C. THIEBAUT.

MACHINE FOR THE MANUFACTURE OF CORRUGATED CARDBOARD.

APPLICATION FILED JAN. 10, 1913.

1,197,078.

Patented Sept. 5, 1916.

2 SHEETS—SHEET 1.

Fig. 1.

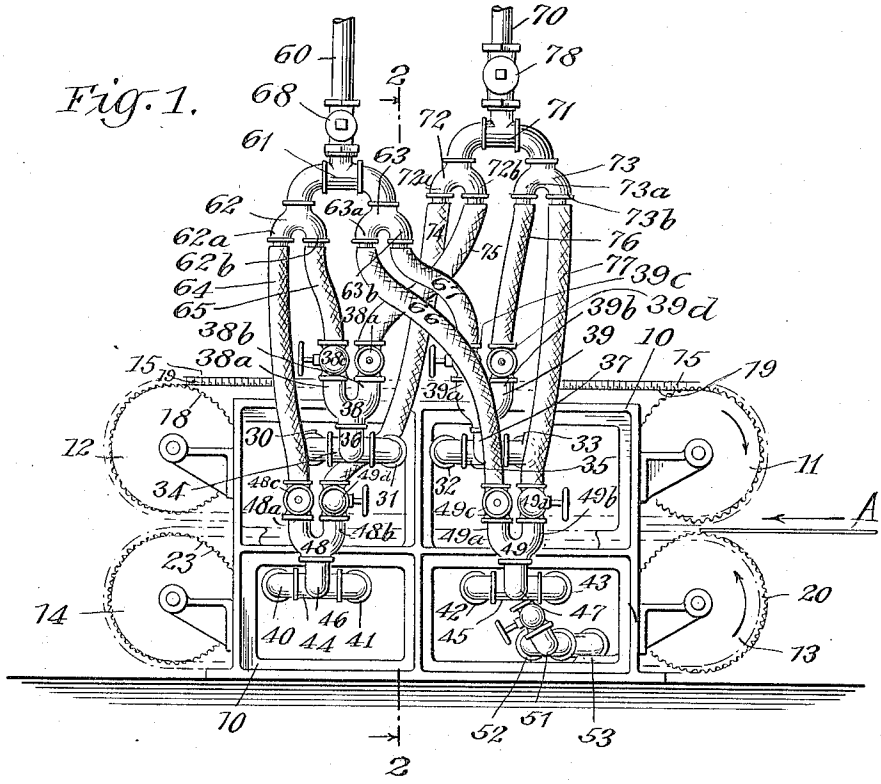


Fig. 2.

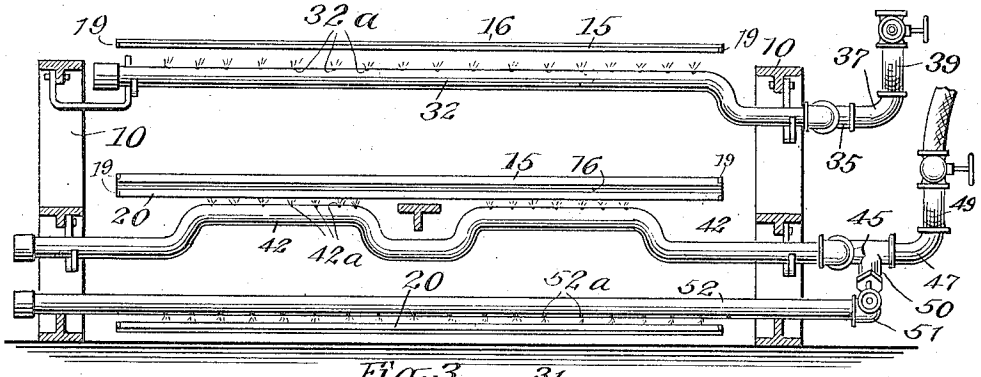
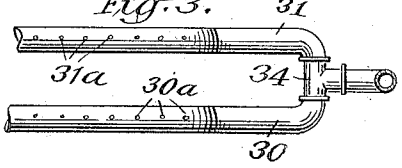


Fig. 3.



WITNESSES

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2 SHEETS—SHEET 2.

Fig. 4.

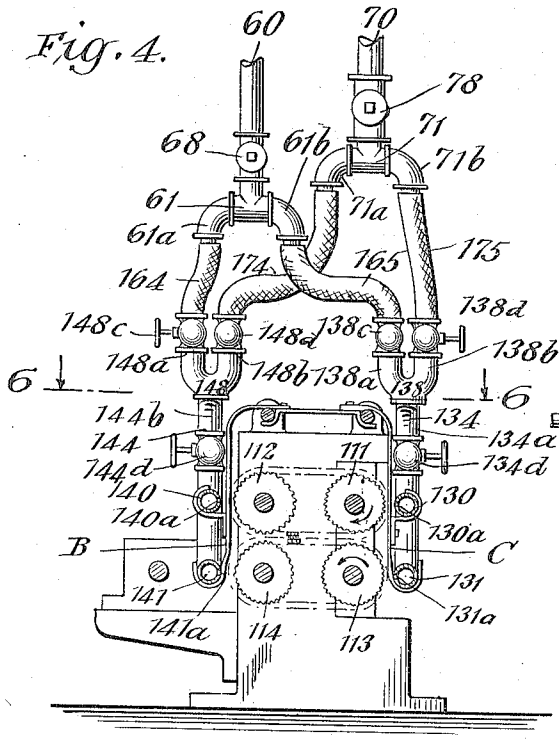


Fig. 5.

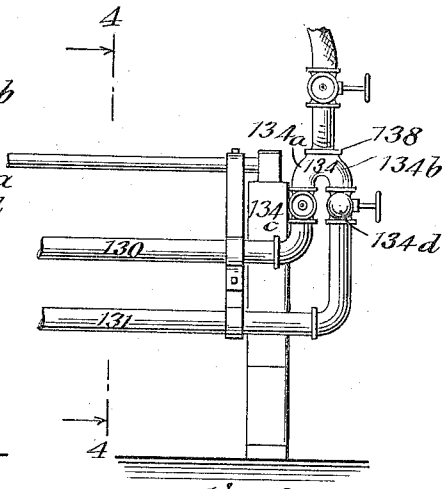


Fig. 6.

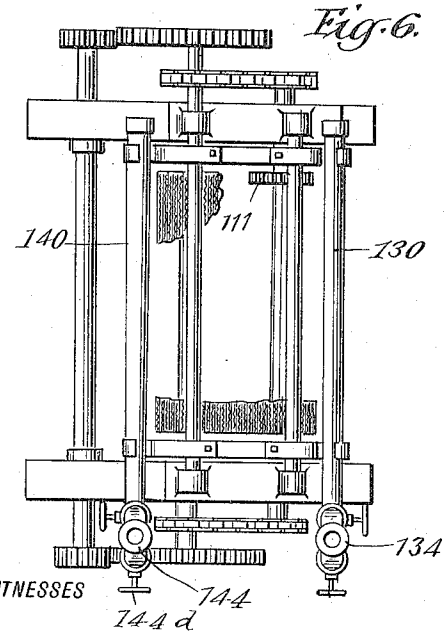


Fig. 7.

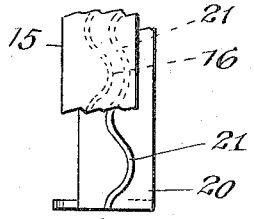
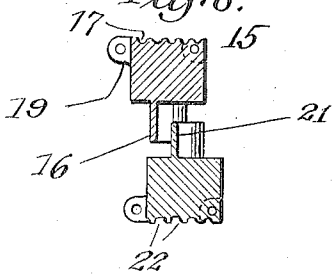


Fig. 8.



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UNITED STATES PATENT OFFICE.

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MACHINE FOR THE MANUFACTURE OF CORRUGATED CARDBOARD.

1,197,078. Specification of Letters Patent. Patented Sept. 5, 1916.

Application filed January 10, 1913. Serial No. 741,187.

To all whom it may concern:

Be it known that I, CAMILLE THIEBAUT, a citizen of the French Republic, residing at Vitry-sur-Seine, France, have invented certain new and useful Improvements in Machines for the Manufacture of Corrugated Cardboard, of which the following is a specification.

This invention relates to improvements in machines for the purpose of fabricating a novel corrugated cardboard and especially to the means for heating and drying the cardboard as it is made in the machine. Heretofore several hours have been required to dry the cardboard after it is made, but by my improvement the drying is done directly in the machine and the cardboard is dry and ready for use when it leaves the machine.

The objects of the invention will appear from the hereinafter description.

I have illustrated certain embodiments of the invention in the accompanying drawings, in which the same reference character refers to the same part in the several views.

Referring to the drawings: Figure 1 is a side elevation of the machine. Fig. 2 is a vertical section on line 2 of Fig. 1. Fig. 3 is a detail plan view of certain details. Fig. 4 is a cross section on line 4 of Fig. 5. Fig. 5 is a side elevation showing certain details of construction. Fig. 6 is a sectional view on line 6 of Fig. 4. Fig. 7 is a detail of the chains forming the corrugation in the cardboard. Fig. 8 is a cross sectional detail of the same.

Referring especially to Figs. 1, 2, 3, 7 and 8, the part marked 10 represents the frame of the machine. On the upper part and at the entrance of the machine is journaled a drive roller 11, and on the opposite end of the machine is journaled a corresponding roller 12. Immediately below the roller 11 and adjacent thereto is a roller 13, and at the opposite end of the machine below the roller is another roller 14. 15 is a corrugated belt or chain which passes over the rollers 11 and 12. The outer surface of this belt is provided with transverse corrugating blades 16, and the inner surface is provided with the transverse grooves 17, into which mesh the transverse teeth 18, on the rollers 11 and 12.

20 is another belt which passes over the rollers 13 and 14, and it is provided with the corrugating blades 21, which mesh with the corresponding blades 16 on the upper belt. The lower belt is also provided on its inner surface with grooves 22, into which mesh the transverse teeth 23, on the rollers 13 and 14. These rollers are driven by suitable means, not shown. The details of the elements forming said belts or chains 15 and 20, are shown in Figs. 7 and 8, the different elements of the blades being hingedly connected by the lugs and recesses 19.

A shows the paper as it passes through the machine in the direction indicated by the arrows. Mounted in the frame of the machine and extending transversely of the belts or chains and directly under and adjacent to the upper run of the belt 15, are the pipes 30, 31, 32 and 33, said pipes being in pairs and the pipes 30, 31, meeting in the branch 34, and the pipes 32 and 33 meeting in the branch 35. The inner surface of each of these pipes is provided with a series of perforations 30^a, 31^a, 32^a and 33^a. The branches 34 and 35 are provided with the inlets 36 and 37, respectively, to each of which is connected other branches 38 and 39. Also mounted in the frame of the machine and extending transversely of the same and directly under the upper run of the belt or chain 21, are two pair of pipes, the legs of the first pair being marked 40 and 41, and the legs of the second pair marked 42 and 43, respectively. Each of these legs is connected to the common branches 44 and 45, having an inlet 46 and 47, to each of which is connected the branches 48 and 49. Extending from the branch 45 is a pipe 50, which is connected to the branch 51. To each leg of this branch is connected a pipe 52 and 53, extending transversely of the machine and adjacent to the lower run of the belt 20. The upper surfaces of the pipes 40, 41, 42 and 43, are provided with perforations 40^a, 41^a, 42^a and 43^a, and the lower surface of the pipes 52 and 53 is provided with the perforations 52^a and 53^a, respectively.

60 is an air inlet pipe, to the outlet end of which is connected the branch pipe 61, and to each end of this branch pipe is connected another branch 62 and 63.

70 is a gas supply pipe, to the outlet end of which is connected the branch pipe 71, and to each end of said branch pipe is con-

nected the branches 72 and 73. To the end 62^a of the branch 60, is connected a pipe 64 which leads to and connects to the end 48^a of the branch 48, heretofore referred to. Connected to the end 62^b of the branch 62 is another pipe 65, the other end of which is connected to the end 38^a of the branch 38. Connected to the end 63^a of the branch 63 is a pipe 66, which extends to and connects with the end 49^a of the branch 49. To the other end 63^b of the branch 63, is connected a pipe 67, which extends to and connects with the end 39^a of the branch 39.

To the end 72^a of the branch 72 is connected the pipe 74, the other end of which is connected to the end 48^b of the branch 48. To the other end, 72^b, of the branch 72, is connected the pipe 75, which extends to and connects with the end 38^b of the branch 38. Connected to the end 73^a of the branch 73 is the pipe 76, which extends to and connects with the end 39^b of the branch 39. To the other end 73^b of the branch 73, is connected the pipe 77, which extends to and connects with the end 49^b of the branch 49.

The air supply pipe 60 where it connects with the branch 61, is provided with the valve 68, and the gas supply pipe 70 where it connects with the branch 71 is provided with a valve 78. Each end of the branch 38 is provided with the valves 38^c and 38^b, and each end of the branch 48 is provided with the valves 48^c and 48^d. Each end of the branch 39 is provided with the valves 39^c and 39^d and each end of the branch 49 is provided with the valves 49^c and 49^d.

The machine is operated as follows: The belts are driven in the direction indicated by the arrows and the paper A, the different layers of which are glued together and wet or moist, is passed between the moving belts or chains, and the blades 16 and 21 corrugate the paper as it passes through the machine, and as the paper leaves the machine it is thoroughly dried by the apparatus described.

The drying apparatus operates as follows: Air is supplied through the pipe 60, and gas through the pipe 70, the valves 68 and 78 respectively being open to regulate the amount of air and gas supplied to the respective branches 61 and 71. The air passes out through the ends of the branches 61 and to the branches 62 and 63. Some of the air passes from the branch 62 through the pipe 64 and into the branch 48. Some of the gas which is supplied to the branch 71 passes into the branch 72 and through the pipe 74 to the branch 48, where it mixes with the air and forms a suitable combustion mixture, and passes into the branch 44 and into the pipes 40 and 41, where it passes through the openings 40^a and 41^a and is ignited and impinges upon the upper run of the blade 21. Some of the air supplied to the branch 62 passes out through the pipe 65 and into the branch 38. Some of the gas also passes out of the branch 72, through the pipe 75 to the branch 38, where it is mixed with the air to form a proper combustible material, and then it passes into the branch 34 and into the pipes 30 and 31, and escapes through the openings 30^a and 31^a, in the upper side of said two pipes where it is ignited and the burning gas impinges upon the inner surface of the upper run of the chain 15. Some of the air which is supplied to the branch 63, passes through the pipe 66 to the branch 49, and some of the gas in the branch 73 passes through the pipe 77, into the branch 49 and mixes with the air, the mixture passing out through the branch 45 and into the pipes 42 and 43, out through the perforations 42^a and 43^a, in the upper surface of each of said pipes, where it is ignited and the burning gas impinges upon the upper run of the belt 21. Some of the air also passes out of the branch 63, into the pipe 67 and into the branch 39. Gas from the branch 73 passes through the pipe 76, into the branch 39, where it mixes with the air, forming a proper combustible mixture which passes into the branch 35, in the two pipes 32 and 33, through the openings 32^a and 33^a in the upper surface of these pipes, where it is lighted and the flames impinge upon the upper run of the belt 15.

If desired, and as shown, some of the mixture of air and gas in the branch 49 is permitted to pass through the pipe 50, into the branch 51, and through the pipes 52 and 53, out through the perforations 52^a and 53^a in the under side of said pipes, where it is lighted and the flame is caused to impinge upon the lower run of the belt or chain 21. The branch pipes are provided with valves 38^c, 38^d, 48^c, 48^d, 39^c, 39^d, 49^c, 49^d, as hereinabove described for the purpose of regulating the amount of air and gas supplied to the respective branches 38, 48, 39, 49, to form the proper mixture of air and gas, and the pipe 50 is provided with a valve 50^a, so that the mixture of air and gas may be supplied to the pipes 52 and 53, as desired or required.

By the construction shown the amount of air and gas supplied to the branches and the amount of mixed air and gas supplied to the burners can be accurately and easily adjusted and governed so that the proper temperature can be given to the chains and to the paper to properly and satisfactorily dry the paper as it passes through the machine.

In Figs. 4, 5 and 6, I have shown a modified construction in which the pairs of rollers 111, 112 and 113, 114, are arranged closer together and the heating pipes are arranged on the outside of the frame so that the flame from the heating pipe will impinge upon the outside of the rollers. The heating pipes 130 and 131 are fastened in suitable hangers

C, connected to the frame of the machine and these pipes are provided with perforations 130[a] and 131[a] respectively, on the inside of the pipes. The pipes 140 and 141 are supported in suitable hangers B, on the opposite side of the machine and outside of the chains, the inner surface of these pipes being provided with perforations 140[a] and 141[a], respectively, so that the flame will impinge upon the outer surface of the chain adjacent thereto. The pipes 130 and 131 are connected to the respective ends 134[a] and 134[b] of the branch 134, and each of these ends or branches is provided with the valves 134[c] and 134[d] and the branch 134 is connected to the branch 138. To each end of 138[a] and 138[b] of the branch 138, is connected the pipes 165 and 175, respectively, each of said branches being provided with the valves 138[c] and 138[d]. The inlet end of the pipe 165 is connected to the end 61[b] of the branch 61, and the inlet end of the pipe 175 is connected to the end 71[b] of the branch 71. The pipes 140 and 141 are connected to the respective ends 144[a] and 144[b] of the branch 144, the said branches or ends thereof being provided with suitable valves 144[c] and 144[d], respectively. This branch 144 is connected to the branch 148 and to one end 148[a] of the latter branch is connected the pipe 164, which is connected to the end 61[a] of the branch 61. To the other end 148[b] of the branch 148 is connected the pipe 174, the other end of said pipe 174 being connected to the end 71[a] of the branch 71. The ends of the branch 148 are provided respectively, with the valves 148[c] and 148[d]. By this construction, as in the other construction hereinabove described, the amount of air and gas and the proportion of the mixture can be accurately governed and controlled and the flame at the proper temperature can be caused to impinge upon the corrugating belts or chains, and the paper passing through the machine is properly dried and when it leaves the machine is in proper condition for immediate use.

Certain changes can be made without departing from the scope of the invention as expressed in the subjoined claims.

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

1. In a machine for corrugating cardboard or paper, a frame, a pair of belts or chains each having corrugated blades transverse of the direction of travel of said chains, a burner for each chain impinging a flame directly on said blades, and means for supplying a mixture of air and gas to the burners.

2. In a machine for corrugating paper or cardboard, a frame, a pair of chains each having corrugating blades transverse thereof, said transverse blades adapted to intermesh during a part of the travel of the belt, a burner inside of each belt having perforations adjacent to the belt whereby the heating flame is impinged upon the underside of each blade, and means for supplying a mixture of air and gas to the burner.

3. In a machine for corrugating cardboard or paper, a frame, a pair of rollers carried by the frame, an endless chain carried by the rollers, said chain having corrugating blades transverse of the same, another pair of rollers carried by the frame, a second endless chain carried by said rollers having corrugating blades transverse of the same, the blades on the two belts intermeshing during a part of the travel of the belts, a pipe inside of each chain having perforations therein to impart a heating flame directly to the underside of each of said blades on the upper run of each belt, and means for supplying a mixture of air and gas to said heating pipes.

4. In a machine for corrugating paper, a frame, a pair of rollers carried by the said frame, an endless belt or chain traveling over said rollers and having transverse corrugated blades, a second pair of rollers carried by the frame, an endless belt or chain traveling over said second pair of rollers having transverse corrugating blades the working faces of which intermesh with the working faces of the first mentioned blades during a part of the travel of the belt, a pair of perforated pipes inside of the first mentioned belt, another pair of pipes inside of the second mentioned belt, an air supply and a gas supply, connecting means leading from the said air supply and said gas supply to mixing chambers, and connections between said mixing chambers and said pipes.

5. In a machine for corrugating paper or cardboard, a frame, a pair of rollers carried by said frame, an endless belt or chain traveling over said rollers having on the surface thereof transverse corrugating blades, a second pair of rollers below the first mentioned pair, an endless chain or belt traveling over said second mentioned rollers having transverse corrugating blades the working faces of which intermesh with the working faces of the first mentioned corrugating blades, a series of pipes inside of the first mentioned belt or chain having perforations therein adapted to throw heating flame against the corrugating blades in the upper run of said belt, a series of heating pipes between the runs of the second mentioned belt having perforations therein adapted to impart heating flame to the corrugating blades in the upper run of said belt, mixing chambers connected to each series of heating pipes, and an air supply and a gas supply having branches and connections leading to each of said mixing chambers.

6. In a machine for corrugating paper or

cardboard, a frame, a pair of rollers carried by said frame, an endless belt or chain traveling over said rollers having on the surface thereof transverse corrugating blades, a second pair of rollers below the first mentioned pair, an endless chain or belt traveling over said second mentioned rollers having transverse corrugating blades intermeshing with the first mentioned corrugating blades, a series of pipes inside of the first mentioned belt or chain having perforations therein adapted to throw heating flame against the corrugating blades in the upper run of said belt, a series of heating pipes between the runs of the second mentioned belt having perforations therein adapted to impart heating flame to the corrugating blades in the upper run of said belt, mixing chambers connected to each series of heating pipes, an air supply and a gas supply having branches and connections leading to each of said mixing chambers, a pipe having perforations adapted to throw a heating flame against the corrugating blades in the lower run of the second mentioned belt, and connections between said pipe and one of the said mixing chambers.

In witness whereof I have hereunto set my hand at Paris, France, this second day of December, 1912.

CAMILLE THIEBAUT.

In presence of—

ANTON SABTATIER,

LUCIEN MENMENGER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."