A. STADERINI.

BOX MAKING MACHINE.

APPLICATION FILED MAR. 7, 1910.

1,001,319.

Patented Aug. 22, 1911.

2 SHEETS—SHEET 1.

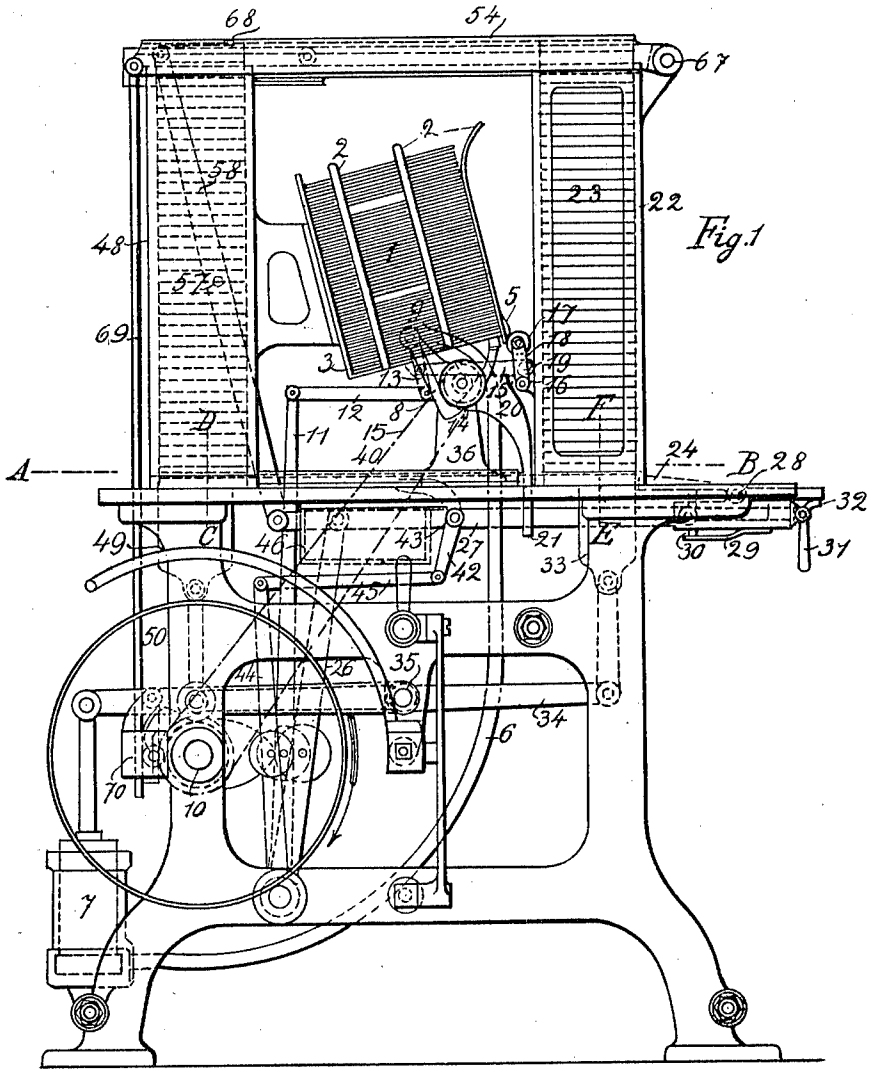

Fig. 1

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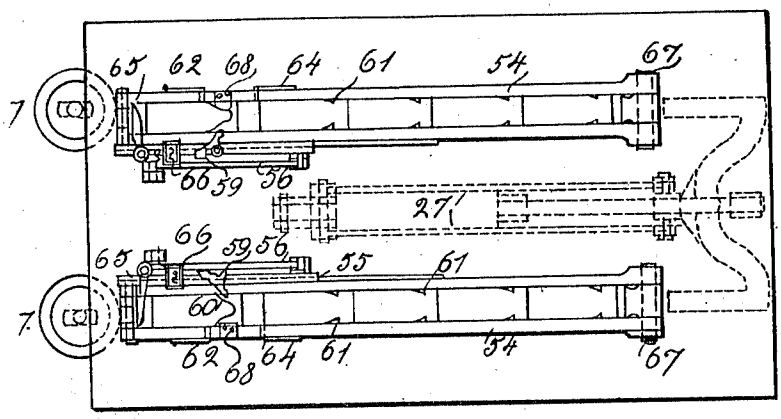


Fig. 2.

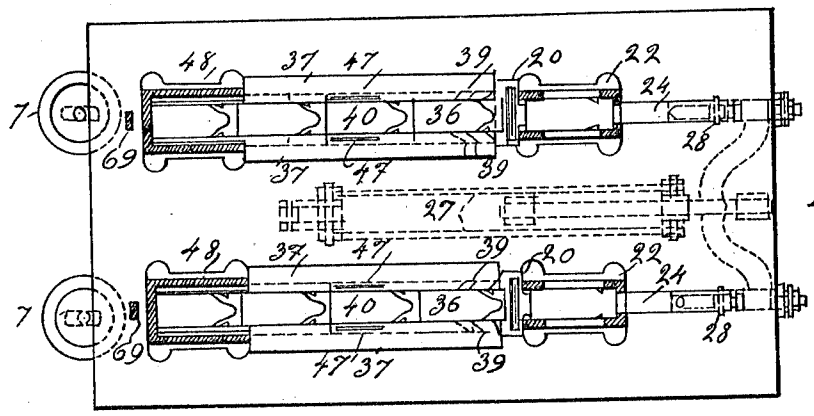


Fig. 3.

Fig. 4.

Fig. 5.

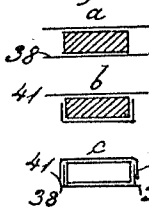


Fig. 6.

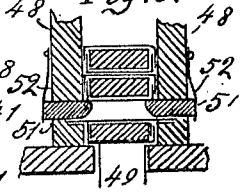


Fig. 7.

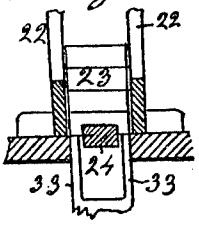
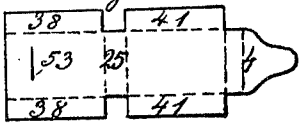


Fig. 8.



Witnesses:
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UNITED STATES PATENT OFFICE.

ALESSANDRO STADERINI, OF ROME, ITALY.

BOX-MAKING MACHINE.

1,001,319. Specification of Letters Patent. **Patented Aug. 22, 1911.**

Application filed March 7, 1910. Serial No. 547,927.

To all whom it may concern:

Be it known that I, ALESSANDRO STADERINI, manufacturer, a subject of the King of Italy, and residing at Rome, in the Kingdom of Italy, have invented a new and useful Box-Making Machine, of which the following is a specification.

The present invention relates to a box making machine and in the annexed drawings is shown a practical form of same.

Figure 1 is a side view of the machine. Fig. 2 is a plane view of the same. Fig. 3 is a section on line A—B of Fig. 1, and Fig. 4 shows a box made by the machine. Fig. 5 is a cross section through a box containing a core and shown in three different stages of the process. Fig. 6 is a section on line C—D of Fig. 1. Fig. 7 a section on line E—F of Fig. 1, and Fig. 8 shows the shape of the paper blanks from which the boxes are made.

In the drawing —1— is a pile of paper blanks of the shape shown on enlarged scale in Fig. 8. The pile of paper is kept laterally by rods —2— and rests upon a lath —3— which, however, supports only a portion of the sheet pile, viz. that which is near the folding flap —4— (Fig. 8) of the blanks. In order to prevent the falling down of the portion of the paper blanks in front of the folding flap —4—, on the front rod —2— is provided a spring —5—, on which rest the paper blanks. Under the frame supporting the sheet pile there is a suction pipe —8— connected with an air pump —7— by means of a rubber hose —6—. This aspirator is rotatably mounted on a support —9— and can be swung by means of a cam mounted on the main driving shaft —10—, controlling the movement of a lever —11— provided with a roller which runs on the said cam, and by means of the connecting rod —12— and of the lever —13— connected to the aspirator. The front portion of the aspirator —8— is placed between two pulleys —14— mounted on a shaft to which pulleys is imparted a rotary motion through a chain wheel drive —15— from the main shaft —10—. The lever —13— by means of a connecting rod —15′— is connected with a lever —18— pivoted at —16— and carrying a cylindrical roller —17—, and namely in such a manner that on account of an opening —19— provided in said connecting rod —15′—, in which slot plays a pin fitted on lever —18—, the lever —18— only starts swinging when the lever —13— has already performed a part of its oscillation and when therefore also the suction pipe —8— of the aspirator has already performed a part of its oscillation.

Now when the machine is running, the lowest sheet of the pile —1— is sucked up by the aspirator —8— which, as already stated, is in communication with the air pump —7—, whereafter the suction pipe —8— is withdrawn and places the sheet adhering to it on the pulleys —14—. In the meantime also the lever —18— with the cylindrical roller —17— has been swung, so that said roller rests now on the sheet which the suction pipe —8— had placed on the cylindrical pulleys —14—. Therefore, the sheet is lying between the roller —17— and the rotating pulleys —14—, and as it is pressed against the pulleys —14— by the roller —17—, so it is carried forward by the said pulleys. Now the sheet picked up from the pile is dropped into a funnel-shaped chute —20— and falls upright on the bottom —21— of same. The suction pipe —8— swings then back to the initial position shown to pick up a second sheet which, as the former sheet in the meantime has already been carried farther, is also dropped into the funnel-shaped chute and so on. Now the blank which is in the chute —20— is folded around a core corresponding to the shape of the box to be made. A large number of these cores is placed in a vertical rectangular pit —22—. Now the lowest of the cores —23— located in the pit —22— by means of a nose —24— can be caused to advance underneath the pile of cores passing through rectangular slots in the walls of the funnel-shaped chute —20—. Now when there is a sheet in the funnel-shaped chute —20—, the core —23— which has been caused to advance by the nose —24— comes into contact with the central portion —25— (Fig. 8) of this blank, and, when the core is caused to advance farther and to pass through a rectangular slot in the second wall of the funnel-shaped chute —20—, said blank is doubled around the core —23—, as shown at *a* in Fig. 5. Also the movement of the nose —24—, which produces the forward motion of the lowest core, is controlled by a cam mounted on the main shaft —10— and acting on the lever —26— and the connecting rod —27—. The nose is formed by a double-armed lever pivoted at

—28— which by means of a flat spring —29—, which presses a pin against the arm —24—, is kept in the position shown in the drawings. The action of this spring —29— is that the nose, after having carried away the lowest core of the pile, when moving backward can be lowered through the pressure of the cores which are sunk down so that the nose slides in this movement under the pile of the cores and only at the end of the backward stroke, pressed upward by the spring —29—, it will again be ready to push away another core, which latter carries then away in its turn the successive sheet which in the meantime has been dropped in the funnel-shaped chute. In order to be able to stop the working of the machine, on the slide block carrying the double-armed lever —24— is provided a stop lever —31—. When this lever is turned upward, its nose —32— raises the end of the double-armed lever —24—, which end rests above the said nose, so that the arm of the lever carrying the thrust nose is depressed and during its reciprocating motion it slides underneath the cores without pushing forward any of them.

To avoid a sudden sinking of the pile of the cores —23— after having removed the lowest core from below, which would produce a great noise, at the sides of the gangway for the nose —24—, are provided sliding blocks —33—. These sliding blocks, the construction of which is more fully illustrated in Fig. 7, through a cam mounted on the main shaft are moved upward by means of the double-armed lever —34— pivoted at —35— as soon as the lowest core has been carried away by the nose —24— so far that it is no more in the way of the sliding block —33—. The sliding blocks take them up the successive core and move downward, when the lowest core has been completely carried away from below the pile of the cores causing thus said pile to lower little by little. The core which, when passing through the funnel-shaped chute —20—, has carried away the sheet of paper contained in said chute and has now its upper and lower face covered by said sheet, is caused to advance by the nose —24— so far as to completely abandon the funnel-shaped chute —20—, as shown at —36— in Fig. 3. By means of rods —37—, which laterally pass across the way of the cores, the paper is kept in its position adherent to the core. Now during the forward motion the lower edges —38— (Figs. 5 and 8) meet beveled surfaces which in Fig. 3 are shown by dotted lines —39— and which fold upward these edges —38— in the way shown in Fig. 5b. At this stage the core is pushed into the position shown at —40— in Fig. 3 by another advancing core. Now in this position takes place the gumming of the edges —41— (Figs. 5 and 8). The gumming devices consist of double-armed levers —42— which are pivoted at —43— and controlled by a cam mounted on the main shaft —10— which acts on a lever —44— provided with a roller running on said cam, and linked to a connecting rod —45— —46— is a vessel filled with gum, into which dips the free end of the double-armed lever —42—, when the lever is moving toward the right hand side. If a core is in the position —40—, the lever —44— swings toward the left hand side, whereby the free end of the lever —42—, which having been dipped into the vessel —46— and provided with gum, rises upward and strikes against the edges —41— of the paper blank. Of course for each gangway of the cores two levers —42— are to be provided which can be moved together by a single driving device.

In order to avoid that in case of a sheet having been missed viz. a core bearing no blank having been pushed forward, the gumming ends of the levers —42— touch the guide plates —37— dirtying them with gum, these plates at the points, which would be touched by the free ends of the levers —42—, are provided with slots —47—, through which the levers can swing upward without touching the guide plates —37—. The core situated in the position —40— and covered by the blank with gummed edges, after having received two further pushes, reaches a rectangular pit —48—, the bottom of which is formed by a rectangular piston —49— (see also Fig. 6). The piston —49—, when a core has been pushed upon it, is raised upward by means of a cam mounted upon the main shaft —10— on the edge of which runs a roller carried at the lower end of a connecting rod —50— linked to the piston. During this operation the gummed edges —41— of the blank, which project laterally, strike against plates —51— which when receiving a strong thrust, can be shifted laterally overcoming the resistance of the springs —52—. The edges —41—, when sliding over these plates during the ascent of the core are bent downward and by said plates —51— pressed against the edges —38—, whereby the edges forming the side walls of the box are made to adhere and the box takes up the shape shown in Fig. 4. The superposition of the edges —38— and —41— is illustrated at —c— in Fig. 5.

In order to facilitate the introduction of the folding lap —4— of the box in the slit —53—, on the piston —49— can be provided a small protuberant boss which during the ascent of the core abuts against the upper edge of said slit and bends the same slightly inward, to which end the cores, of course, must have a corresponding recess. When the core has been raised above the plates

—51—, these, under the action of the springs —52—, move again inward until they abut against the piston —49—, which is somewhat smaller than the cores, so that at the successive downward stroke of the piston, the cores remain supported by the said plates —51—. Now the cores enveloped in the finished box during the further working of the machine move upward in the pit —48—, and the side walls of this pit can be made resilient or at several points can be provided with elastic plates, so that the overlapping edges are pressed together repeatedly or continuously during the ascent in order to secure their perfect adhesion. During the ascent takes place the drying of the boxes so that they reach completely stuck and dried the upper opening of the pit —48—. Now when a core wrapped in a box leaves at the upper end the pit —48—, the lower face of the box is level with the bottom of a guide channel —54—, the construction of which is shown in Figs. 1 and 2. At the side of this guide channel, which from the pit —48— leads to the pit —22—, is provided a slide —55—. This slide by means of a connecting rod —56— is linked to a double-armed lever —58— pivoted at —57—, the lower end of which is linked to the connecting rod —27—. This connecting rod —27— which, as it has been already mentioned serves to move the thrust nose —24—, causes also the slide —55— to move in such a way that the movement of this slide always takes place in the opposite direction to the movement of the nose —24—. The slide —55— is provided with a catch —59—, the tooth —60— of which in the moment, in which the slide —55— has reached its extreme position on the left hand side engages with a notch —61— of the uppermost core. Now when the slide —55— moves toward the right hand side, the core is thereby drawn out from the box. By means of a nose —62—, which under the action of a spring rests against the core, the box is kept in its position, the said nose rests against the upper edge —63— (Fig. 4) of the box, thus preventing the box following the movement of the core.

When the slide —55— has reached its extreme position on the right hand side, nose —64— engages behind the core moved toward the right hand side by the said slide with its catch, so that, when the slide —55— moves again toward the left, the core can not be brought back, but the nose of the catch —59— leaves the recess —61—. Moreover to the slide —55— is applied a lever —65— which during its movement toward the left causes the empty box already finished to move with it and then throws same into a collecting basket beneath or in a chute. When the slide has reached its position on the extreme left and the empty box has thus been expelled the piston —49— rises and the following box still provided with a core comes out from the mouth of the pit —48—, whereby the catch —59— engages again with the recess —61— and the same operation is repeated. When the slide —55— moves toward the right, the lever —65—, of course, strikes against the box, from which the core is to be drawn out, and for this reason the said lever is rotatably mounted and kept in position by a spring so that, when it strikes against the box, it swings backward and slides along the sides of the box, whereafter under the action of the spring it resumes its position.

In order to ascertain the number of boxes manufactured the lever —65— has two arms and the machine is provided with a counter —66— which, when the lever —65— oscillates, is caused to move forward by the second arm of this lever. If a bare core arrives, then the lever —65— does not swing, because in this case it does not strike against any box and therefore the counter —60— is not caused to move forward. On account of this disposition the said counter always indicates the exact number of the finished boxes. The bare cores on the guide channel —54— move successively toward the right hand side until they reach the top of the pile —23— so that, when the lowest core of the said piles has been carried away by the thrust nose and the pile sinks, the core which has reached its top is lowered into the pit —22—. In this way the cores perform a continuous cycle.

The two piles of cores consist of the same number of cores. Now when the machine starts working and both of the core piles are empty, viz. there are no boxes around the cores of the left pile, the height of both of the said core piles is the same. However, if cores wrapped in their boxes enter the left core pit, then at the entering of each of the cores enveloped in a box the height of the pile increases by the double of the thickness of the paper, so that the core pile would surpass the guide channel —54—. In order to avoid this, the guide channel is not rigidly fastened to the pits —22— and —48—, but at —67— it is hinged to the pit —22—. The guide channel above the pit —48— at a point, at which the rising cores are not covered with paper, is provided with a stop —68—, against which strikes the upper core when rising. Thereby it is obtained that the upper core lifts the guide channel —54—, and that, when the left core pile is growing in height, the said guide channel is swung upward around the pivot —67—, keeping thus always the same position with respect to the upper core of the left core pile. Now when the upper

core is drawn out, as soon as the stop —68— does not rest on the upper core, the guide channel —54— would sink down until the stop —68— comes into contact with the successive core. As this of course would cause a great inconvenience in the working of the machine, the guide channel is linked to a vertical rod —69— which by means of a brake—70— controlled by a cam mounted on the main shaft can be kept in position. Now as soon as the upper core is drawn out from the box, the rod —69— is fixed through the brake —70— so that, when the core has been drawn out, the guide channel —54— cannot fall down. On the contrary, as soon as the piston —49— raising the left core pile has reached about its highest position, the brake —70— releases the rod —69—, so that the stop —68— rests again on the upper core and the position of the guide channel is again regulated according to the height of the left core pile.

As shown in Figs. 2 and 3, the machine can conveniently be built in such a way that two separate working sections are placed one near the other, so that at each turn of the machine two boxes can be made. The principal driving gears can be placed in the center between the two working sections so that for both compartments a single driving gear may suffice.

Having now fully described this my invention and how the same is to be carried out, I declare that what I claim is:

1. In box making machines the combination of: a support for paper blanks; a supply of loose cores in a vertical pit, means for removing a core from the bottom of said pit and folding and gumming a paper blank thereon; a second vertical pit; means for bringing the core wrapped in the blank under the lower opening of the second pit; means for raising same to the upper opening of the second pit; and means for taking out of the box the core at the upper opening of the second pit and returning it back to the first pit.

2. In box making machines with a support for paper blanks and of loose cores whereon the blanks are folded and gummed the combination of: a vertical pit; means for carrying the cores taken out from the finished box to the upper opening of said pit; means for removing a core from the bottom of said pit and folding and gumming thereon a paper blank; and means for supporting the pile of cores in the pit and lowering same smoothly when the bottom core is removed.

3. In box making machines with a support for paper blanks and of loose cores whereon the blanks are folded and gummed, the combination of a vertical descent pit filled with bare cores; means for removing a core from the bottom of said pit and folding and gumming a paper blank thereon; a second vertical ascent pit, means for bringing the core wrapped in the blank under the lower opening of the ascent pit; means for raising same to the upper opening of said pit; a guide channel establishing a passage for the cores from the upper opening of the ascent pit to the upper opening of the descent pit; and means keeping constantly the bottom of said guide channel at the same height of the lower face of the upper core in the ascent pit.

4. In box making machines with a support for paper blanks and circulating loose cores whereon the blanks are folded and gummed, the combination of: a descent pit for the bare cores; an ascent pit for the cores wrapped in the folded and gummed blanks; a guide channel establishing a passage for the cores from the upper opening of the ascent pit to the upper opening of the descent pit; hinges at the end of said channel connected to the descent pit, and a stop at the other end resting on the upper core of the ascent pit.

5. In box making machines with a support for paper blanks and circulating loose cores whereon the blanks are folded and gummed, the combination of: a descent pit for the bare cores; an ascent pit for the cores wrapped in the folded and gummed blanks; a guide channel establishing a passage for the cores between the upper openings of both pits; a stop at the end of the guide channel adjoining the ascent pit, resting on the upper core; and a braking device which keeps in place the guide channel when the upper core is removed from underneath said stop, and releases same when the next following core is raised in the ascent pit until it comes in contact with the stop.

In testimony whereof I have hereunto signed my name in the presence of two subscribing witnesses.

ALESSANDRO STADERINI.

Witnesses:

LETTERIO LABSCCETTA,

ANTONIO LABSCCETTA.