

Feb. 28, 1939.

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2,148,490

METHOD OF MANUFACTURING REINFORCED PAPER

Filed April 25, 1936

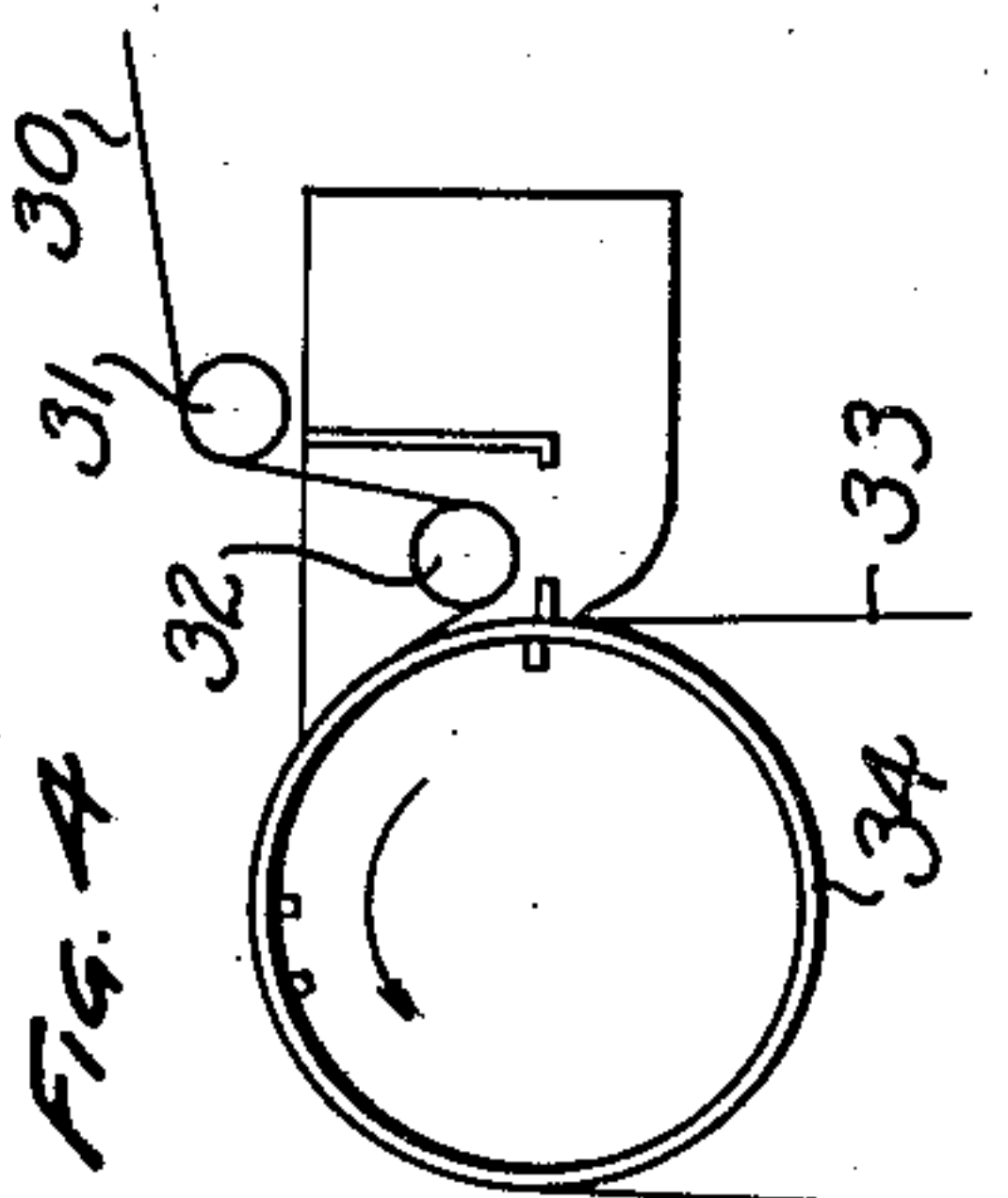
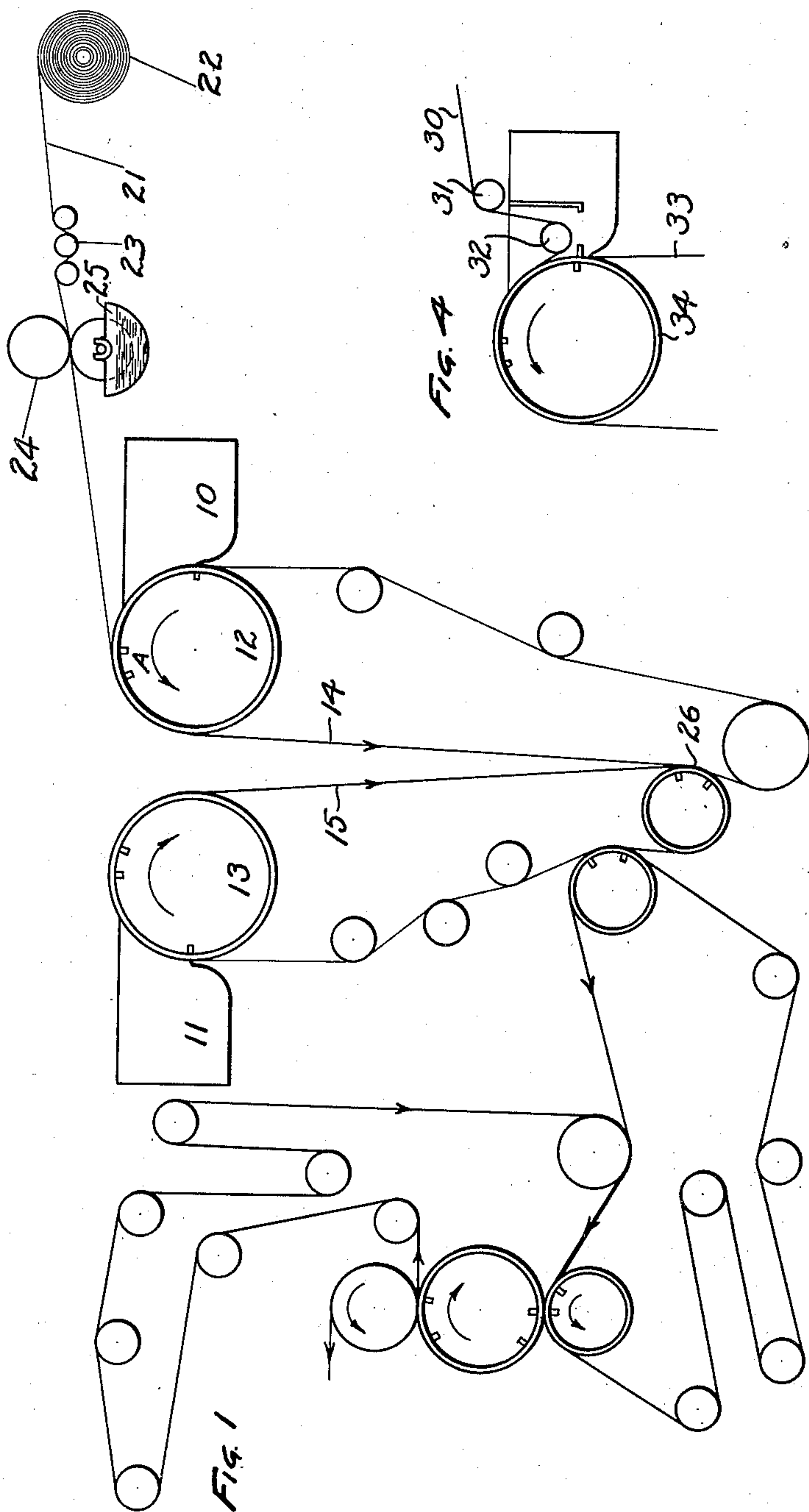


FIG. 3



FIG. 2

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2,148,490

METHOD OF MANUFACTURING REINFORCED PAPER

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Application April 25, 1936, Serial No. 76,410

2 Claims. (Cl. 92—41)

The invention to be hereinafter described re-
lates to reinforced paper.

There is a very great commercial need for a
tough strong paper having a high degree of tear
5 resistance, for wrapping parcels and for making
bags of different character. For such and many
other purposes the paper must withstand many
sudden hard strains and tough treatment.

It is the principal object of the present inven-
10 tion to provide a novel method and machine for
economically producing in one operation a strong
finished reinforced sheet in which the paper and
fabric are securely bonded together.

Another object of the invention resides in the
5 novel product resulting from the method herein
set forth.

Other objects and advantages of the invention
will be apparent from the following description
and from the accompanying drawing, in which—

0 Fig. 1 is a diagrammatic side elevation of a
forming apparatus, embodying the present in-
vention;

Fig. 2 is a magnified cross section of a piece of
reinforcing fabric applied to one side of a wet
5 web;

Fig. 3 is a like view of the finished reinforced
sheet; and

Fig. 4 is a modified form of apparatus in which
the reinforcing web is led through the stock vat.

0 As shown in Fig. 1, the apparatus embodies one
or more suction forming rolls and adjacent stock
vats of the character disclosed in prior Patents
No. 1,718,574 and No. 1,748,360. The apparatus
comprises two head boxes or stock vats 10 and 11
5 and cooperating forming rolls 12 and 13, forming
wires 14 and 15 and suitable carrying and trans-
fer rolls, all of which are now well understood in
the art and need not be further described here.
The upwardly moving portions of the forming
40 rolls are subjected to vacuum in the region of the
head boxes where the paper pulp is deposited.

In accordance with the present invention,
means are provided for supplying a sheet of cloth
fabric or the like 21 to the paper web on one of
45 the forming wires, and, if desired, for coating the
fabric sheet before it is applied to the web on the
forming wire with a suitable fluid material having
the desired adhesive characteristics so that the
fabric may be very intimately bonded with the
50 pulp fibers. Adjacent the paper forming appa-
ratus suitable supporting means are provided for
a roll 22 of cloth fabric 21. The fabric is sup-
plied through spreader rolls 23 by which it is con-
stantly maintained in a smooth condition. From
55 the spreader rolls the cloth fabric is led to the

upper side of the wet paper web on the forming
wire 14 at a point just beyond the forming area
on the suction roll. It travels with the forming
wire and the paper web thereon, the adhesion and
frictional engagement of the layers being suffi- 5
cient to draw the fabric from the roll 22 and
through the spreading rolls, etc.

The reinforcing fabric 21 is thus applied to the
web of paper pulp on the roll 12 before leaving
the roll and while the web of paper is still wet, so 10
that the reinforcing fabric is forced slightly into
the paper fiber mass by reason of the slight fric-
tional resistance to forward movement of the re-
inforcing fabric. This action causes a very
thorough union of the reinforcing fabric with the 15
wet paper fibers, as illustrated in Fig. 2, some of
the fibers being caused to move up into the inter-
stices between adjacent threads of the fabric at
the time, or just after, the paper web on the form-
ing roll is subjected to the action of vacuum at the 20
region A.

Before applying the reinforcing fabric 21 to
the paper web the fabric may, if desired, be led
through the nip of coating rolls 24, the lower
coating roll dipping into a tank 25 containing a 25
quantity of fluid or semi-fluid material having
adhesive characteristics and preferably of a mois-
ture repelling nature. The material of the bath
may be of such character that it becomes tacky
and very adhesive, especially at high tempera- 30
tures. As the cloth fabric passes over the lower
coating roll it is given an application of the coat-
ing material, the squeeze action of the two rolls
preventing an excess of material being supplied.
Latex or similar fluid may be used as a coating 35
since the properties of such substance are admir-
ably adapted for the purpose intended. It will be
understood that the container or tank 25 is main-
tained at a suitable temperature so that the coat-
ing material is in a fluid condition. After the 40
application of the coated or uncoated reinforcing
fabric to the paper web on the forming roll 12
the combined sheet may be carried by the wire 14
to the point 26 where the combined sheet is trans-
ferred, preferably by suction, to a wet paper web 45
produced on the forming roll 13, the fabric side
of the combined sheet being applied to the outer
surface of the second paper web, so as to incor-
porate the reinforcement between two outer lay-
ers of paper. The reinforced paper web thus ob- 50
tained, and which has been shown in section in
Fig. 3, is then supplied to the driers and its con-
stituent parts are securely bonded together by
the heat and pressure of the driers. Any bonding
material with which the reinforcing fabric was 55

coated is rendered tacky and adhesive by the drying and heating action. The product is a single composite, reinforced sheet of a flexible character.

5 In accordance with the modified form of apparatus illustrated in Fig. 4, the reinforcing fabric sheet may be applied to the mat of paper fibers on the forming roll before the forming wire reaches the end of the forming zone. The
10 woven fabric 30 is thus supplied through suitable spreader rolls, not shown, over an upper guide roll 31 mounted above the head-box partition, down through the paper stock and around and under the submerged guide roll 32. The fabric
15 then passes through the paper stock onto the adjacent forming wire 33 on forming roll 34 at a point a suitable distance below the line at which the roll emerges from the stock.

The reinforcing fabric cloth web is thus in
20 contact with and covers an appreciable segment or arc of the forming roll below the surface of the stock, and is acted upon by the forming vacuum. A partial layer of fibers will be formed on the making wire, and then the reinforcing fabric
25 will be applied to the outer surface of this partially formed layer of paper fibers. During the continued rotation of the forming roll and after the reinforcing fabric is applied to the partially formed layer of fibers, the suction of
30 the forming roll continues to act so as to deposit additional paper fibers on the outer side of the reinforcing fabric as the vacuum continues to draw the fibers of the stock intimately about, over and through the spaces between the crossed
35 woven threads of the fabric. The fabric threads are thus straddled by innumerable paper stock fibers which are matted intimately together on and in the body of the fabric, the matted fibers securely interlocking the layers of paper fibers
40 which are on the two opposite sides of the fabric. The sheet which emerges from the paper stock vat is a fabric reinforced paper web in which the fabric and the paper fibers are thoroughly and intimately incorporated as a component part
45 thereof.

While the integrally united fabric and paper fibers coming from the forming roll 34 may be subjected to the heat and pressure of the driers to produce the finished product, an outer
50 layer of paper web may be applied to the com-

posite web that is formed as just above mentioned. A second headbox and a second forming roll may therefore be provided and the paper web it produces is applied to the outer layer of the composite formation produced on the forming wire 33. The resultant web is then subjected
5 to heat in the driers, forming the composite web into an integrally united mass of paper fibers and reinforcing strong fabric. The product is made as a single continuous formation, the apparatus being quite simple. The product is adapted
10 to be bent without disturbing the intimate and integral formation of its constituent elements, and may be of any desired density dependent upon the pressure to which the composite web is
15 subjected in the driers.

While the method herein described, and the forms of apparatus for carrying the method into effect, and the product produced thereby, constitute preferred embodiments of the invention,
20 it is to be understood that the invention is not limited precisely thereto, and that changes may be made therein without departing from the scope of the invention which is defined in the appended
25 claims.

What is claimed is:

1. The method of manufacturing reinforced paper comprising forming a web of paper by vacuum formation on a forming roll, feeding a
30 reinforcing fabric onto said paper web after emergence of the web but before it leaves the forming roll, curving the fabric partly around the roll while the outer side of the fabric is unconfined to fill the interstices between the threads
35 of the fabric by paper fibers, removing the composite sheet from the forming roll, and subjecting to heat and pressure.

2. The method of manufacturing reinforced paper comprising separately forming a plurality
40 of webs of paper by vacuum formation on forming rolls, feeding therebetween a reinforced fabric, supplying coating material to said fabric during such feeding, applying the fabric while unconfined to the outer surface of one of the webs
45 after emergence of such web from the stock supply and before such web leaves the forming roll, and heating and pressing the composite sheet.

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CERTIFICATE OF CORRECTION.

Patent No. 2,148,490.

February 28, 1939.

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It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows; Page 2, second column, line 42, claim 2, for the word "reinforced" read reinforcing; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 18th day of April, A. D. 1939.

Henry Van Arsdale

(Seal)

Acting Commissioner of Patents.