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APPARATUS FOR SPLICING PAPER

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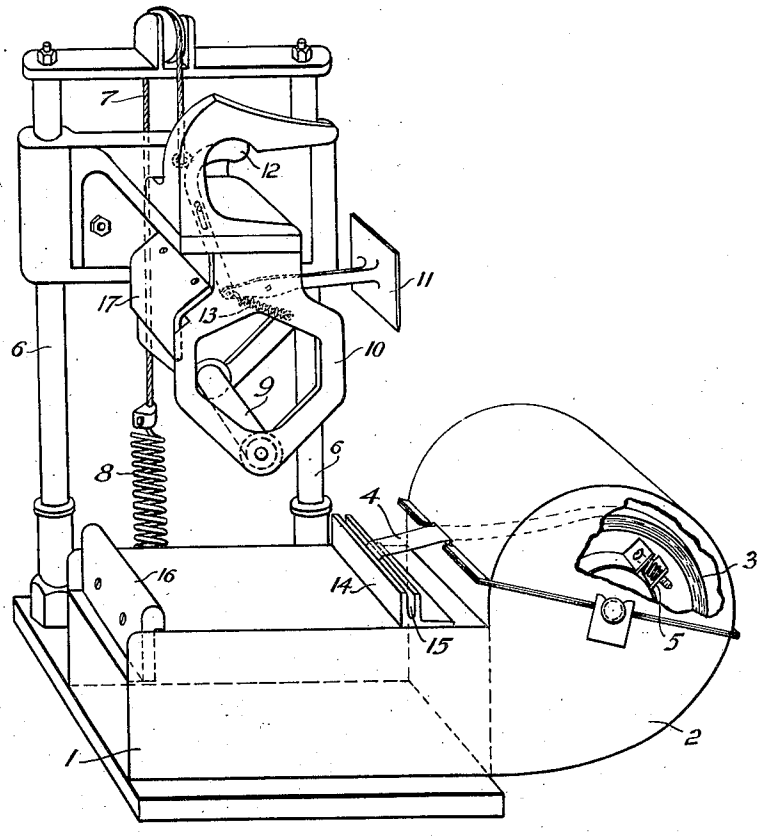

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APPARATUS FOR SPLICING PAPER

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5 Claims. (Cl. 91—14)

This invention relates to the splicing of sheets of paper and particularly in the manufacture of paper, wherein the long sheet or web of paper is frequently broken and in re-winding the sheet, for example, from the reel of the paper machine it is necessary to join or splice the sheet at the point of rupture.

It has been common practice to use an adhesive material, such as gum or glue, for this purpose. Another method is to place a thin tape of rubber between the broken ends and seal the same by passing a hot iron over the splice. Difficulties are experienced with heretofore known methods and the object of this invention is to overcome these difficulties. For example, it frequently happens that the adhesive or rubber finds its way to an underlying layer or turn of paper on a roll and this turn or layer adheres to the spliced layer causing another tear when the paper is unwound from the roll. Tension applied to the sheet before the splice has sufficiently set causes rupture of the splice. When the paper is stored, particularly under high temperatures, the splice weakens through deterioration of the adhesive or oxidation of the rubber and often permits the ends to part with obvious difficulties when the paper is being used in a printing press or elsewhere. The thickness of the splice is sometimes an objection and the adhesive frequently loses its adhesive properties when the spliced paper is coated by immersion in hot wax or other coating materials or is coloured by immersion in dye solutions.

The object of the present invention is to provide a method and convenient apparatus for overcoming these and other difficulties in splicing paper and to form a splice which is permanent and strong and which does not unduly increase the thickness of the sheet.

The invention will now be defined with reference to the accompanying drawing illustrating in perspective an apparatus of convenient form for use in splicing the paper.

It has been found that a compound of cellulose, (cellulose constituting the body of the paper), which is soluble in a suitable organic solvent, is best adapted for the purpose of splicing the paper. A solution of such a compound may be applied to the broken ends of the sheet by means of a brush or a roller but such method of application is not readily amenable to sufficient accuracy or ease of control. Preferably, therefore, the soluble cellulose compound is formed into a tape of any desired width, say ⅜", ½", or ¾", and of a predetermined thickness, which should be constant at, say, .0012". This tape is then used in forming the splice. To cause it to adhere to the paper it is passed through an organic solvent which wets and plasticizes it. When the so plasticized tape is placed between the broken ends of the sheet, sealing is effected by passing a hot iron over the sheet to press the parts into intimate contact and to evaporate the solvent.

In the apparatus shown, 1 is a container for the solvent, 2 a separate, but conveniently located, compartment in which a roll 3 of the tape 4 is located and in which is provided a brake 5 for regulating the unwinding movement of the roll. The upright 6 carries movable means for immersing and cutting the tape, which means are held in raised position by the rope 7 and spring 8. The immersion means consists of a roller 9 mounted in the movable frame 10. The cutter 11 is mounted in this frame and is associated with a trigger 12 which, when moved manually against the tension of a spring 13, depresses the cutter to sever the tape. To assist in the cutting of the tape there is arranged on the container 1 an auxiliary cutting member 14 having therein a groove or slot 15 and at the opposite end of the container is a guide plate 16. Mounted on the immersion device is a complementary guide member 17, which, when the immersion device is lowered into the container, forms with the guide member 16 a channel through which the tape is withdrawn from the solvent.

In operation the ends of the paper sheet to be joined are trimmed as required. The free end of the tape emerging from the compartment 2 is drawn across the solvent container, the immersion device is depressed to cause the roller 9 to immerse the tape in the solvent, the tape is then drawn through the solvent until a sufficient length has been obtained, and the trigger 12 is depressed, forcing the cutter 11 into the groove 15 to sever the tape. The plasticized strip of tape is now laid on one sheet of paper and the other placed on top of it when sealing is effected by passing a suitably heated iron over the sheet. The unplasticized exposed ends of the tape are then removed. It will be observed that the free end of the tape 4 after cutting is left in its unwetted or unplasticized condition and is ready for the next operation.

Alternatively, the free end of the tape after immersion may be caused to adhere to the sheet of paper and the device itself may be moved across the sheet so that the tape emerging from

the solvent lies immediately upon the paper and may be cut off when the required length is obtained.

It will be apparent that a variety of soluble cellulose materials, such as, for example, cellulose acetate or nitrate, may be used but cellulose acetate has been found to be most suitable. Various solvents, such as acetone di-acetone, ethyl lactate, butyl acetate, may be used as the wetting or plasticizing agent. If the solvent plasticizer acts on the tape too quickly, the tape may become too soft or even dissolved before the operator has had time to put it in place on the end of the sheet. On the other hand, if it acts too slowly and has too high a boiling point, the drying of the splice takes too long and traces may remain in the sheet. Thus di-acetone is preferably used with a cellulose acetate tape, these being best adapted to meet all the requirements.

The splice so formed does not unduly increase the thickness of the sheet at the tape used is very thin and when plasticized and subjected to heat the cellulose compound of which it is formed penetrates more or less into the overlapping margins of the sheet and intimately binds them together.

We claim:

1. A device for splicing paper comprising a solvent container, a compartment adjacent thereto, a roll of cellulose acetate tape mounted in said compartment a brake to control movement of said roll, a vertically movable device for immersing tape withdrawn from said roll in solvent in said container, a cutter carried by said immersion device, a trigger for operating the cutter, auxiliary cutting means on said container adjacent said compartment, a tape guide plate on the opposite end of said container and a cooperating guide plate on said immersion device.

2. A device for splicing paper comprising a liquid container, a compartment adjacent thereto, a roll of tape mounted in said compartment, a vertically movable device for immersing tape withdrawn from said roll in the liquid in said container, and cutting means for the tape carried by said immersion device.

3. A device for splicing paper comprising a liquid container, a compartment adjacent thereto, a roll of tape mounted in said compartment, a vertically movable device for immersing a strip of tape withdrawn from said roll in the liquid in said container and means for severing said strip of tape at a point between the roll and said immersion device, said severing means being carried by said immersion device.

4. A device for splicing paper comprising a liquid container, a compartment adjacent thereto, a roll of tape mounted in said compartment, a vertically movable device mounted above said container for immersing tape withdrawn from said roll in the liquid in said container, resilient means tending to hold said device out of contact with said liquid, and cutting means for the tape carried by said device.

5. A device for splicing paper comprising a liquid container, a compartment adjacent thereto, a roll of tape mounted in said compartment, a vertically movable device mounted above said container for immersing tape withdrawn from said roll in the liquid in said container, a resilient means tending to hold said device out of contact with said liquid, a cutter for the tape carried by said device, auxiliary cutting means on said container adjacent said compartment, and a trigger adapted to move said cutter into engagement with said auxiliary means.

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