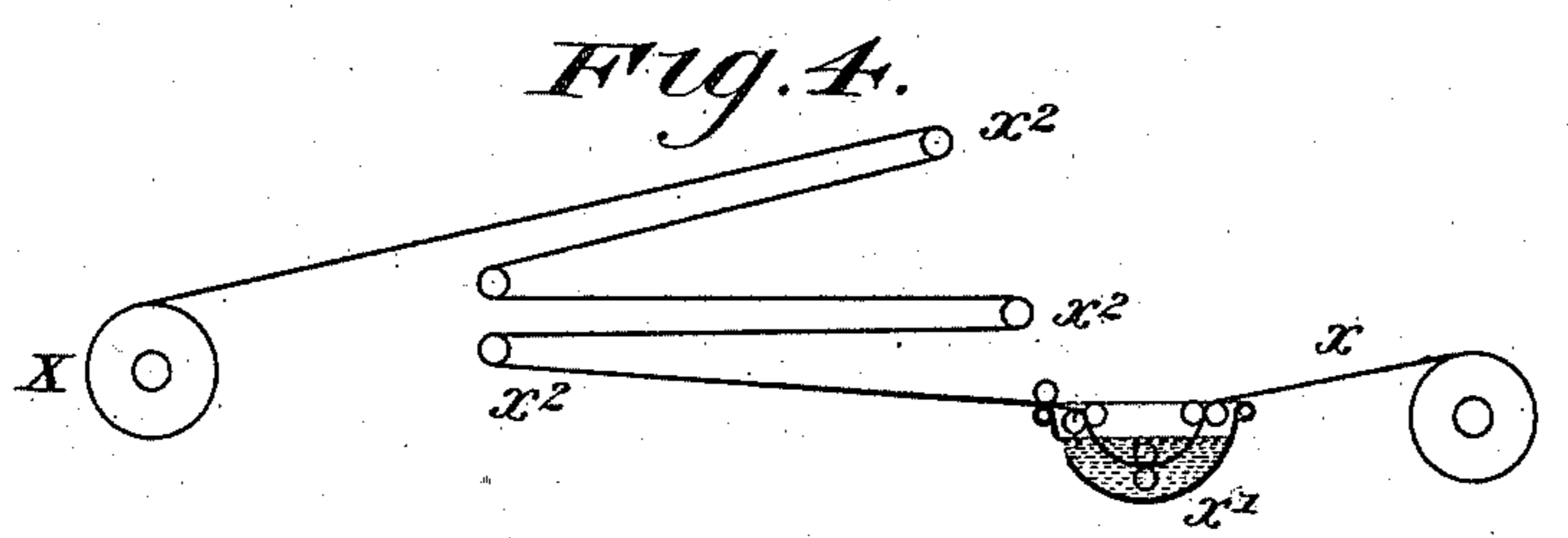
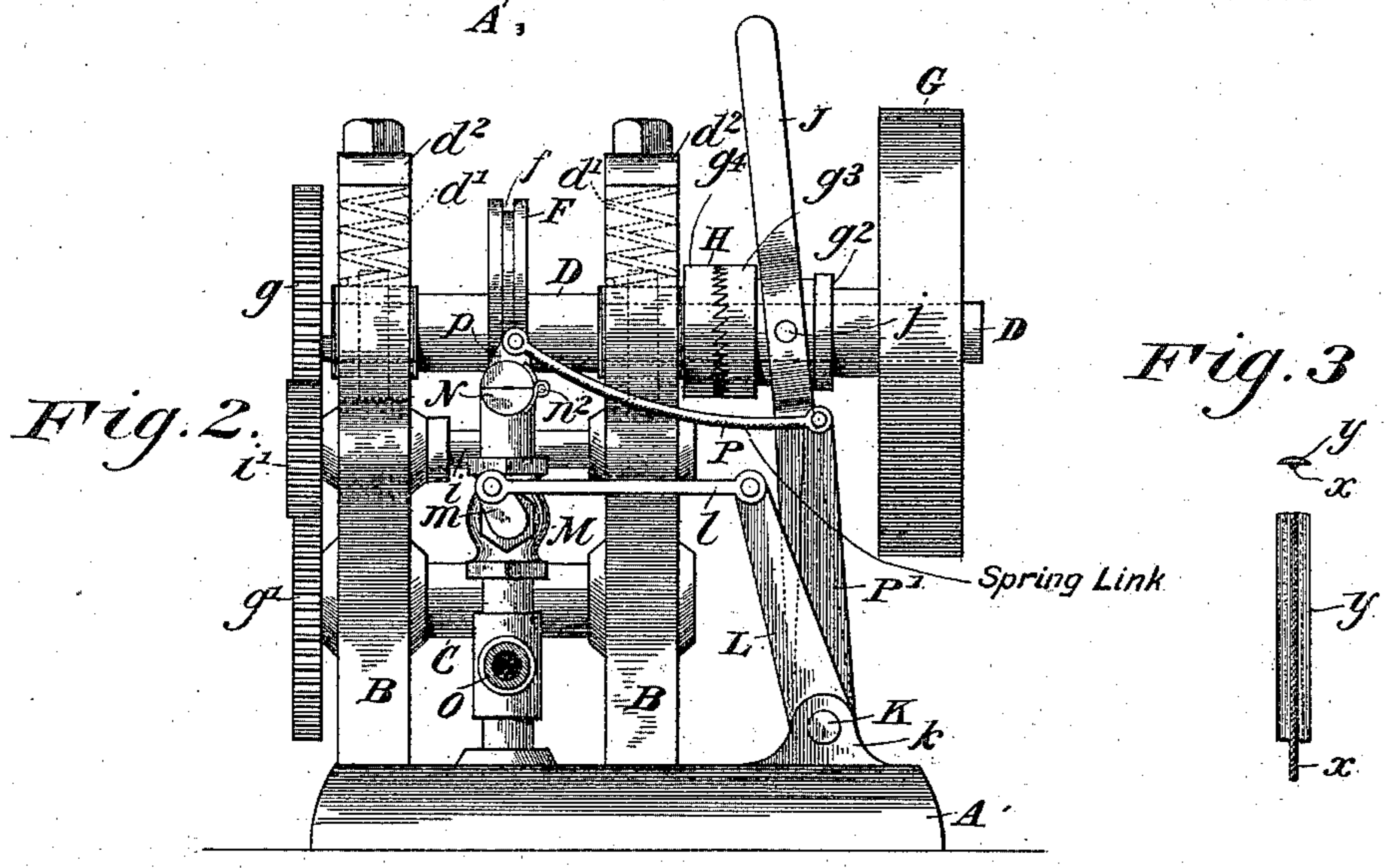
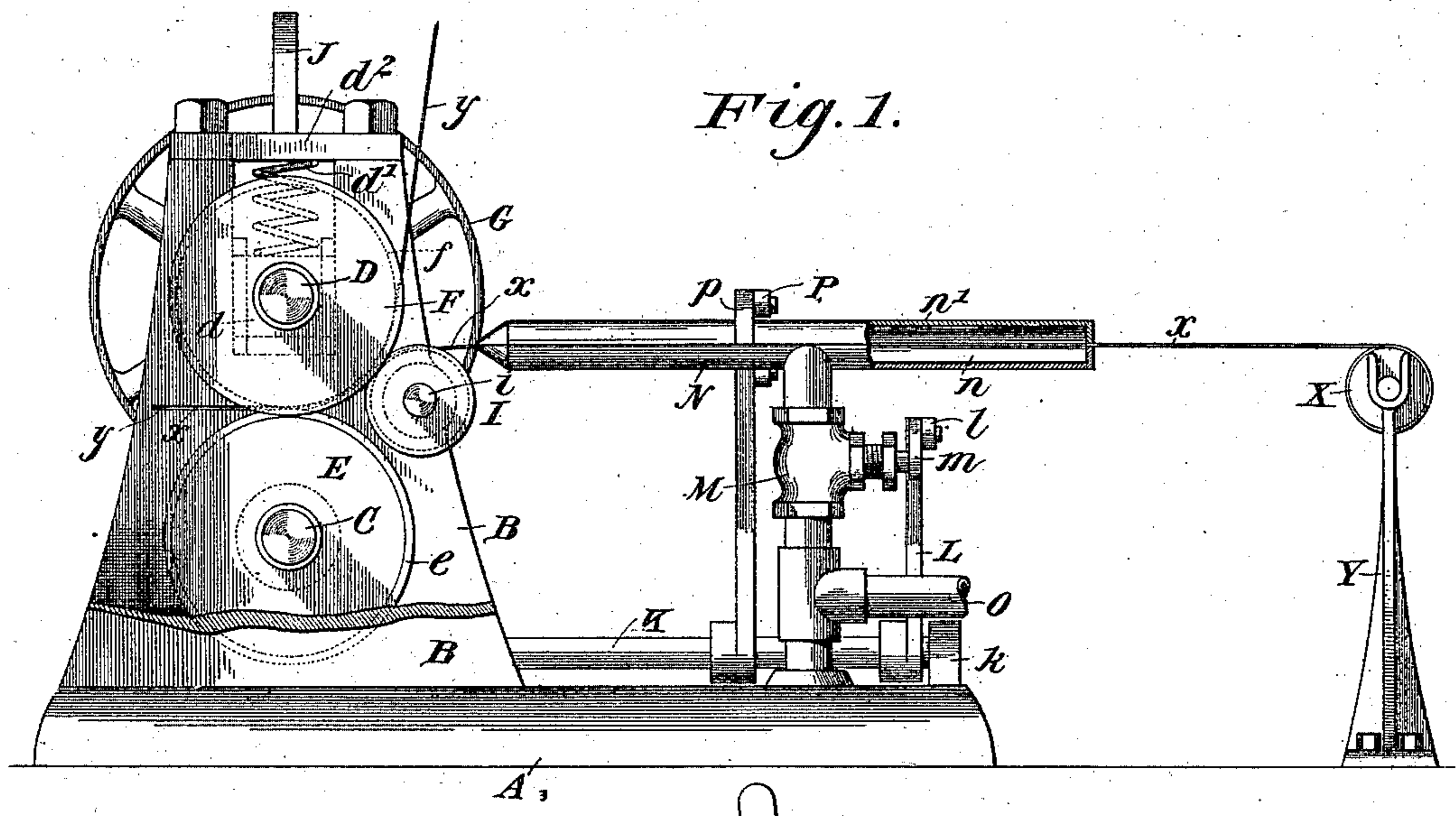


(No Model.)

H. B. MORRIS.
REINFORCED CANE STRIP AND APPARATUS FOR PREPARING IT.
No. 558,827. Patented Apr. 21, 1896.



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UNITED STATES PATENT OFFICE.

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REINFORCED CANE STRIP AND APPARATUS FOR PREPARING IT.

SPECIFICATION forming part of Letters Patent No. 558,827, dated April 21, 1896.

Application filed January 15, 1896. Serial No. 575,646. (No model.)

To all whom it may concern:

Be it known that I, HENRY B. MORRIS, a citizen of the United States, residing at Michigan City, in the county of Laporte and State of Indiana, have invented certain new and useful Improvements in Reinforced Cane Strips and Apparatus for Preparing Them, of which the following is a specification.

Cane strips, while usually strong enough to resist the strain of weaving, have many weak spots difficult to detect in sorting them and apt to break in the loom, especially when used as warps. When thus used, they are usually formed into long strips by scarfing the ends of the cane strips and cementing them together. These spliced strips are, however, liable to be broken in the loom, their thin scarfed ends being unable to resist the strain to which they are subjected, and the cane is also apt to break at other points. Frequent stoppages of the loom are caused by this breaking, and they constitute a very serious source of delay and add materially to the cost of manufacture, besides producing imperfect strands in the finished fabric or mat, requiring extensive repairs.

The object of my invention is to so reinforce or strengthen these cane strips as to enable them to resist the strains of weaving and produce a smooth uniform mat, which end I attain by securing a small but strong filament, cord, string, or thread to the cane strip, said string being preferably composed of linen, ramie, or other like strong material and of such small diameter as not to add materially to the bulk of the cane strip to which it is attached. The article of manufacture thus produced constitutes the first part of my invention.

The next part of my invention relates to improved apparatus for producing the reinforced cane strips above described. This apparatus comprises means for softening the glue or cement on a previously coated or saturated thread and means for pressing this thread into contact with and securing it to the cane strips. This apparatus, however, contains many features of novelty which will be hereinafter more particularly described and claimed. I wish it understood, however, that the reinforced cane strip above described

may be made on apparatus differing in details of construction from that herein shown and described.

Some parts of the apparatus shown may be used without the others or in connection with apparatus differing somewhat in construction from that shown.

In the accompanying drawings, Figure 1 represents a side elevation of the apparatus which I employ with some of the gear-wheels removed and one of the supporting-standards broken away to show other parts more clearly. Fig. 2 is a front elevation of the machine. Fig. 3 shows a cross-section and a bottom plan view of the reinforced cane strip, and Fig. 4 is a diagram showing the manner of coating or saturating the string or thread with glue and of drying it.

The first step in preparing the reinforced cane strips is to coat or saturate the string, thread, or cord with glue or cement. This is done by drawing a string x , as shown in Fig. 4, through a bath of melted glue x' , from which it is passed over a series of rolls x^2 , which may be located in any suitable drying-chamber, and thence to a spool X. A sufficient number of rolls x^2 are employed and arranged suitable distances apart to enable the glue or cement on the string to dry before it is wound upon the spool X, so that the coils may not stick together, but may readily unwind when required. The string or thread thus prepared is transferred to the apparatus shown in Figs. 1 and 2, by means of which it is applied to the cane strip. The spool X is shown in Fig. 1 as mounted in standards Y, having open bearings, and in suitable position to deliver the glued string x to the apparatus for applying it to the cane strips. The drawings show the mechanism of this apparatus mounted upon a bed-plate A, provided with standards B, mounted on its rear end. Two horizontal shafts C D are journaled in these standards, one above the other. The lower shaft C turns in fixed bearings, while the upper one D turns in bearing-blocks d , movable vertically in slots or recesses in the upper portions of the standards. The blocks are normally pressed downward by springs d' , placed above them in the recesses, and held down by plates d^2 , secured to the tops of the standards B.

The shaft C carries a roll E, provided with a central annular rib *e*, which fits in a corresponding annular groove *f* in a roll F, mounted on the shaft D. The groove *f* is wide enough to easily admit the cane strip *y* and serves as a guide therefor while the reinforcing-string is being applied and secured.

The springs *d'*, above mentioned, tend to keep the rolls C and D pressed together with sufficient force to firmly unite the cane strip and string, as hereinafter more particularly described.

The shaft D is prolonged beyond one of the standards B and is provided with a driving-pulley G and clutch mechanism H. The opposite or left-hand end of the shaft D carries a spur-wheel *g*, driving a corresponding gear *g'* on the shaft C. The gearing is such as to drive both wheels E and F at the same speed.

The guide-wheel I is mounted on a shaft *i*, journaled in the standards B, and serves to direct the string *x* into contact with the cane strip *y* before it passes into the bite of the rolls E and F.

The shaft *i* is driven by a spur-wheel *i'*, meshing with the gear *g*. The wheel I is thin and narrow. Its periphery projects into the annular groove *f* of the roll F. It has likewise a small annular groove in its periphery for guiding the string centrally to the cane strip to insure uniformity.

The shaft *i*, it will be observed, is arranged above the top of the roll E, so that the top of the guide-wheel I is considerably higher than the bite of the rolls E and F, thus permitting the cane and string to be properly positioned before pressure is applied to unite them. The band-wheel G, before mentioned, is mounted upon a sleeve *g*², turning freely on the shaft D, and carries a clutch-sleeve *g*³, provided at its inner end with teeth engaging with corresponding teeth upon the clutch-block *g*⁴, fixed upon the shaft D. This clutch is thrown into or out of gear, as desired, by a shaft-lever J, pivoted at *j* to the sleeve *g*² and having its long end secured to a horizontal rock-shaft K and journaled in lugs *k* on the bed-plate.

An upright radius-arm L, fixed on the shaft K, is connected by a link *l* with a crank-arm *m* on the rocking stem of a valve or cock M, controlling the steam supply of the steam-box N. Steam is supplied through the inlet-pipe O and passes through the valve to the steam-box, through which the glued string passes in order that the glue may be softened preparatory to being applied to the cane strip. This steam-box is shown as consisting of a horizontal pipe or tubular box horizontally divided, so as to constitute a fixed lower portion *n* and a movable upper portion *n'*, hinged at *n*² to the lower portion. This steam-box extends from the front end of the machine toward the pressure-rolls E and F, and when its sections are united it is tightly closed, with the exception of a small hole at each end large enough only to permit a passage of the glued string without allowing any consider-

able escape of steam. The fixed section *n* of the steam-box is shown as mounted directly upon the upper portion of the steam-supply pipe and as being supported thereby; but it may be otherwise arranged and supported. The abutting edges of the sections *n* and *n'* are accurately fitted together to prevent any material escape of steam while the box is closed. The movable section *n'* is lifted or turned upon its hinges to open the steam-box, when desired, by means of a crank-arm *p*, connected by a link P to a radius-arm P', fixed at its lower end to the rock-shaft K. The link P is curved and elastic, for the purpose hereinafter described. The organization, it will be observed, is such that when the lever J is shifted the steam-inlet valve and steam-box are appropriately and simultaneously opened and closed.

In operation the cane strip *y* is by preference fed downward from an overhead reel or other source of supply into the groove *f* in the upper pressure-roll F and thence partially around said roll and between it and the lower roll E. The string is simultaneously led over the top of the wheel I and is by said wheel pressed nearly or quite into contact with the portion of the cane in the groove of the upper pressure-roll F. The cane strip and string are firmly united and cemented together by the pressure-rolls, and the completed strip may then be wound up on a suitable drum or reel. (Not shown in the drawings.)

It is important to the successful operation of the machine that the glued string *x* should traverse the steam-box at a uniform speed and for a sufficient length of time for the glue thereon to be softened and rendered adhesive. It passes directly from the steam-chamber to the pressure-roll while in this softened condition. The length of time thus required must necessarily require the exercise of some judgment, depending on the character of the glue or cement employed or its dryness or hardness. A too long exposure to the steam would render the glue too soft, and, in fact, it might dissolve or become non-adherent and incapable of being attached to the cane. It is therefore necessary that whenever the machine is stopped access of steam to the glued string should be prevented.

The apparatus is so organized that when the lever J is moved so as to disengage the clutch the resulting movement of the radial arms P' and L, respectively, opens the steam-box by raising its top and closes the steam-inlet valve. The steam supply being thus cut off the string in the steam-box is at once exposed to the air and undue softening of the glue is prevented. When, however, it is desired to start the machine, it is important that the string contained in the steam-chamber should be exposed for a short time to the action of the steam before passing between the pressure-rolls. Therefore when restarting the operation of the machine, the lever J is first moved far enough

to open the steam-valve and close the steam-chamber, but not far enough to close the clutch.

After the string has been sufficiently steamed the clutch is closed by the further movement of the lever J. The yielding connecting-rod P, having already closed the steam-chamber, yields to and is deflected by this additional movement of the starting-lever J and tends to hold the steam-chamber securely closed. Freshly-melted glue cannot advantageously be used for securing a string to the cane strip in accordance with my invention, as it requires considerable time to set in order to become adherent, and were freshly-melted glue used in my machine the string would quickly separate from the cane after passing the pressure-rolls. Moreover, saturating the string with glue shortens it by causing it to shrink, so that if the cane strip and string were united simultaneously with the application of glue the subsequent shortening of the string would result either in breaking it or in the formation of unattached loops. By my process, however, the string is retained in a shrunken condition by the glue, which dries upon it. In passing through the steam-box it is only slightly softened and is not liquefied. On being cemented to the cane no perceptible difference appears in its length.

The advantage incident to the employment of a cord, string, or thread of less width than the cane strip from a tape or band of equal width of the strip is evident. The thread is sufficiently strong for all practical purposes and does not appear in the woven fabric or mat, as would be the case with a band or tape of the same width as the strip. In fact, a very fine thread being usually employed, after it passes the pressure-rolls it is so intimately united with the cane that it is scarcely perceptible, even when subjected to close examination, and yet it so adds to the strength of the cane strip that there is no liability whatever of the string being snapped or broken in the loom. Consequently the output of the loom may be uniformly at its maximum.

What I claim is—

1. A continuous cane strip, reinforced or strengthened by a filament, cord, string or thread of less width than the cane strip glued to its inner or under surface only.

2. A cane strip, reinforced or strengthened by a string or thread of fibrous or textile material of less width than the strip glued or cemented to its inner or under surface only, substantially as described.

3. Apparatus for reinforcing cane strips for weaving comprising means for softening a glued reinforcing-string, and positively-driven feeding and pressure rolls for cementing the softened glued string and cane strip together.

4. Apparatus for reinforcing cane strips for weaving, comprising devices for softening a glued reinforcing-string, yielding pressure-rolls which feed the cane strip and cement the

softened, glued strip thereto, and a guide interposed between the softening devices and the pressure-rolls.

5. Apparatus for reinforcing cane strips for weaving, comprising devices for softening a glued reinforcing-string, positively-driven pressure-rolls for feeding the cane and cementing the softened, glued string thereto, and a grooved guide-wheel guiding the cane into an annular groove in one of the pressure-rolls, which also receives an annular tongue on the other pressure-roll.

6. Apparatus for softening a previously glued string or thread, comprising a closed steam-chamber, means for feeding a glued string therethrough, means for controlling the steam supply, means for opening and closing the steam-chamber, and mechanism which simultaneously opens and closes the steam-supply valve and steam-chamber.

7. Apparatus for reinforcing cane strips for weaving, comprising a closed steam-chamber, means for feeding a glued string therethrough, means for controlling the steam supply, means for opening and closing the steam-chamber, and mechanism which simultaneously opens or closes the steam-supply valve and steam-chamber, and stops or starts the feed mechanism, the organization being such that the steam-chamber is closed and steam admitted thereto before the feed mechanism acts, or vice versa, for the purpose specified.

8. Apparatus for reinforcing cane strips for weaving, comprising means for feeding a cane strip and a glued string, a steam-chamber through which the string passes, a guide-wheel in traversing which the cane strip and string are united, and pressure-rolls between which the string and strip pass, and by which they are secured together.

9. Apparatus for reinforcing cane strips for weaving, comprising means for feeding a cane strip, a steam-chamber for softening a glued string, means for uniting and cementing the cane strip and string together, and means for successively closing the steam-chamber, opening its steam-inlet valve, starting the cementing mechanism or vice versa, for the purpose specified.

10. Apparatus for reinforcing cane strips for weaving, comprising pressure-rolls, actuating mechanism therefor, a shifting clutch-lever, a steam-chamber, its hinged sections, and an elastic or yielding connecting-link intermediate of the clutch-lever and hinged portion of the steam-chamber, whereby the top of the steam-chamber is locked by the movement of the clutch-lever in starting the mechanism.

In testimony whereof I have hereunto subscribed my name.

HENRY B. MORRIS.

Witnesses:

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ARTHUR N. GITTINGS.