

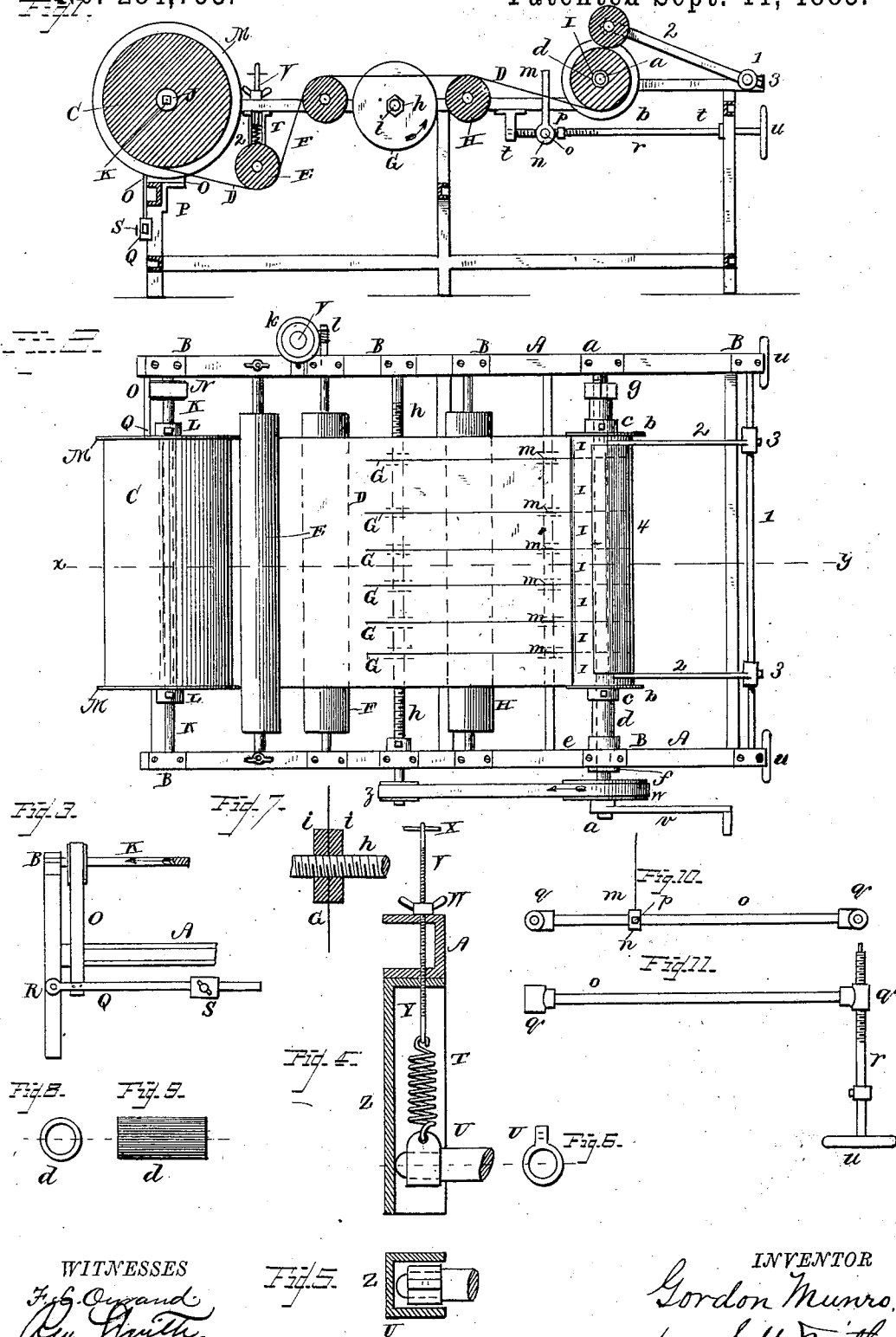
(No Model.)

G. MUNRO.

MACHINE FOR CUTTING ROLL PAPER.

No. 284,753.

Patented Sept. 11, 1883.



WITNESSES

Wm. C. O'Connell
Rev. J. Smith.

Fig. 5. 2

INVENTOR
Gordon Munro.
by *Wm. Smith.*
Attorney

UNITED STATES PATENT OFFICE.

GORDON MUNRO, OF TROY, NEW YORK.

MACHINE FOR CUTTING ROLL-PAPER.

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To all whom it may concern:

Be it known that I, GORDON MUNRO, of Troy, county of Rensselaer, State of New York, have invented new and useful Improvements in Machines for Cutting Roll-Paper, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification.

10 My invention relates to that class of machines employed in cutting or dividing up rolls of paper, transversely of the roll and longitudinally of the sheet of which the roll is formed, in which the roll to be divided or cut
15 into strips is placed upon a suitable unwinding or delivering reel, arbor, or axle, parallel with a suitable winding or receiving reel, arbor, or axle, the said delivering and receiving reels being situated on opposite sides of
20 suitable knives or cutters, the several cutters, when more than one cutter is used, being placed in a line parallel with the axes of said reels, and at distances from each other corresponding to the desired widths of the strips to be
25 produced, the relative position of the said reels and cutters being such that when the roll of paper has been placed on the delivering-reel and the loose or outer end of the paper is properly secured, as by glue or paste, to the
30 receiving-reel, and the latter reel is rotated, causing the paper to unwind from the original roll and wind up on the said receiving-reel, the knives or cutters will pass through the paper, presenting their cutting-edges in the
35 direction of the delivering-reel, and the moving paper, being drawn against and past the said cutting-edges, will be cut into strips of the desired widths, and the said strips will be wound into rolls of the same widths upon the
40 receiving-reel, from which reel they may be removed when they have acquired the desired diameter.

My invention consists of certain details of construction hereinafter described.

45 In the drawings, Figure 1 is a vertical longitudinal section on the line *xy* of Fig. 2. Fig. 2 is a plan of a machine embodying my invention. Figs. 3 to 11, inclusive, are details hereinafter described.

50 Like letters in the several figures refer to the same parts of the machine.

A is the frame of the machine, provided with suitable bearings, B, for the several axles.

C is the roll of paper under process of division, (shown as partially unwound,) the paper 55 D, passing from the roll C under the guide and tension roller E and up over the bearing-roller F, encounters six singly-acting rotary knives or cutters, G, and is thereby cut or divided into seven parts or longitudinal strips, which 60 strips, continuing to move on in the same direction supported by the bearing-roller H, pass under and are wound up on the receiving-reel, and form new rolls I, corresponding in length to the widths of the strips and to 65 the distances apart of the several cutters G.

By "single acting," referring to the rotary cutters, it is meant to distinguish the cutters from those operating in connection with opposing cutters, rollers, or surfaces. In my 70 machine there are no opposing cutters or surfaces, and therefore each cutter acts singly to do its work.

Rolls of paper may be obtained from the paper-manufactories wound upon wooden cylinders, which cylinders have a rectangular opening 75 along the axes suitable for receiving a square axle or reel-arbor. Such a wooden cylinder, J, is shown in section in the center of roll C, Fig. 1. The axle or arbor K is square 80 in section near the center, to fit the square opening in cylinder J, but is round in section toward each end to fit the movable collars L and disks or flanges M. The collars L and disks M prevent the paper from shifting endwise. 85

The delivering-reel K L M consists, essentially, of an axle, K, provided with suitable appliances for carrying the roll and delivering the paper by allowing it to unwind in the manner required in the direction of the cutters and 90 receiving-reel. Axle K may be round throughout its length, and provided with a thread and nut, fixed collar, and tubes or bushes similar to those hereinafter described as appertaining to the receiving-reel. 95

To axle K is fitted a pulley, N, over which a band, O, passes, acting as a brake to secure the requisite tension to the paper. One end of band O is secured to a bracket or arm, P, attached to a cross-bar of the frame A. The 100 other extremity of band O is attached to the lever Q. Lever Q is pivoted to the frame A

at R, and is provided with a movable weight, S. By moving the weight S along the lever Q the resistance of the brake can be regulated, less friction being required as the roll C becomes reduced in diameter.

The weight of the guide and tension-roller E when the machine is in operation is partially supported by the paper D and partially by adjustable springs T at the end of the roller-axle. In practice, owing to inequalities in the paper, the relative height and weight of the two ends of roller E, as well as the tension of the paper, frequently require adjustment. The journals of roller E revolve in collars U, said collars being suspended by spiral springs T, attached to the adjusting screw-rods V. The rods V—one on each side of the machine—are raised and lowered by means of nuts W. Through the upper ends of rods V pass small rods or levers X, which, being held, keep the rods V from turning. The collars U are moved up and down in vertical grooves G in guides Z, in which they fit loosely. The axle of roller E is confined endwise between the vertical back faces of the grooves Y. The function of the adjustability of the guide and tension roll E is to vary as occasion may require, the "bite" or surface-contact of the moving paper on the measuring-roller F, which is operated by such frictional contact, and to guide the paper with precision. By depressing the roller E the paper is given a greater surface-contact with the roller F and the slipping of the paper on said roller F is prevented, thus insuring the rotation of the latter and the operation of the measuring device, and, by the arrangement permitting the adjustment of either end of said roller E independently of the other, any tendency of the paper to run to one side of the desired path can be overcome.

To cut cleanly and leave smooth edges to the strips the knives or cutters G should be of steel, and have keen sharp edges, and be as thin as possible; but knives or cutters of any known form which will cut, saw, or chop through the paper with a rotary, reciprocating, or other motion may be employed, but I prefer circular disks of thin steel concentric with the arbor or axle, as shown in Figs. 1 and 2.

Of the receiving-reel *a b c*, *a* is the axle, *b* the end disks or flanges fitting loosely on the axle, and *c* collars with set-screws to hold the disks *b* against the ends of the outer rolls I. The receiving-reel *a b c* consists, essentially, of an axle, *a*, provided with suitable appliances for receiving the paper in the required manner.

In the manufacture of paper boxes and for other purposes, the rolls I are removed from the cutting-machine to other machines, where the said rolls are unwound by drawing off the paper for any required purpose, and it is therefore convenient and desirable that the rolls I should be wound upon bushes or short tubes *d* of the same length as the roll, said bushes *d* fitting loosely both the axle *a* and the axle on any other machine to which rolls I are to

be removed. The flanges M of the delivering-reel K L M should be in line with the flanges *b* of the receiving-reel *a b c*, and the bushes *d* should be of lengths equal to the widths of the strips or rolls wound on them in such manner that the bushes *d* on the axle *a* will exactly fill the space between the flanges *b*.

On axle *a* are two fixed collars, *e* and *f*, forming end bearings for the journal. On the other end of axle *a* a thread is cut and a nut, *g*, provided. A supply of bushes or short tubes *d* of various lengths being provided, the axle *a* between the nut *g* and collar *e* may be covered by them, except such space as may be occupied by the flanges *b* or collars *c*. Then by screwing up the nut the end pressure on the bushes *d* will keep them from turning on axle *a* while the machine is in operation. The set-screws in collars *c* may be tightened or not after the nut *g* is screwed up, or the collars *c* may be in such case dispensed with; but I prefer to have them provided.

Upon the cutter-arbor or axle *h*, and for nearly the whole of its length, is cut a thread, which, to prevent catching the cutters, should be a square in preference to a V-shaped thread. Upon this arbor are fitted as many pairs of nuts *i* as there are cutters required.

The cutters G, when the machine is at work, are each firmly held between a pair of the said nuts *i*. It is evident that by means of the nuts *i* and the screw-threaded arbor *h* the position of the cutters on the arbor may be altered at pleasure, or the cutters removed or replaced as required.

Instead of the nuts *i* and the threaded arbor, I have employed a smooth arbor of the same diameter as axle *a*, with a nut and thread at one end and a collar at the other end, and have adjusted the position of the cutters by the length of the tubes *d*, placed between the several cutters and between the nut and collar of the axle. Many other devices for making the position of the cutters adjustable may be employed; but I prefer the threaded arbor and pairs of nuts *i*, as above described.

For convenience the knives should cut downward, and suitable supports be provided underneath the paper to hold it against the downward pressure of the cutting-edges. With the rotary cutters shown in the drawings a suitable support is also necessary to keep the paper clear of the nuts *i*. Bearing-rollers F and H are provided for the purpose of thus supporting the paper. Rollers cause less friction than would fixed bearing-surfaces, and unlike such fixed surfaces have no tendency to change the direction in which the paper moves.

It is frequently and generally desirable to know the length of the strips of paper forming the rolls I. For the purpose of registering and indicating that length a suitable measuring or registering machine, *k*, is secured to the frame A and operated by a screw, *l*, upon the end of the axle of roller F, which axle is prolonged for that purpose. The numbers on the dial of the measuring-machine indicate

the number of revolutions of the roller F. That number of revolutions multiplied by the circumference of said roller will give the length of the paper which passes over and moves the roller.

I have found in practice that the edges of the paper forming the several rolls I have a tendency to interlock, so much as to cause inconvenience afterward in separating the several rolls from each other. To prevent that inconvenience I have provided adjustable guide-blades *m*, which, being placed exactly in line with the cutters in the planes of contact of the contiguous rolls and as close as possible to the rolls, prevent the said interlocking. The guide-blades *m* should be smooth on the sides and edge and quite thin and of a length somewhat greater than half the diameter of the receiving-reel, and so provided with supporting and adjusting appliances as to be readily placed close to the axle *a* when the rolls I are small, and to be easily moved toward the cutters as the rolls I increase in diameter.

In the drawings, *n* are hubs, from which the blades *m* project. The hubs *n* are fitted to a round movable carrier-shaft, *o*, upon which they are secured in suitable positions by set-screws *p*, and upon which they may be freely moved or turned when the set-screws *p* are loosened. The ends of the shaft *o* are screwed into T-shaped end pieces, *q*, through which are screwed the parallel adjusting screw-rods *r*. The adjusting-rods *r* are placed one on each side of the machine, and revolve without endwise motion in suitable bearings, *t*, in or projecting from the frame A. Hand-wheels *u* are provided on rods *r*, by turning which hand-wheels the carrying-shaft *o* is moved back and forth, regulating the distance of the blades *m* from the cutters.

v is a crank, placed upon the projecting end of axle *a*, for giving motion to the machine when the work is done by hand; but if the work to be done is extra heavy the cutter-arbor may be used as the driving-shaft. The speed of the cutter-arbor should not be less than twice that of the receiving-reel for ordinary work, with cutter not exceeding eight inches in diameter. When power is used, fast and loose pulleys may be placed on a prolongation of either of the said axles. Motion is communicated from one of the said axles to the other by means of pulleys *w* and *z* and belt.

The transverse axle 1 turns freely in its end bearings, and carries the two parallel adjustable rods 2, the hubs of which rods fit loosely on that axle, and are fastened and loosened by means of set-screws 3. The length of rods 2 is equal or nearly equal to the distance between the centers of axles 1 and *a*. The jour-

nals of the swinging presser-roller 4 have their bearings in the ends of rods 2. The surface of roller 4 pressing upon the paper while being wound onto the receiving-reel, as shown in the drawings, serves to make the rolls I compact and smooth. When roller 4 is not in use, it may be swung over and allowed to hang down over the end of the machine and out of the way.

It is not necessary in using my improved method of cutting and dividing roll-paper that the several parts of my invention be incorporated in one machine. On the contrary, it is evident that each reel and its appliances and the cutters and their appliances could be placed severally in distinct machines, and that by the employment of the three said distinct machines, when placed in line and at proper distances from each other, my method of cutting roll-paper could be carried into effect.

Having thus described my invention, I claim—

1. In a machine for cutting roll-paper, the combination, with the singly-acting rotary cutters and means for imparting a positive rotary movement thereto in a direction opposing the path of the moving paper, of friction-rollers on opposite sides of said cutters for upholding the paper, the adjustable guiding-roller, and means, substantially as described, for moving the paper under tension up to the action of said cutters, substantially as and for the purpose specified.

2. In a machine for cutting roll-paper, the combination, with the adjustable guide and tension-roller E, of the suspended collars U, spiral springs T, and adjustable rods V, passing through the frame A, adjusted by nuts W and held by levers X, substantially as and for the purpose described.

3. In a machine for cutting roll-paper, the supporting-rolls F and H, arranged upon opposite sides of the rotary cutters G, in combination with the laterally-adjustable blades or fingers *m*, interposed between the roll H and the receiving-reel, and made adjustable toward and away from said reel, substantially as described.

4. In a roll-paper-cutting machine in which the paper winding upon the receiving-reel *a b c*, is drawn past the cutters G, the adjustable guide-blades *m*, in combination with the herein-described mechanism for adjusting the same both laterally and longitudinally of the machine, substantially as and for the purpose set forth.

In testimony whereof I have hereunto set my hand this 4th day of August, A. D. 1882.

GORDON MUNRO.

Witnesses:

J. LEONARD WHITE,
DAVID R. SMITH.