

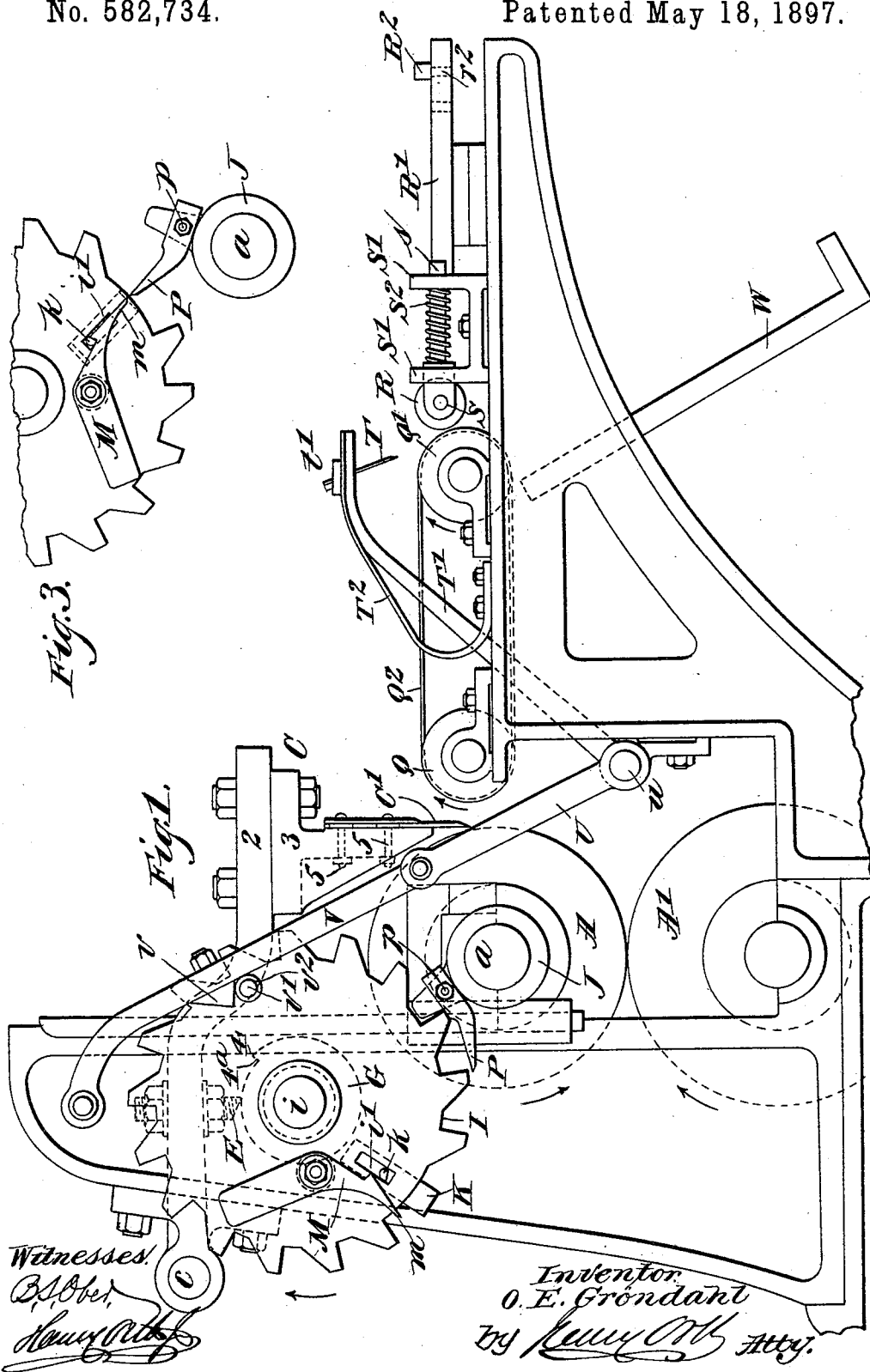
(No Model.)

2 Sheets—Sheet 1.

O. E. GRONDAHL.
MACHINE FOR MAKING PAPER BOARD.

No. 582,734.

Patented May 18, 1897.



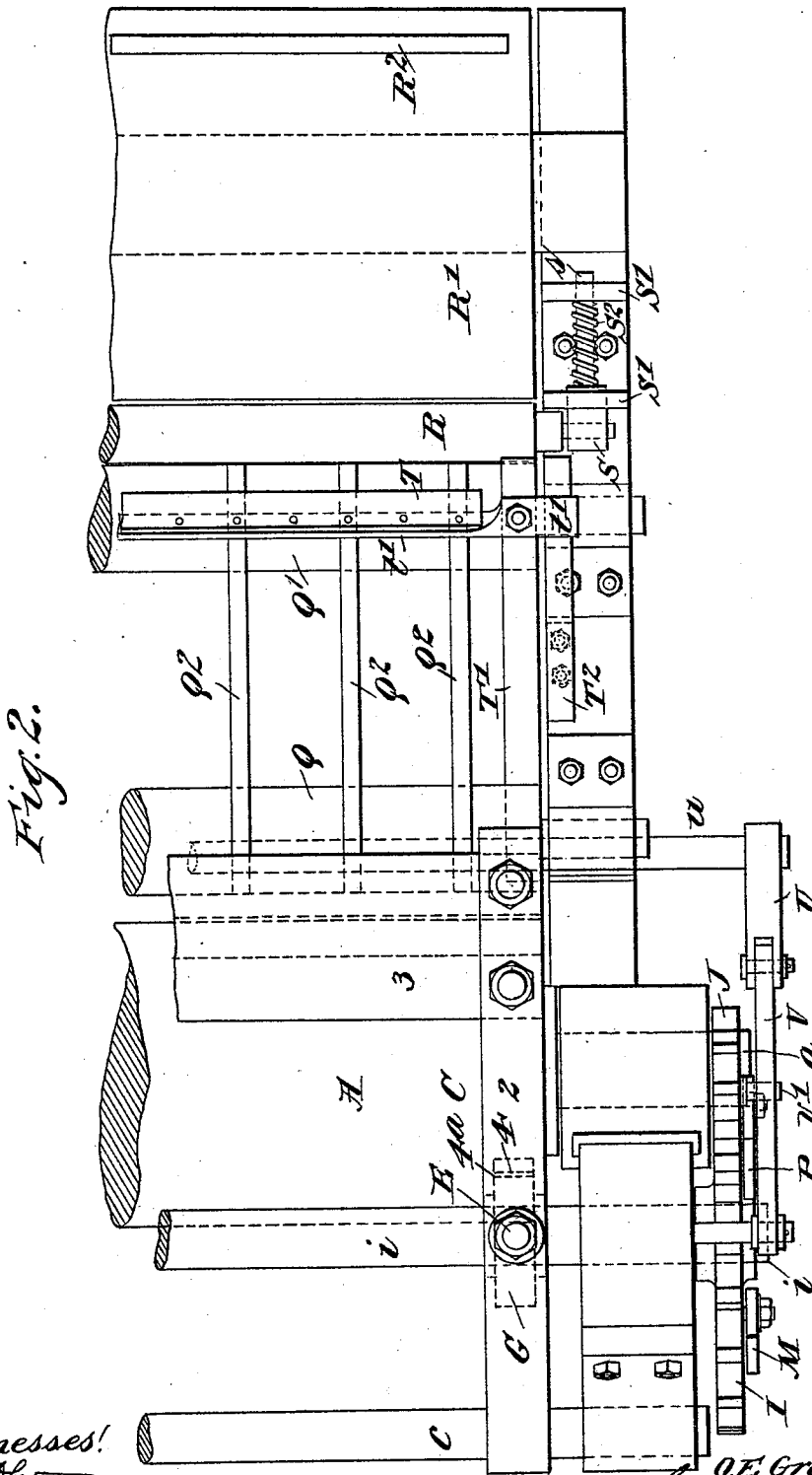
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Witnesses!

B. S. Ober,
Secretary.

Inventor.

O.E. Gröndahl.
by Henry M. Atty.

UNITED STATES PATENT OFFICE.

OLAUS ELISA GRONDAHL, OF HONEFOS, NORWAY.

MACHINE FOR MAKING PAPER-BOARD.

SPECIFICATION forming part of Letters Patent No. 582,734, dated May 18, 1897.

Application filed February 28, 1896. Serial No. 581,171. (No model.) Patented in Norway March 7, 1895, No. 4,302; in Sweden March 9, 1895, No. 6,446; in Germany April 6, 1895, No. 83,803; in Hungary July 28, 1895, No. 3,287, and in Austria September 20, 1895, No. 45/3,360.

To all whom it may concern:

Be it known that I, OLAUS ELISA GRONDAHL, a subject of the King of Sweden and Norway, residing at Honefos, in the Kingdom of Norway, have invented certain new and useful Improvements in Machines for Making Paper-Board, (for which patents have been obtained in the following countries, to wit: Norway, No. 4,302, dated March 7, 1895; Sweden, No. 6,446, dated March 9, 1895; Germany, No. 83,803, dated April 6, 1895; Austria, No. 45/3,360, dated September 20, 1895, and Hungary, No. 3,287, dated July 28, 1895;) and I do hereby declare the following to be a full clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this application.

My invention has relation to paper-making machines, and more particularly to machines for making thick sheets, like pasteboard. As is well known, these thick sheets of pulp are formed by feeding the pulp to suitable rolls, a cylinder of pulp being formed around one of them, which cylinder, after having acquired the desired thickness, is cut lengthwise and stripped off its roll, the length of the sheets thus obtained depending upon the diameter of the pulp-roll. Inasmuch as the thickness of the sheets depends not only on the feed of the pulp, but also on the number of revolutions of the forming or couching rolls, it has heretofore been found impossible to so regulate the feed of the pulp relatively to the number of revolutions of the forming or couching rolls that all the sheets produced will be of the same thickness.

It is the object of my invention to avoid the difficulties above referred to by the provision of means whereby the cylinders of pulp formed on one of the couching-rolls, and hereinafter referred to as the "pulp-roll," are automatically cut lengthwise and stripped off said pulp-roll, and by the provision of means whereby the thickness of the pulp cylinder on the pulp-roll is automatically regulated, irrespective of the feed of the pulp.

On the other hand, in the manufacture of thick pasteboard doubling a thick sheet of pulp has heretofore been effected by hand; and a further object of my invention is to avoid this labor by the provision of means whereby the thick sheets of pulp are automatically folded and delivered from the machine.

That my invention may be fully understood, I will describe the same in detail, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation, and Fig. 2 a fragmentary top plan view, of so much of a machine for making thick sheets of pulp as is necessary to illustrate my invention; and Fig. 3 is a detail view.

In said drawings, A and A' are the forming or couching rolls, to which the pulp is fed in any usual and well-known manner, the upper roll A being the pulp-roll—namely, the roll upon which the thick cylinder of pulp is formed—said rolls being likewise of any well-known or usual construction.

Upon the shaft of roll A, at or near each end, is secured a wheel J, having a single tooth in gear with a toothed wheel I, carried by a shaft *i*, so that said toothed wheel I will be revolved step by step at each revolution of the single-tooth wheel J of the roll A.

The frame of the machine carries a shaft *c*, serving as pivot for the cutter or knife frame C, consisting of two side bars 2, one on each side of the machine, and of a cross girth or bar 3, to which the knife or cutter blade C' is secured.

The knife-blade C' is preferably adjustable on its carrier, to which end it is provided with transverse or vertical slots, through which the fastening-bolts 5 pass, as shown in dotted lines in Fig. 1.

Upon the shaft *i*, that carries the toothed wheels I, are secured two cams G, one below each of the side bars 2 of the knife-frame C, a bolt or pin E, secured to and projecting from the under side of said side bars, having bearing on the respective cams G. The knife-blade C' is so adjusted relatively to the pulp-roll A that the cutting edge of said blade will normally lie close to the periphery of the said

roll, and the cams G are constructed with their greatest and least half-diameters $4\frac{1}{2}$ upon the same radius, thus forming an abrupt shoulder.

5 As the roll A revolves the wheel I step by step the cutter-frame C is gradually lifted by the action of the gradually-increasing diameter of the cams G on the pins E, and when said wheels I have made a complete
10 revolution, the roll A having during this time made a number of revolutions equal to the number of teeth on said wheels, the cutter-frame C will have been lifted to its highest point, the pins E being then at the points 4
15 of their respective cams, and as the said wheels I complete their revolution, the said pins drop from 4 to $4\frac{1}{2}$, and with them the cutter-frame C, the knife C' cutting the cylinder of pulp on roll A lengthwise, and as the
20 said roll A continues to revolve the knife C' strips the cylinder of pulp from the roll, the operation being completed before the tooth on wheel J again comes in contact with a tooth on wheel I. The thickness of the sheet
25 of pulp thus obtained depends, therefore, on the number of revolutions of the roll A to each revolution of wheel I.

Inasmuch as it has been found impossible to regulate the feed of the pulp to the forming-rolls so as to make it absolutely uniform, the
30 sheets of pulp produced will vary in thickness in accordance with the quantity of pulp fed to the forming-rolls during a single revolution of the wheel I, and as this quantity varies materially at various times the sheets obtained are not of the same thickness.

After the cylinder of pulp has been cut lengthwise and partly stripped off its roll A by the action of the knife C' the free edge of
40 said cylinder falls over onto a continuously-revolving roller Q, connected by tapes Q² with a continuously-revolving roller Q', and as said sheet is gradually pushed onto said roller Q by the revolution of the roll A the traveling tapes Q² will gradually carry the sheet of
45 pulp along toward the delivery end of the machine.

A roller R has its bearings in blocks S, provided each with a stem s, said blocks and stems sliding freely in standards S' on the
50 frame of the machine, the roller R being held in contact with the tape-roller Q' by means of a spring S² on the stems s exerting its pressure upon the bearings S of said roller R, as shown. In rear of the roller R and close there-
55 to is arranged a table R', that has near its outer end a transverse abutment or ledge R², and below the rolls Q' R is arranged an inclined rack or table W.

60 To the frame of the machine, on each side thereof, is pivoted an arm V, that has an abutment v in the path of a pin v', secured to wheel I, said pin being preferably provided with an antifriction-roller v². Each of the
65 arms V is provided with a longitudinal slot at its lower end, through which passes the

pivot-pin, by means of which said arm is loosely hinged or pivoted to a radial arm U on a shaft u, to which are also secured two
70 radial arms T', connected by a cross-bar t', to which a creasing-blade T is secured at such an angle that when the radial arms T' are depressed the said creasing-blade will be close to the nip of the rolls Q' R, while the distance
75 from the plane of nip of said rolls to the rear face of the ledge or abutment R² is equal to one-half of the length of a sheet of pulp produced in the machine.

The operation of the creasing mechanism is so timed that as soon as the outer edge of
80 a sheet of pulp abuts against the inner or rear edge of the abutment R² the creasing-blade T will be depressed to crease said sheet midway of its length and at the same time depress the creased portion to the nip of the rolls Q' R, the blade receding into its normal position
85 under the stress of springs T², acting on the radial arms T'. In other words, as the creased portion of the sheet is seized by the rolls Q' R the rollers v² on pins v' of the wheels I move
90 clear of the abutments or shoulders v on arms V, allowing the creasing appliances to be returned into their normal position by the springs T². The sheet of pulp fed to the rolls Q' R is folded thereby and delivered in a
95 folded condition upon the inclined rack or table W, hereinbefore referred to.

I have hereinabove stated that the thickness of a sheet of pulp obtained will depend upon the number of revolutions of the pulp-
100 roll A previous to its being cut, and that owing to the more or less irregular supply of pulp to the forming-rolls the sheets produced are not all of the same thickness, and that in order that the sheets may be cut after a given
105 number of revolutions of the roll A the wheel I should have a corresponding number of teeth. I have also stated that one of the objects of my invention is the provision of means whereby all the sheets produced are of the
110 same thickness. When these appliances are employed, it is necessary that the wheel I should not only have a less number of teeth, but that one of the teeth should be removed and another substituted that can be with-
115 drawn from the path of the single tooth on wheel J, for a purpose which I will now describe.

As shown in Fig. 1, the wheel I has one of its teeth removed and is provided with a
120 socket or slideway in which is fitted a movable tooth K, provided with a lug or stud k, that projects through a slot i' in wheel I, to which is pivoted a gravity-catch M, adapted to engage the lug k on tooth K and hold the
125 same retracted or out of the path of the single tooth on wheel J, Fig. 3. To the tooth of the last-named wheel is adjustably secured on a suitable bolt p a tripping-finger P, adapted at the proper time to engage the nose m
130 of the gravity-catch M and trip the same, thereby releasing the tooth K and allowing

the same to slide into the path of the tooth on wheel J. As shown, the tripping-finger P has its nose or point in advance of the tooth on wheel J, the adjustment being such that when the wheel I has made a complete revolution to, say, sixteen revolutions of the roll A the tripping-finger P on the tooth of wheel J will lie in the space of the missing tooth of wheel I, in rear of the nose of catch M, while the pins or bolts E will be near the point 4 of greatest half-diameter of their respective cams G. The roll A will now continue to revolve without actuating the wheel I, and as the thickness of the cylinder of pulp on said roll A increases the latter will gradually move toward said wheel I, and when the cylinder of pulp is of the desired thickness the nose or point of the tripping-finger P will engage the nose or point *m* of the gravity-catch M, trip the same, and release the tooth K. A further partial revolution of a distance equal to that between the point of the tripping-finger and the forward edge of the tooth on wheel J will bring said tooth into engagement with the tooth K, thereby again revolving the wheel J, at the same time causing the cutter-frame to drop, whereby the pulp cylinder is cut lengthwise and fed to the creasing, folding, and delivery appliances, as above set forth.

It is obvious that by means of the appliances last described all the sheets of pulp produced will be of the same thickness, irrespective of any irregularity in the feeding of the pulp to the forming-rolls.

After the sheet has been stripped from its roll A the tooth K is withdrawn by hand and held in that position by the catch by simply pushing said tooth inwardly. A single operator is thus enabled to attend to a large number of machines.

I do not desire to limit myself to the construction and arrangement of the operative mechanisms as described and shown, as these can be varied in many ways without departing from the nature of my invention. Thus, for instance, the cutter-frame may be moved positively in cutting by springs, cams, or otherwise, and returned to a normal position by springs instead of cams. The tripping-finger P may be secured to another part of wheel J instead of its tooth, while the tooth K may be positively moved when released by the catch M, as by a spring, while the said gravity-catch may be replaced by a spring-actuated catch, as will be readily understood.

In practice I may use a table R' of a maximum length and provide means whereby the abutment or ledge R² can be adjusted along the said table to suit various lengths of sheets—as, for instance, by providing the ledge R² with pins *r*², and the table with holes, or vice versa, as shown in dotted lines in Fig. 1.

Having thus described my invention, what I claim as new therein, and desire to secure by Letters Patent, is—

1. In a machine such as described, the combination with the roll A, a cutter of the same length as and cooperating with said roll to cut a cylinder of pulp thereon lengthwise, means for taking the same off its roll in the form of a sheet, a creasing-blade adapted to crease the said sheet, and mechanism for operating the cutter and creasing-blade, controlled by the movements of the aforementioned roll A, for the purpose set forth.

2. In a machine such as described, the combination with the roll A, a cutter of the same length as, and cooperating with said roll to cut a cylinder of pulp thereon lengthwise, means for taking the same off its roll in the form of a sheet, a creasing-blade adapted to crease said sheet, and mechanisms for operating the cutter and creasing-blade controlled by the movements of the aforesaid roll; of folding devices cooperating with the creasing-blade to fold the creased sheet, for the purpose set forth.

3. In a machine such as described, the combination with the roll, the single-tooth wheel J on its journal, a swinging cutter-frame carrying a cutter of the same length as and adapted to cooperate with said roll; of a toothed wheel operated by the aforesaid single-tooth wheel J, and a cam G on the shaft of said toothed wheel acting on a projection from the cutter-frame, for the purpose set forth.

4. In a machine such as described, the combination with the roll A, the single-tooth wheel J on the journal thereof, a swinging cutter-frame carrying a cutter of the same length as and adapted to cooperate with said roll; of a toothed wheel I having one of its teeth removed, a sliding tooth in lieu of said removed tooth, a catch adapted to hold said tooth withdrawn from the path of the tooth on wheel J, and a tripping device on the last-named tooth adapted to trip said catch and release the sliding tooth, and the cam G on the shaft of wheel I acting on a projection from the cutter-frame for the purpose set forth.

5. In a machine such as described, the combination with the roll A, the single-tooth wheel J on the journal of said roll, the swinging cutter-frame C carrying the cutting-blade C', a toothed wheel I actuated by the single-tooth wheel J and provided with a stud or pin projecting from its face, and a cam G on the shaft of said wheel acting on a projection from said cutter-frame; of the shaft *u*, its radial arms U and T', a creasing-blade secured to the latter arms T', and arms V provided with a projection *v* in the path of the stud on the toothed wheel I pivotally connected with a fixed support, and with the radial arms U, respectively, substantially as and for the purpose set forth.

6. In a machine such as described, the combination with the roll A, a cutter and stripper cooperating therewith, and a creasing device adapted to crease a sheet of pulp stripped

from the said roll A; of the tape-rollers Q, Q',
the table R' provided at or near its outer end
with a transverse abutment, and the roller R
held yieldingly in contact with said tape-roller
5 Q', said rollers Q' R having their nip in the
plane of motion of the creasing device, sub-
stantially as and for the purpose set forth.

In witness whereof I have hereunto set my
hand in presence of two witnesses.

OLAUS ELISA GRONDAHL.

Witnesses:

ALFRED J. BRYN,
JOB VAALER.