H. GUEFFROY.

MACHINE FOR PRODUCING FABRIC, PAPER, OR CARDBOARD HAVING AN INCLOSURE OF CROSSING THREADS.

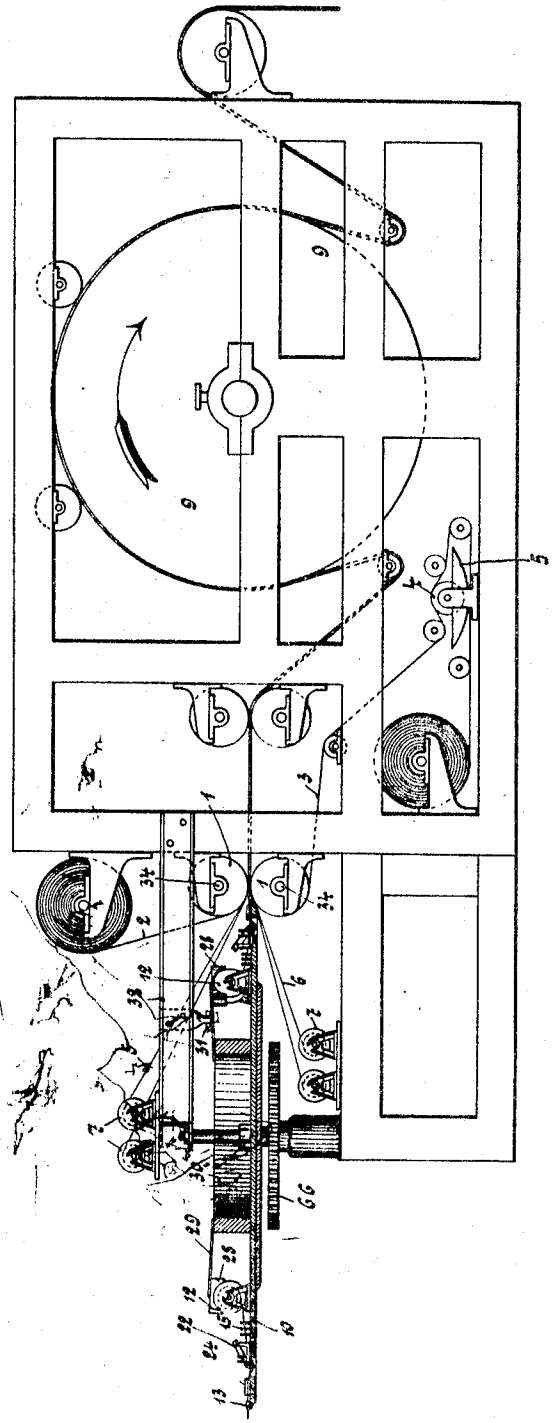
APPLICATION FILED SEPT. 14, 1910.

1,015,174.

Patented Jan. 16, 1912.

5 SHEETS—SHEET 1.

Fig. 1



WITNESSES

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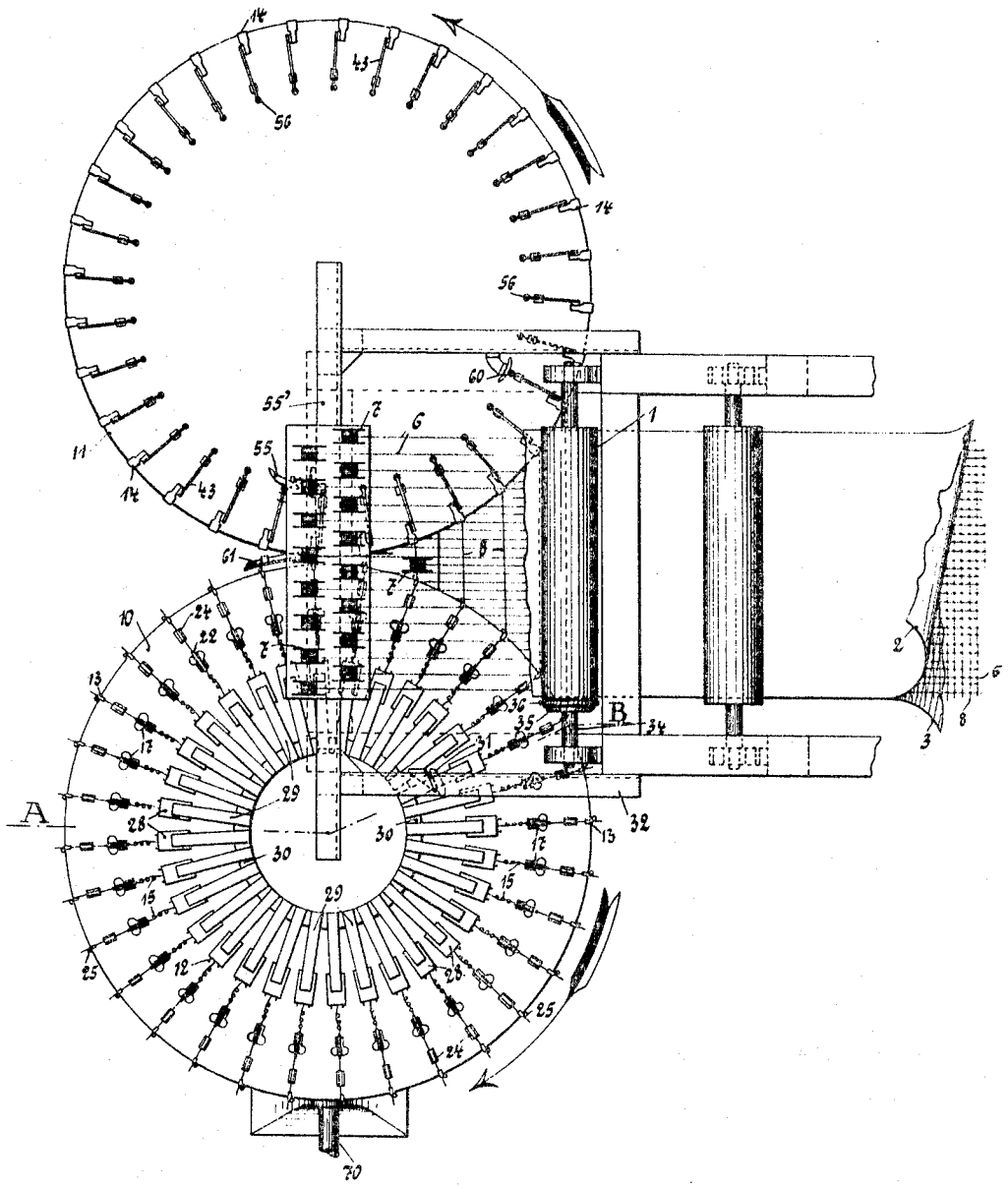
Fig. 2



WITNESSES

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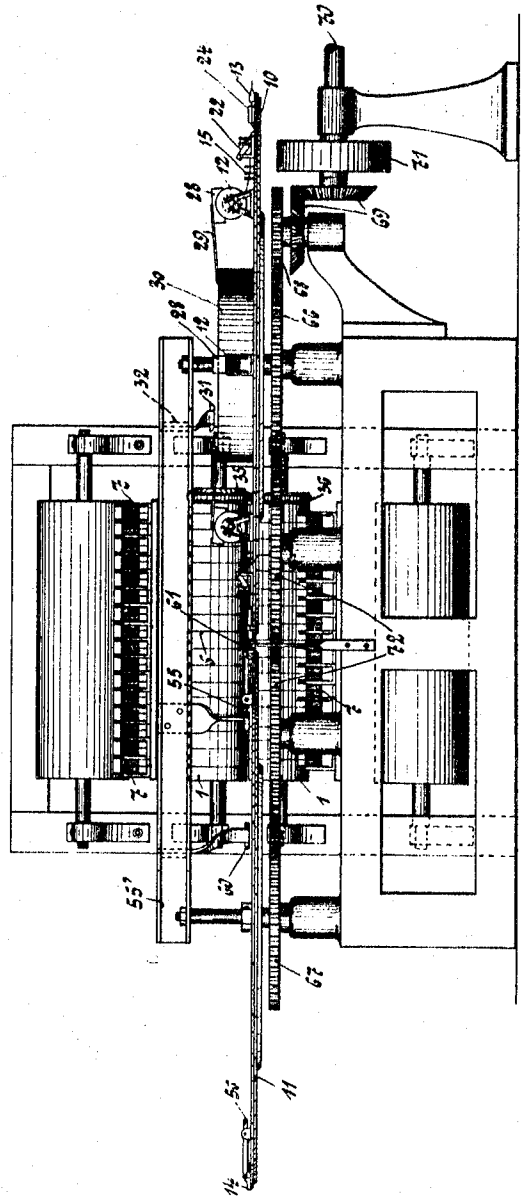
Fig. 3



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6 SHEETS—SHEET 4.

Fig. 4

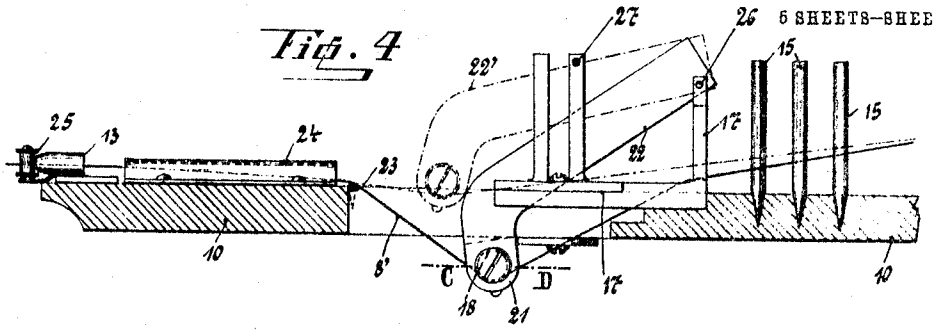

Fig. 6

Fig. 5

Fig. 7

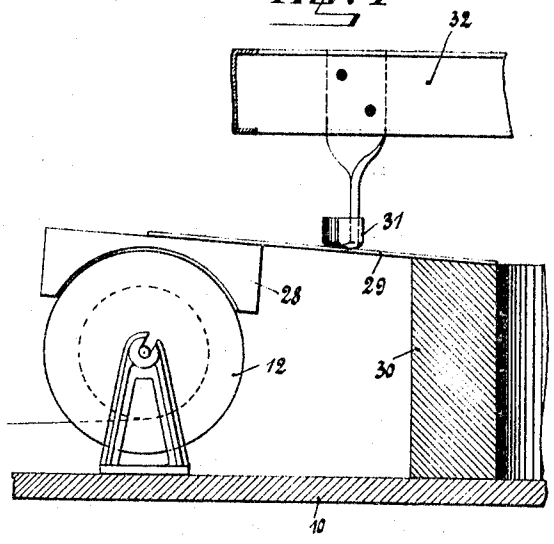

Fig. 9

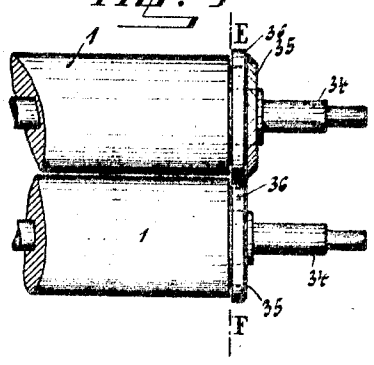

Fig. 10

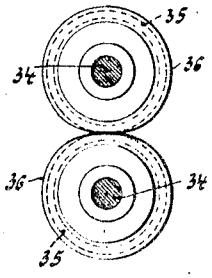

Fig. 8

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5 SHEETS—SHEET 5.

Fig. 11

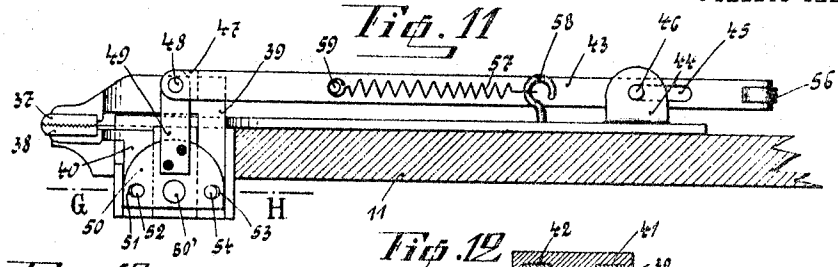


Fig. 12

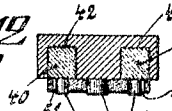


Fig. 13

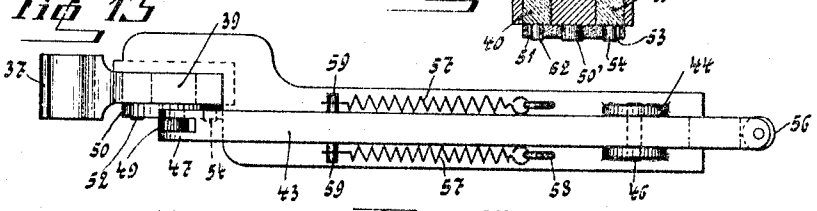


Fig. 14

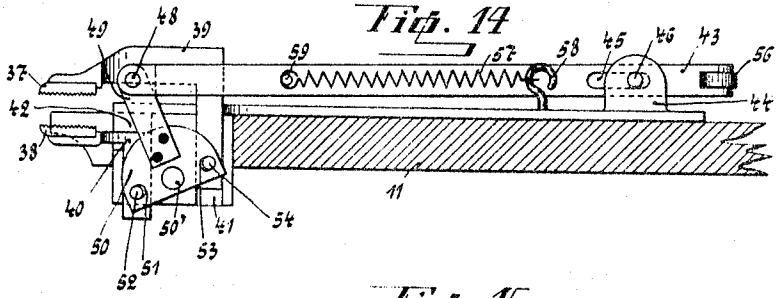


Fig. 15

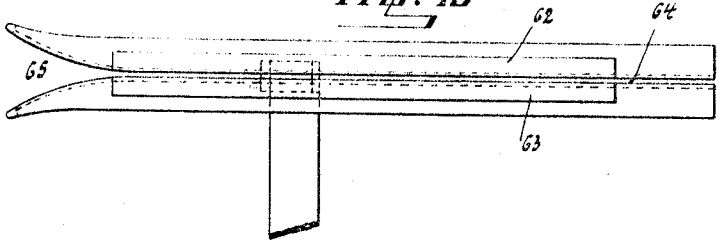


Fig. 16

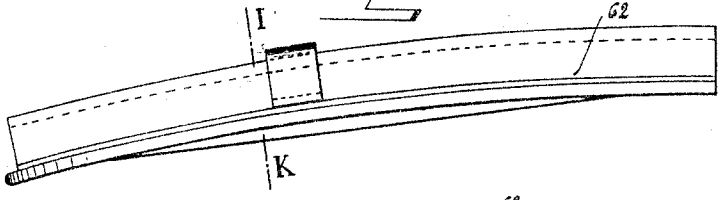
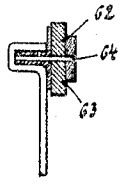


Fig. 17



WITNESSES

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UNITED STATES PATENT OFFICE.

HERMANN GUEFFROY, OF BERLIN, GERMANY, ASSIGNOR TO DRAHTPAPIER G. M. B. H., OF BERLIN, GERMANY.

MACHINE FOR PRODUCING FABRIC, PAPER, OR CARDBOARD HAVING AN INCLOSURE OF CROSSING THREADS.

1,015,174. Specification of Letters Patent. Patented Jan. 16, 1912.

Application filed September 14, 1910. Serial No. 581,983.

To all whom it may concern.

Be it known that I, HERMANN GUEFFROY, a subject of the King of Prussia, residing at No. 11 Wormserstrasse, in the city of Berlin, German Empire, have invented certain new and useful Improvements in Machines for Producing Fabric, Paper, or Cardboard Having an Inclosure of Crossing Threads; and I do hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to a machine for producing fabric, paper, or card board having an inclosure of crossing threads, preferably of crossing metal wires. A process for producing paper with such an inclosure is known, according to which a series of longitudinal wires or the like is introduced between two widths of paper or fabric, whereupon a series of transverse wires is inserted, so that, on sticking the widths of paper together, which is done in the well known roll sticking machine, the wire inclosure is fastened. In the processes and machines of this kind heretofore known the threads inserted across the longitudinal threads were inserted in a more or less loose condition, that is without sufficient tension. These transverse threads were not able to prevent the paper from being torn, because they were only able to offer resistance after the paper had been broken. This drawback is overcome by my invention, as I insert the transverse threads under tension and keep them stretched, until they are tightly grasped by the pressure roll of the sticking machine and cannot get out of position. In my invention the transverse threads are caught at their free ends and are pulled at a certain tension from a spool, and then, while still retaining this tension, are introduced, parallel to each other, into the apparatus designed to combine the separate widths, my machine being provided with suitable devices, which enable the wire to be kept under tension, until it is taken hold of by the pressure rolls and cut.

On the accompanying drawing illustrating such a machine by way of example, Figure 1 is a side elevation and a part section on the line A—B of Fig. 2. Fig. 2, a plan of the front part of the machine, and Fig. 3, a front elevation, while Figs. 4–14 show details.

The two widths of fabric, paper, or the like, are combined with the wire inclosure between the two rolls 1 of the sticking machine. To these rolls the paper width 2 is led from above, while the paper width 3 in introduced from below. The lower paper width 3 is previously passed over a roll 4, which rotates in a vessel 5 containing an adhesive, so that this adhesive is applied to one side of the paper width 3. Between the widths of paper 2 and 3 a series of longitudinal wires 6 are introduced, which are wound off spools 7. At the same time the wires 8 are introduced between the widths at an angle to the longitudinal wire 6. By the pressure of the rolls 1 the paper widths are combined and the wire inclosure is thus fixed. The finished paper with inclosure is then led in suitable manner over a drying drum 9. Machines of this kind are already known so that a more detailed description will not be necessary.

My invention relates to the manner of introducing the transverse wires. The apparatus, as above mentioned, must fulfil the conditions that said transverse wires are inserted parallel to each other and at a right angle to the longitudinal wires, and that, before all, the transverse wires are kept under tension, until they are taken hold of by the pressure rolls of the machine.

According to my invention the series of transverse wires 8 are guided and moved toward the pressure rolls 1 by two rotary disks 10, 11, which are provided in the same horizontal plane. Said disks 10, 11 rotate about their vertical axes at a uniform speed in opposite directions. On the disk 10 is provided a number of wire spools 12 at a uniform circumferential distance from each other, from each of which spools a wire passes to a nozzle 13 provided at the edge of the disk. Corresponding to each nozzle 13 there is a gripping device 14 on the rotary disk 11. Said gripping devices 14 are so arranged at the edge of the disk 11 that at the point at

which the circumferences of the two disks 10, 11 are nearest together, a nozzle 13 is always exactly opposite a gripper 14. At this point the gripper 14, the construction and operation of which I will describe below, seizes the end of the wire projecting out of the nozzle 13. According as the distance of the respective nozzles and grippers, owing to the rotation of the disks 10, 11, increases, the wires will be drawn off the spools 12 and introduced parallel to each other between the pressure rolls 1.

In order to explain the manner of guiding the wire from the spool 12 to the nozzle 13 I refer to Figs. 4–6. Fig. 4 is a radial section through the outer part of the horizontal disk 10. Fig. 5 is a plan thereof and Fig. 6 a section on the line C—D of Fig. 4. The wire drawn off the spool 12 is first led around tightening pins 15 secured to the disk 10 and then through the slot 16 of a guide piece 17 and under the roll 18, which rotates about the cylindrical part 19 of a screw 20 inserted in the forked end 21 of a bell crank lever 22. From the roll 18 the wire passes over a cross piece 23 and through a guide 24 on the disk 10 and then through the nozzle 13. In order to prevent the wire from being injured by the front edge of the nozzle 13 a roll 25 is arranged in front thereof. As soon as the respective gripper 14 has seized the projecting free end, the wire 8′ is subjected to a certain tension and the bell crank lever 22, which can rotate about the pivot 26 in the guide block 17 is gradually raised until it reaches the position 22′ shown in dotted lines in Fig. 4. The highest position of the lever 22 is determined by the stop 27, which then bears against the top edge of the lever. As soon as the pull at the end of the wire 8′ projecting out of the nozzle ceases, that is, as explained below, when the wire is cut, the bell crank lever falls again by reason of its own weight. It then pulls the wire 8′ back to such an extent that only a small piece projects through the nozzle 13, which is adapted to be caught by one of the grippers 14, as soon as the disks 10, 11 have described a complete revolution. In this way all waste of wire is avoided and the gripper is caused to take hold of the wire at its end. By the wire being pulled back through the nozzle, the free end, which as evident from Fig. 2, is bent sidewise over the roll 25 by the lateral pull, will be straightened.

In order to assure that the wires, when being drawn off their spools 12 receive a certain tension, a special brake is provided for each spool 12 (Fig. 7). On the circumference of each spool bears a brake block 28, which is carried by a spring 29. The inner ends of these springs are all fastened to a ring 30, which is connected to the disk 10 in suitable manner (Fig. 1). As soon as one of the wires 8, owing to the rotary movement of the disks 10, 11 has been brought close to the pressure rollers 1 the brake is put on, so that the rotation of the corresponding spool 12 is retarded, and, as a consequence, the wire receives a considerable tension. The brake is put on with the assistance of a stop 31, which is secured to a rail 32 carried by the frame of the machine. This stop 31, the bottom of which is suitably curved, projects down so far that the spring 29 passing thereunder is depressed and the respective brake block 28 accordingly pressed against the spool. The stop 31 is so arranged that the spool 12 is still retarded some short time after the wires between the pressure rolls have been cut off. By this means the spool is prevented from being rotated further by momentum, which would cause the wire to become loose on the spool or entangled, and would occasion disturbances in the operation of the machine. This, and all unnecessary unwinding of the spools, are prevented by the action of the brakes.

In order to reduce the friction of the spring 29 on passing under the stop 31, rolls 33 may be provided under the stop 31, as shown, for example, in Fig. 8.

As soon as a transverse wire 8 has been introduced between the pressure rolls, it must of course be cut off. For this purpose the axes 34 of the rolls 1 are provided with circular cutters, the operation of which will be evident from Fig. 9, which shows the particular part of the pressure rolls in front elevation. Fig. 10 is a section on the line E—F of Fig. 9.

Should it occur that one of the wires is cut off before it has been properly taken hold of by the pressure rolls 1 and fastened between the paper widths 2 and 3, said wire might lose its tension. This must however be avoided, because otherwise the strength of the material produced would be impaired. Now the rotating disks 10, 11 are so arranged in regard to the pressure rolls 1 that the wire is not cut off, until it is held by the rolls. It is however preferable to provide an auxiliary device consisting of two disks 36 of rubber or other similar material, which are provided on one side of the circular cutters 35 on the axes 34 of the rolls 1. These disks have a somewhat larger diameter than the circular cutters 35, so that they come into contact with each other in advance of the vertical middle of the rolls 1 and are thus somewhat flattened, as shown in Fig. 10. Between these flattened portions of the disk 36 the wire is held until it is fastened in position by the paper widths being stuck together. The same effect would of course be obtained, if a disk 36 of elastic material were provided on the axis of one of the circular cutters and press against the flange of the other circular cutter. The elastic disk would also be flattened by pres-

sure against the flange and thus hold the wire. A corresponding device is preferably provided on the opposite side of the pressure rolls, in order to balance any differences in letting hold of the wire. Instead of constructing the cutting device to cut the wires as soon as they arrive between the pressure rolls, said device may be so arranged as to cut the wires after they have left the rolls. For this purpose the cutters may, for example, be fitted on special axes behind the pressure rolls instead of on the axes of these latter.

The construction and operation of the grippers carried by the disk 11, which, at a suitable moment, catch the free ends of the wires projecting through the nozzles 13 is shown in Figs. 11–14. Fig. 11 is a radial section through the outer part of the disk 11 and shows the closed gripping device in side elevation. Fig. 12 is a section on the line G—H of Fig. 11, Fig. 13, a plan, and Fig. 14, a side elevation corresponding to Fig. 11, showing the gripper in the open position. The wire is held between the ribbed jaws 37, 38 of the gripper 14. The upper jaw 37 is fastened to an angularly bent guide piece 39 and the lower jaw 38 to a guide piece 40, which has also an angularly bent shape. The guide pieces 39, 40 fit in vertical guides 41, 42, which enable the jaws to be opened by a movement parallel to each other. This movement is effected by a rail 43, the back end of which rests in a fork 44 provided on the disk 11, and is provided with a longitudinal slot 45, through which passes a bolt 46 carried by the fork 44. The front forked end 47 of the rail 43 is jointed by a pin 48 to a rod 49, the other end of which is attached to a disk 50 adapted to turn about the pin 50′. A slot 51 of this disk 50 fits on a pin 52 attached to the guide piece 40 on the lower jaw 38, while a second slot 53 fits on a pin 54 provided on the guide piece 39 of the upper jaw 37. If the rail is moved inward as far as possible (to the right according to Fig. 11) the link 49 will occupy a vertical position and the two jaws 37, 38 of the gripper will be closed. If however the rail 43 is moved outward (to the left according to Fig. 11) the link 49 and the disk 50 connected thereto will be moved into an inclined position. As a consequence the lower jaw will be moved downward by the pin 52 and the upper jaw upward by the pin 54, so that the gripper will be opened, as shown in Fig. 14. The movement of the rail 43 necessary to open the jaws of the gripper is obtained by a curve 55 secured to a cross rail 55′ of the frame over the disk 11. Against this curve 55 presses a roll 56 at the back end of the rail 43. As a consequence the rail 43 is pressed outward (to the left according to Fig. 11) and the gripper is opened. At the same time the springs 57 are bent, which at one end, are fastened to a hook 58 attached to the rotary disk 11, and, at the other end, to a pin 59 fastened to the rail 43. Between the open jaws the end of the wire projecting through the nozzle 13 can pass. Owing to the further rotation of the disk the roll 56 passes off the curve 55, whereupon the rail 43 will be moved inward by the springs 57 (to the right according to Fig. 11), so that the jaws will be closed and the wire between them held fast. Said wire is thus held, until it passes between the pressure rolls 1. At this moment the roll 56 at the back end of the rail 43 will bear against the second curve 60. The rail 43 will be moved outward again, the gripper opened, and the wire accordingly released. As soon as the roll 56 leaves the curve 60 the gripper closes again and remains closed until the roll 56, owing to the rotation of the disk again reaches the curve 55, whereupon the described operation will be repeated.

If now it should happen that the end of the wire projecting through the nozzle 13 does not take a horizontal position, but is bent somewhat up or down, it might occur that it will not pass between the jaws 37, 38, but slip over one of the same. In order to prevent this, there is provided in advance of the point, where the gripper has to catch the wire, a guide 61, which is about concentric to the disk 10. This guide is shown in Figs. 15–17. Fig. 15 is a side elevation, Fig. 16, a plan and Fig. 17, a section on the line I—K of Fig. 16. The guide consists substantially of two parts 62, 63, between which there is an opening 64. At their outer ends the parts 62, 63 are bent outwardly, as shown in Fig. 15. The opening 65, which is wide at the end and gradually decreases in width in passing into the opening 64, causes the end of the wire projecting through the nozzle to be led, during the rotation of the disks 10, 11, exactly between the jaws 37, 38 of the gripper 14. The disks 10, 11 are rotated by the spur-wheels 66, 67 keyed to the axes of these disks. In the spur-wheel 66 engages a spur-wheel 68, which is rotated through the agency of the bevel gearing 69 by the driving shaft 70, carrying the pulley 71. From the spur-wheel 66 the motion is transferred to the spur-wheel 67 by the intermediate wheels 72 in such a way, that the two disks 10, 11 are rotated at the same speed, but in opposite directions.

The speed at which the cross wires 8 are fed to the pressure rolls 1 can be regulated not only by suitable construction of the gearing, but also by choosing a larger or smaller number of spools 12 on the disk 10 and a corresponding number of grippers 14 on the disk 11.

I do not desire to limit myself to the pre-

cise details of construction and arrangement herein shown and described, as it is obvious that various modifications may be made therein without departing from the essential features of my invention as defined in the appended claims.

I claim:

1. A machine for making paper and the like having an inclosure of crossing threads, comprising a pair of pressure rolls, spools having threads wound thereon, means for unwinding, stretching and feeding the threads one after the other to the pressure rolls, and a cutting device which cuts off the thread taken hold of by the said rolls.

2. A machine for the production of a fabric having an inclosure of crossing threads, the said machine comprising a pair of pressure rolls, two disks rotating at the same speed in opposite directions, spools carried by one of said disks and having threads wound thereon, and means carried by the other disk for unwinding the threads from said spools and introducing them between said pressure rolls.

3. A machine for the production of a fabric having an inclosure of crossing wires between the covering webs, comprising in combination two horizontal disks adapted to rotate at the same speed in opposite directions, wire spools carried by one of said disks at a uniform circumferential distance from each other, and grippers on the other disk to grasp the wires unwound from said spools, the said grippers corresponding in number with the said spools.

4. In a machine for the production of a fabric having an inclosure of crossing wires, two disks adapted to rotate at the same speed in opposite directions, wire spools carried by one of said disks, and nozzles provided at the circumference of said disk and to which the wires are led from said spools.

5. A machine for the production of a fabric having an inclosure of crossing wires, the said machine comprising two disks adapted to rotate at the same speed in opposite directions, wire spools carried by one of said disks, levers, rolls carried by said levers and under which the wires are led from said spools, and nozzles at the edge of the disk and through which the wires pass.

6. A machine for the production of a fabric having an inclosure of crossing wires, the said machine comprising two disks rotating at the same speed in opposite directions, wire spools carried by one of said disks, rolls under which the wires from the spools pass, nozzles at the edge of said disk and through which the wires pass, and a lever carrying each of said rolls, the said lever being raised when the wire is pulled and adapted to pull back into its first position as soon as the pull ceases.

7. A machine for the production of a fabric having an inclosure of crossing wires, the said machine comprising two disks adapted to rotate at the same speed in opposite directions, wire spools carried by one of said disks, nozzles at the edge of said disk to each of which a wire is led from one of said spools, grippers carried by the other disk, each gripper being open when opposite to a nozzle of the first mentioned disk to permit the wire projecting out of said nozzle to enter the gripper, and means for closing the gripper to cause the same to grasp the wire.

8. A machine for the production of a fabric having an inclosure of crossing wires, the said machine comprising two disks adapted to rotate at the same speed in opposite directions, wire spools carried by one of said disks, a corresponding number of grippers carried by the other disk for grasping the wires and unwinding them from the spools, and brake devices on the disk carrying the wire spools for retarding the rotation of said wire spools and subjecting the wires being unwound from said spools to tension.

9. A machine for the production of a fabric having an inclosure of crossing wires, the said machine comprising two disks adapted to rotate at the same speed in opposite directions, wire spools carried by one of said disks, grippers on the other disk which seize the wire and unwind it from the spools, and a guide into which the projecting end of the wire enters, the said guide directing the end of the wire between the jaws of the grippers.

10. A machine for the production of a fabric having an inclosure of crossing wires, the said machine comprising two disks adapted to rotate at the same speed in opposite directions, wire spools carried by one of said disks, grippers on the other disk which seize the wires and unwind them from said spools, two rolls between which the wires drawn off are introduced parallel to each other, and a cutting device for cutting off the free ends of the wires.

11. A machine for the production of a fabric having an inclosure of crossing wires between the covering webs, the said machine comprising spools carrying the transverse wires, means for unwinding the wires from said spools, rotating rolls between which the said wires are introduced, and a cutting device at the side of the rotating rolls which cuts off the wires introduced between said rolls.

12. A machine for the production of a fabric having an inclosure of crossing wires between the covering webs, the said machine comprising spools carrying the transverse wires, rotating rolls, means for unwinding

the wires from said spools and introducing them between the rotating rolls, a cutting device at the side of the rotating rolls which cuts off the wire between the rolls, and a clamping device for holding said wires until they are fastened in position by the covering webs being stuck together.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

HERMANN GUEFFROY.

Witnesses:

ALFRED DROTE,

HENRY HASPER.