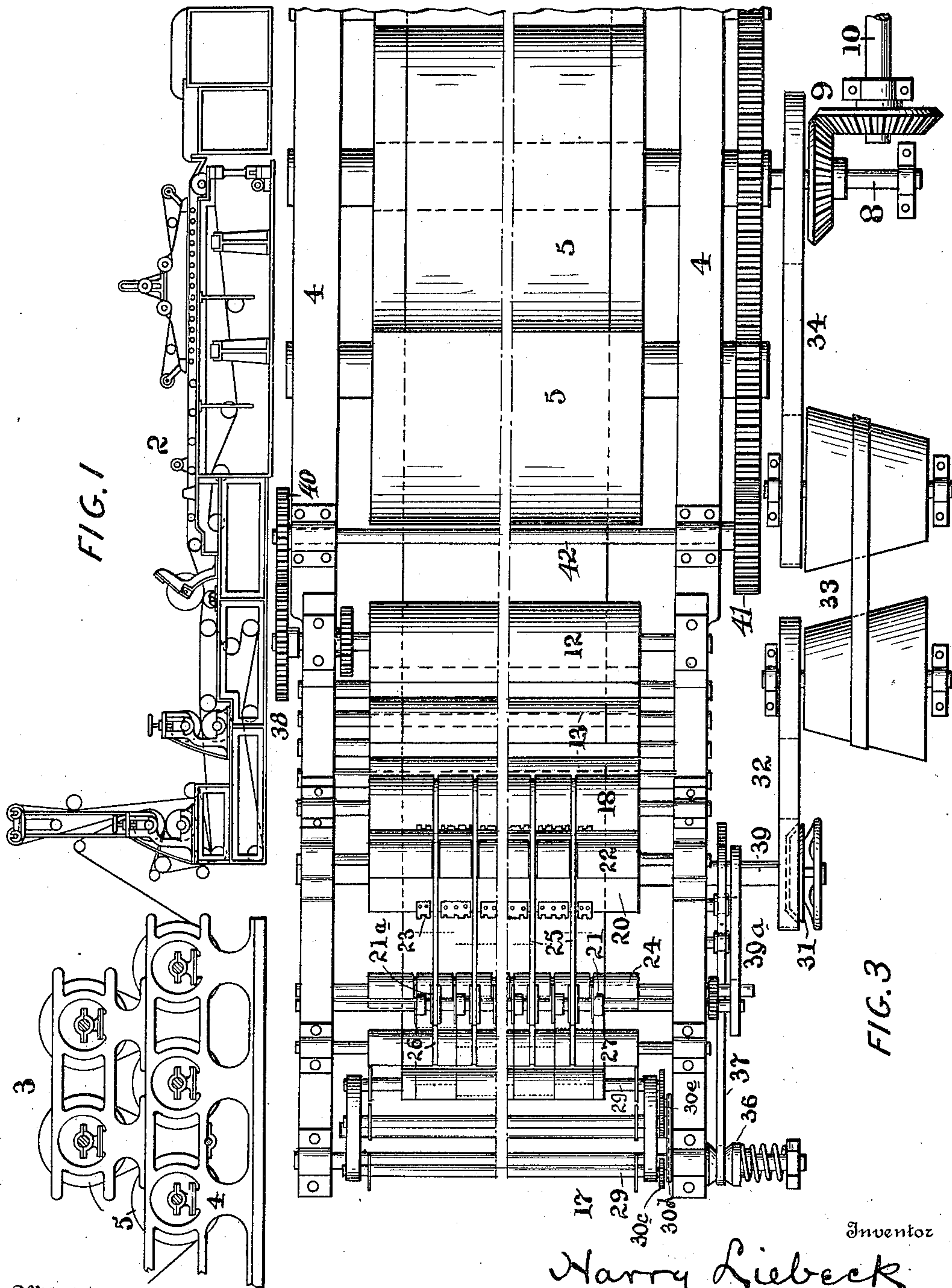


H. LIEBECK.
MACHINE FOR MANUFACTURING TOILET PAPER.
APPLICATION FILED SEPT. 9, 1909.

999,375.

Patented Aug. 1, 1911.

2 SHEETS—SHEET 1.



Witnesses

Daniel Webster, Jr.
E. G. Farley

Inventor

Harry Liebeck

By

[Signature]

Attorney

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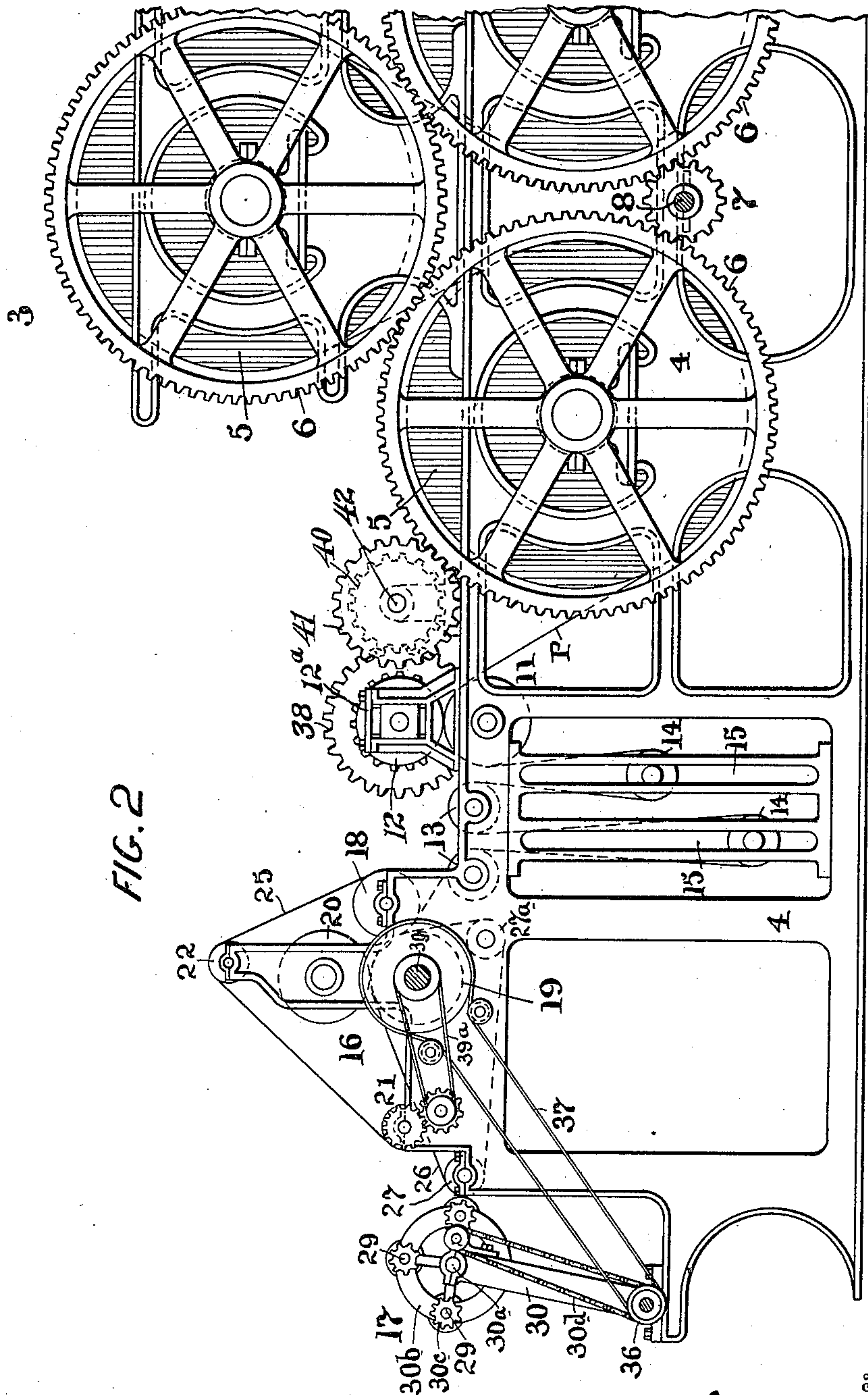


FIG. 2

Witnesses
Daniel Webster, Jr.
E. G. Farley.

Inventor
Harry Liebeck
Attorney

UNITED STATES PATENT OFFICE.

HARRY LIEBECK, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO SCOTT PAPER COMPANY, A CORPORATION OF PENNSYLVANIA.

MACHINE FOR MANUFACTURING TOILET-PAPER.

999,375.

Specification of Letters Patent.

Patented Aug. 1, 1911.

Application filed September 9, 1909. Serial No. 516,910.

To all whom it may concern:

Be it known that I, HARRY LIEBECK, a citizen of the United States, and a resident of the city and county of Philadelphia, State of Pennsylvania, have invented an Improvement in Machines for Manufacturing Toilet-Paper, of which the following is a specification.

My invention has reference to machines for manufacturing toilet paper and consists of certain improvements which are fully set forth in the following specification and shown in the accompanying drawings which form a part thereof.

Heretofore, it has been customary in the manufacture of toilet papers to first manufacture the paper and wind it upon mandrels in large rolls; these rolls of paper are then shipped to the factories where they are perforated, slit and rewound into a multiplicity of small rolls of connected sheets which are then placed in the wrappers and sold on the market as toilet paper. In view of the fact that the papers are sold at a very low price, it is important to reduce, as far as possible, all unnecessary expense in the manufacture, from the preparation of the paper to the package in its market form, and the object of my invention is to enable the finished rolls of toilet paper ready for the market to be made at one and the same operation with the preliminary making of the paper. The result of this is that the cost is reduced very materially, there is less waste, and a more satisfactory roll may be made since the paper is at once wound ready for the market without being subjected to varying atmospheric conditions between the original making of the paper and the final rewinding, as now takes place.

In carrying out the above objects, I provide a paper making machine of any suitable character with means for perforating, slitting and winding the web of paper as it leaves the drying cylinders of the paper making machine, the said parts being so combined and co-acting that the perforating, slitting and winding operations take place with a speed commensurate with that of the travel of the web from the drying rolls of the paper making machine.

My improvements consist of constructions and combination of parts which are fully described in the specification and more particularly defined in the claims. These

improvements will be better understood by reference to the drawings, in which:

Figure 1 is a side elevation of a paper making machine to which my improvements are applied; Fig. 2 is an elevation showing a portion of the drying cylinders of the paper making machine and with my improvements applied thereto; and Fig. 3 is a plan view of the structure shown in Fig. 2 with the addition of some of the power transmitting devices.

2 represents an ordinary paper making machine, and 3 are the drying means therefor, and said means comprise a plurality of steam heated cylinders 5 geared together and supported in a suitable frame 4 and around which cylinders the paper web is passed in the final drying operation. These steam heated cylinders 5 have their shafts provided with gears 6 and by which they are geared together in series. These gears of the drying cylinders may be rotated by means of a pinion 7 on a shaft 8 which in turn is driven by miter gears 9 and a power shaft 10 receiving power from any suitable source.

11 and 12 are calendering or pressure rolls between which the paper web P passes after it leaves the last drying cylinder 5 by which it is densified to a uniform thickness. These rolls are heavy and the paper roll 12 is supported in guides 12^a whereby it may rise and fall to any slight extent that may be necessary so as to apply full pressure upon the paper.

13 are two guide rolls journaled in the frame 4 and over which the paper is guided in loops, and in each of the loops of the said paper is arranged a heavy roll 14, the journals of which are guided in the vertical guide-ways 15 in the main frame. These rollers 14 are in effect take-up rollers to compensate for any variation in the speed of supply of the paper web from the drying cylinders and the speed of the paper being wound by the winding devices. These take-up rollers 14 are more especially useful in maintaining a constant tension on the paper being fed through the slitting and perforating devices 16 and to the winding device 17 for compensating for those times when the winding mandrels are being changed between the completion of each set of commercial rolls of paper, as will be more fully described hereinafter. From the rollers 13

and 14 the paper web passes under roller 18 and over the drum 19 with which the perforating cylinder 20 coöperates, said cylinder 20 being provided with perforating blades 23 of any suitable character for providing transverse properly spaced slits or perforations across the web of the paper at regular intervals. The transversely perforated paper web then passes between the slitting cutters 21 and 24 which are in cylindrical form and coöperate to slit the paper web at equal distances apart and in lines intermediate of each series of transverse perforations produced by the perforators 23, whereby a series of narrow webs with transverse perforations or slits at regular intervals throughout their length are provided. These narrow webs of paper are then wound upon mandrels 29 and one of these mandrels is shown as full of paper at 29^a in Fig. 3.

To facilitate the guiding of the paper web in passing through the slitting and perforating devices, guide tapes 25 are guided about the rollers 18 and 21^a on the upper slitting cutter shaft and also by a guide roller 22 above the perforating cylinder 20, and further by a second set of lower guiding tapes 26 guided by rollers 27 and 27^a and extends around the perforating drum 19. The tapes 25 and 26 preferably travel in contact with each other except when the paper is between the transverse perforating devices 19 and 20 and the slitting cutters 21 and 24.

The winding devices 17 comprise a pivoted frame 30 carrying at its top a transverse shaft 30^a upon which is mounted heads 30^b carrying a series of mandrels 29 and by means of which heads successive mandrels may be brought into alinement with the roller 27 for receiving and winding the paper webs. As the paper is wound upon the mandrel the increasing diameter of roll pressing against the roller 27 moves the frame 30 at its free end away from the said roller 27. When the proper diameter of roll is made, the paper webs are severed, the shaft 30^a rotated and another mandrel 29 brought into operative position and upon which the webs are wound into a new series of rolls.

The mandrels may be driven in any suitable manner when in operative position, and as shown, they are driven by means of gears 30^c on the mandrels meshing with a pinion 30^c which is driven by a sprocket chain and wheels 30^d from a friction driving mechanism 36, the latter being driven by a belt 37 from the shaft 39 of the perforating drum 19. The slitting cutters may also be driven from the shaft 39 by transmitting belts or chains 30^a. The shaft 39 is driven by a belt 32 through a friction clutch 31 carried upon the shaft, and the belt 32 is driven from the shaft 8 of the driving cylinders by a belt 34 and a variable speed trans-

mitting device 33 by which the speed on the perforating, slitting and winding devices may be accurately adjusted with respect to the surface speed of the drying cylinders. The power transmitting devices are such that the mandrels 29 are frictionally driven through the friction device 36 so that they tend to revolve somewhat faster than is necessary to take up the webs as fed from the paper perforating machine, and in this manner, they maintain the webs under a given amount of tension during the winding operation so that the rolls may be wound with the proper degree of tightness desired, and furthermore, the mandrel may wind with sufficient speed to take up the surplus paper which may be provided by the take-up devices 14.

The calendering rolls 11 and 12 are geared together and are positively driven from the driving means for the drying cylinders, so that their surface speeds are the same as the surface speed of the drying cylinders. As shown, these rollers are geared together by gearing 38 and these are driven by a gear 40 on a shaft 42 which also contains a gear 41 meshing with the gear 6 of the last drying cylinder. Any other form of gearing may be used, if so desired.

The general construction of the machine may be greatly varied to suit the particular character of paper making machine, or the particular character of perforated paper to be made, and I therefore do not restrict myself to the details of the machine, but in all cases the paper-making machine proper will be combined with perforating and winding devices suitable for the purposes of my invention whereby the commercial paper rolls of perforated paper may be automatically formed at the time of making the paper web itself and thereby obviate the enormous expense incident to rehandling, freightage, etc.

It will be understood that the paper is being continuously produced by the paper making machine proper and is being intermittently rolled into small rolls on the mandrels 29 after having been perforated and slitted and the accumulations of paper web between the winding devices and the calendering rolls 11 and 12 is automatically compensated for by the take-up rolls 14. It will also be understood that the mandrels 29 are run at a higher rate of speed than the rolls 11 and 12 so that during the time the paper is rolled upon the mandrel it is taking up the surplus paper between the said calendering rolls and winding device. The mandrels are driven through the frictional driving mechanism so as to only be rotated at a speed commensurate with the paper to be wound. The friction drive 31 of the drum 19 should be adjusted so as to overcome the weight of the take-up rolls 14 and in this

manner relieve the friction drive of the mandrels 29 whereby the tension under which the paper is rolled may be substantially constant. In practice the two friction driving devices 31 and 36 should co-act in the feeding of the paper through the perforating, slitting and winding devices, and by their combined action cause the proper operation of the take-up device 14. In this manner there will be no surplus paper between the drum 19 and the winding mandrels.

I do not restrict myself to any particular details of construction of the means for perforating and slitting the paper, or for winding it, as these may be varied as preferred.

Having now described my invention what I claim as new and desire to secure by Letters Patent, is:

1. In a machine for manufacturing toilet paper, the combination of means for forming a dry web of paper, with means for perforating the paper transversely at intervals in its length to provide weakened transverse portions at intervals in its length while maintaining its continuity, and means for winding the paper into rolls after being perforated.

2. In a machine for manufacturing toilet paper, the combination of means for forming a dry web of paper, with means for perforating the paper transversely at intervals in its length, means for winding the paper into rolls after being perforated, calendering rolls between which the paper web passes before reaching the perforating devices, a take-up device between the calendering rolls and the perforating devices to compensate for irregularities in the speed of operation thereof, and friction driving devices for operating the perforating and winding devices.

3. In a machine for manufacturing toilet paper, the combination of means for forming a dry web of paper, with means for

perforating the paper transversely at intervals in its length, means for winding the paper into rolls after being perforated, calendering rolls between which the paper web passes before reaching the perforating devices, a take-up device between the calendering rolls and the perforating device to compensate for irregularities in the speed of operation thereof, friction driving devices for operating the perforating and winding devices, and connecting means between said friction driving devices and the driving devices of the paper making machine whereby the speed of operation of the several parts may be regulated to properly coöperate and avoid rupturing the paper web.

4. In a machine for manufacturing toilet paper, means for making a paper web provided with drying cylinders, combined with rolls for receiving the paper web from the drying cylinders, perforating devices for perforating the web after leaving the rolls to provide weakened transverse portions at intervals in its length while maintaining its continuity, and winding devices for winding the perforated web into small rolls of paper.

5. In a machine for manufacturing toilet paper, means for making a paper web provided with drying cylinders, combined with rolls for receiving the paper web from the drying cylinders, perforating devices for perforating the web after leaving the rolls, winding devices for winding the perforated web into small rolls of paper, and means controlled by the paper web for driving the perforating devices and winding devices with speeds commensurate with the travel of the length of web to be operated upon.

In testimony of which invention, I hereunto set my hand.

HARRY LIEBECK.

Witnesses:

GEO. E. GRIFFIN,

A. H. SCOTT.