projection moving in unison with said cam
for drawing said slide backward, substan- 40
tially as described and for the purpose speci-
fied.

HIAL S. GRANNIS.

Witnesses:

STEPHEN WALKLEY,
EDWIN N. WALKLEY.