

(No Model.)

6 Sheets—Sheet 1.

A. NEWELL.
PROCESS OF APPLYING CELLULOID TO KEY BOARDS.
No. 423,075.
Patented Mar. 11, 1890.

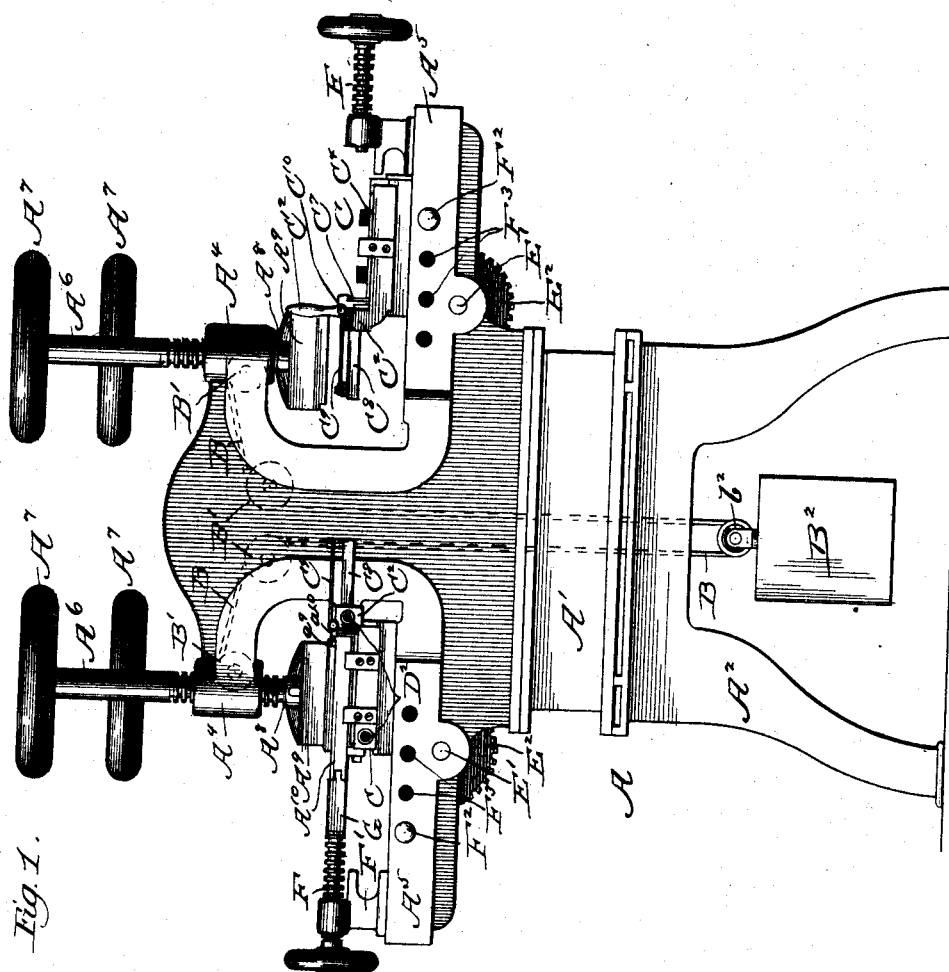


Fig. 1.

Witnesses:

Charles H. Roberts.
G. F. Bridgman

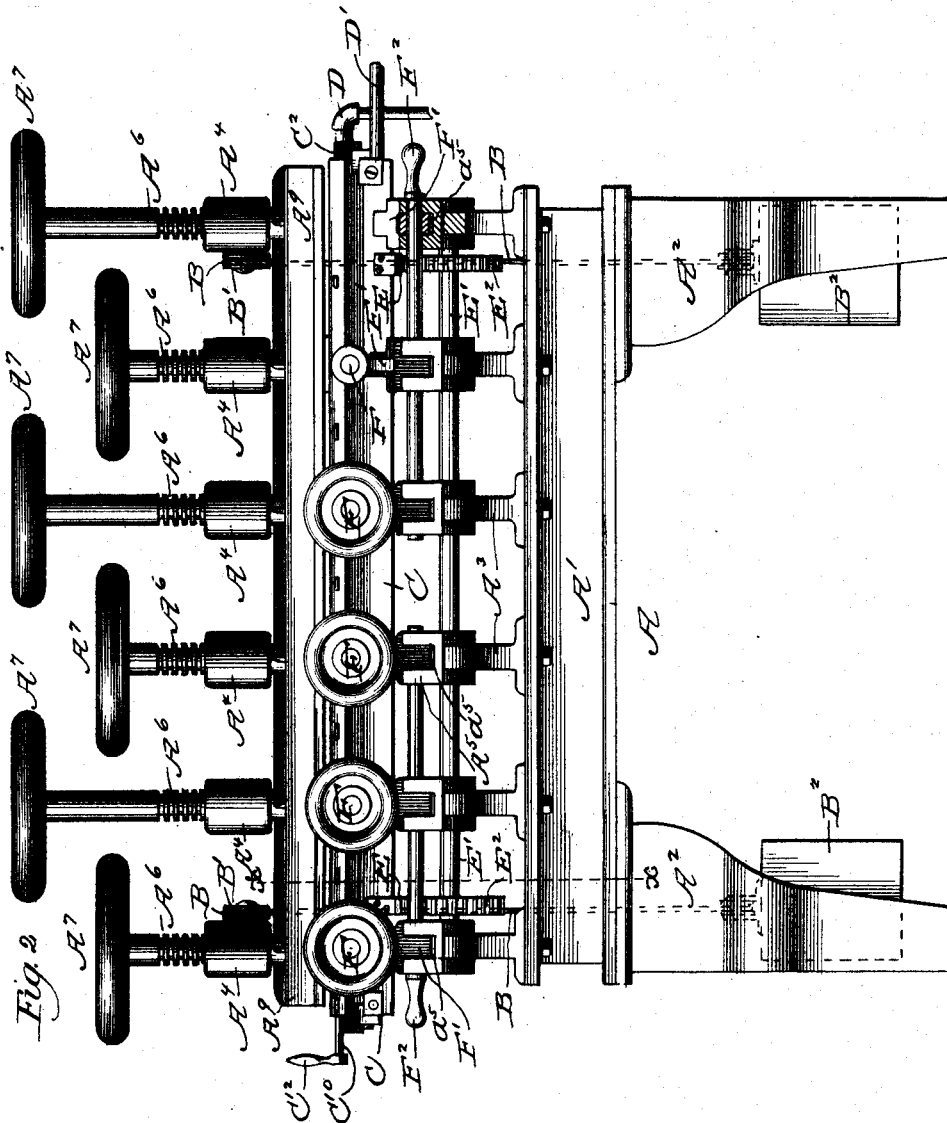
Inventor:
Augustus Newell
by Cyrus K. L. L.
Att'y.

A. NEWELL.

PROCESS OF APPLYING CELLULOID TO KEY BOARDS.

No. 423,075.

Patented Mar. 11, 1890.



Witnesses:

Charles H. Roberts
J. F. Bridgman

Inventor:

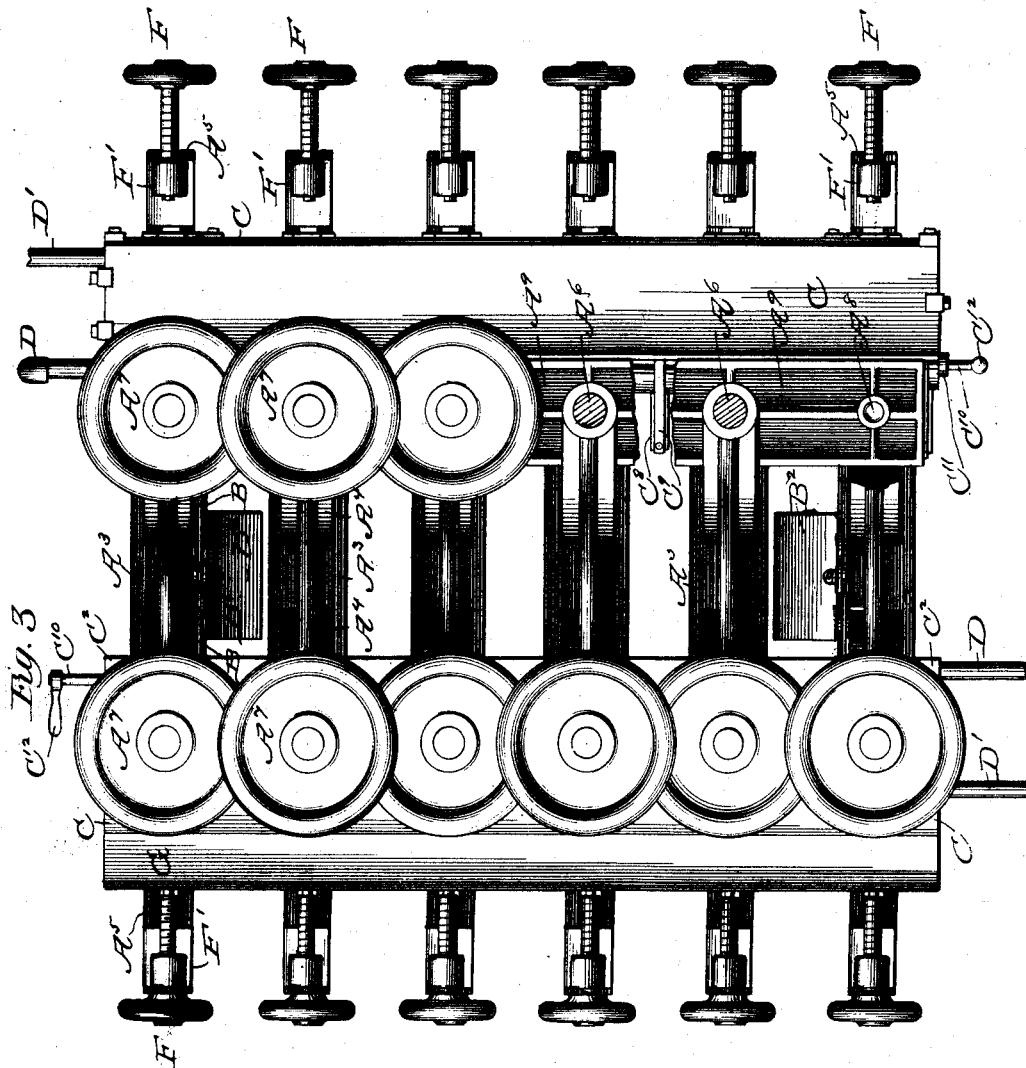
Augustus Newell
by Cyrus K. M.
Atty.

A. NEWELL.

PROCESS OF APPLYING CELLULOID TO KEY BOARDS.

No. 423,075

Patented Mar. 11, 1890.



Witnesses:

Charles H. Roberts.

G. F. Bridgman

Inventor:

Augustus Newell

by Cyrus K. K.

Atty.

(No Model.)

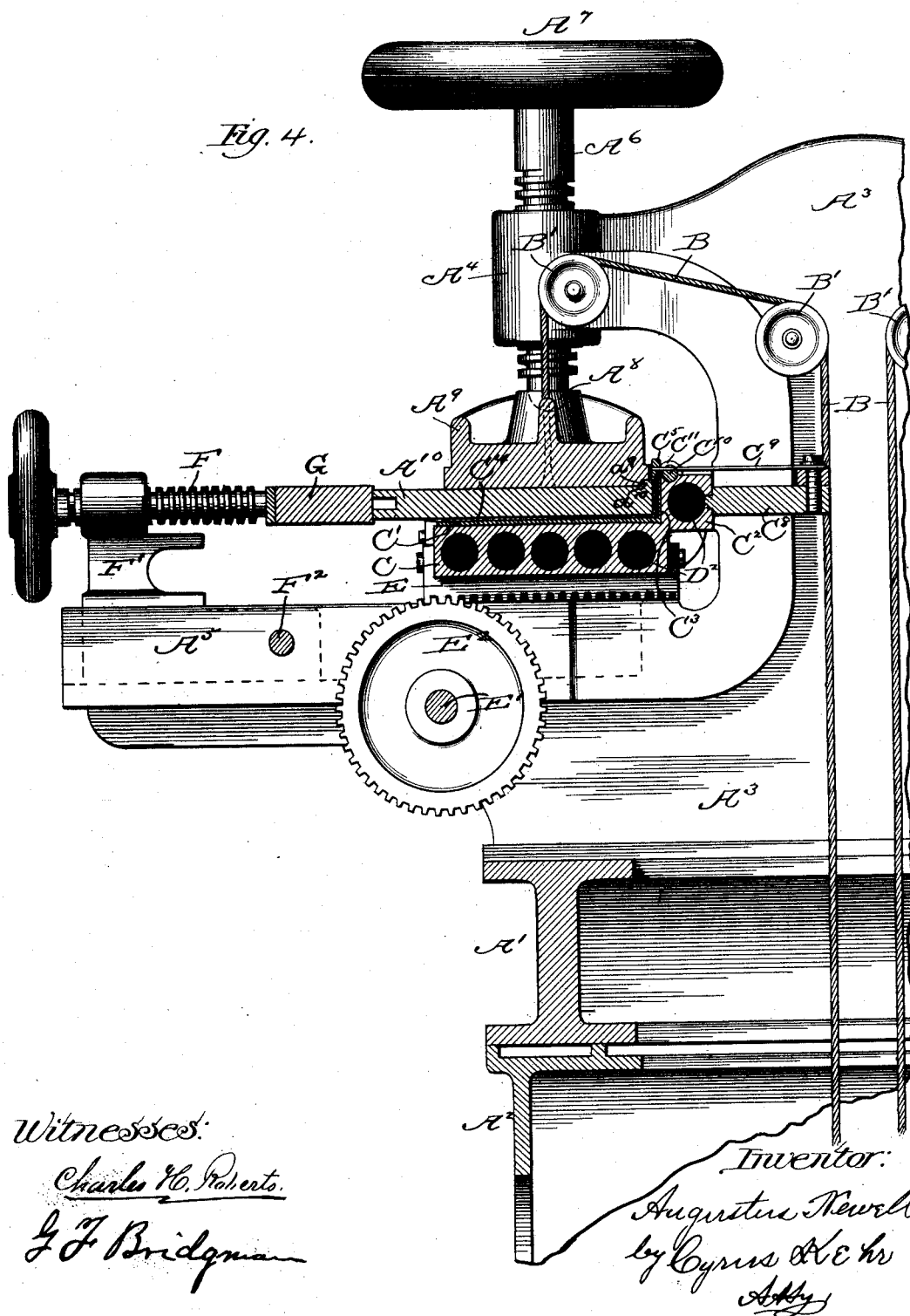
6 Sheets—Sheet 4.

A. NEWELL.

PROCESS OF APPLYING CELLULOID TO KEY BOARDS.

No. 423,075.

Patented Mar. 11, 1890.

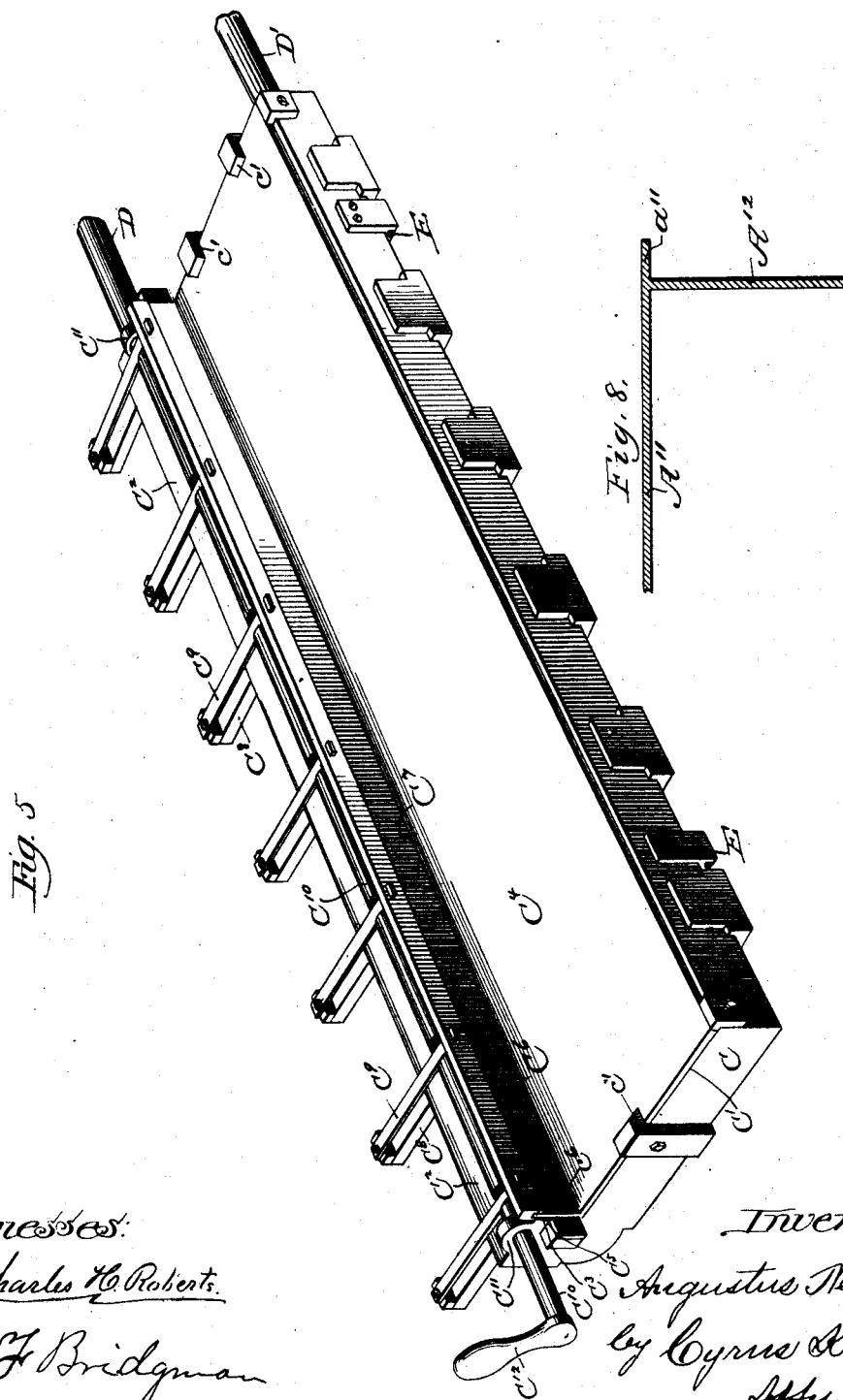


A. NEWELL.

PROCESS OF APPLYING CELLULOID TO KEY BOARDS.

No. 423,075.

Patented Mar. 11, 1890.



Witnesses:

Charles H. Roberts.

J. F. Bridgman

Inventor.

Augustus Newell
by Cyrus K. K.
Atty.

A. NEWELL.

PROCESS OF APPLYING CELLULOID TO KEY BOARDS.

No. 423,075.

Patented Mar. 11, 1890.

Fig. 6

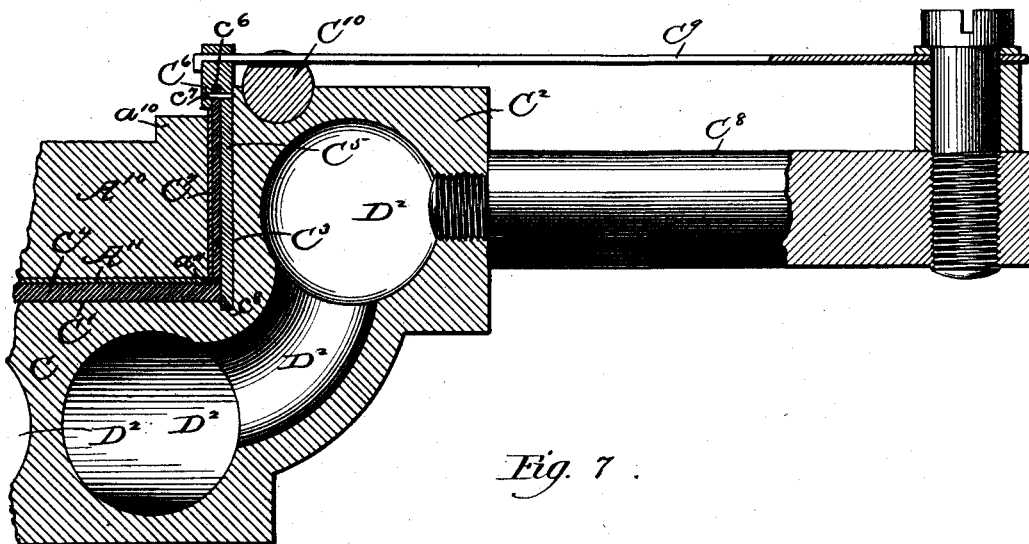
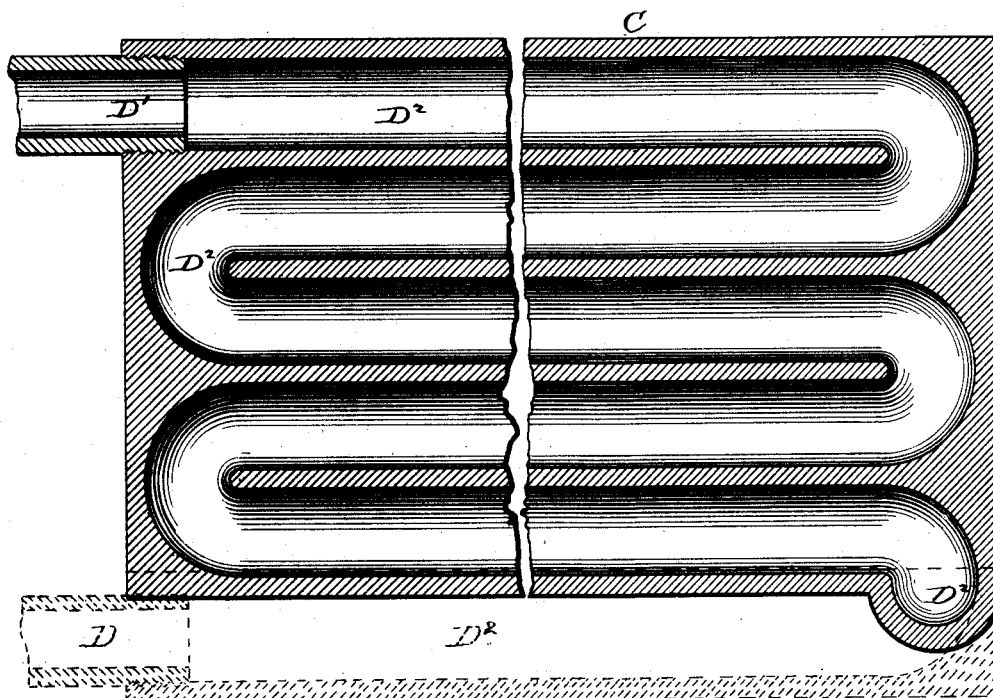


Fig. 7



Witnesses:

Charles C. Roberts
G. F. Bridgman

Inventor:

Augustus Newell
by Cyrus K. K. Jr
Atty.

UNITED STATES PATENT OFFICE.

AUGUSTUS NEWELL, OF CHICAGO, ILLINOIS.

PROCESS OF APPLYING CELLULOID TO KEY-BOARDS.

SPECIFICATION forming part of Letters Patent No. 423,075, dated March 11, 1890.

Application filed August 3, 1888. Serial No. 281,906. (No model.)

To all whom it may concern:

Be it known that I, AUGUSTUS NEWELL, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in the Process of Applying Celluloid to Key-Boards; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

My improved process relates to the simultaneous application to organ and piano key-boards and similar articles of the "top" and "front" strips of celluloid or similar material and the joining of said strips to each other.

In Letters Patent of the United States No. 373,001, granted to William Carl Zeidler, November 8, 1887, there is described a process for applying single sheets of celluloid or similar material to surfaces of wood. I have made improvements upon said process whereby the two strips are simultaneously applied, and said two strips are united to constitute a single piece, and a lip is formed of the projecting edge of the top strip of celluloid.

To make my process clear, I shall describe how it is practiced by the use of a veneering-press, which forms the subject-matter of another application for Letters Patent executed by me of even date herewith. Among the requirements for such work may be mentioned a uniform pressure over the portions of the key-board blank which are to be veneered, and highly-polished hard surfaces to lie in contact with the celluloid, which surfaces may be quickly heated uniformly throughout their area and quickly cooled. Certain features of said press form the subject-matter of Letters Patent of the United States No. 300,725, granted to me June 17, 1884, for improvements in veneering-presses.

In the accompanying drawings, Figure 1 is an end elevation of my improved press. Fig. 2 is a side elevation of the same. Fig. 3 is a plan of the same. Fig. 4 is a vertical transverse section in line *xx* of Fig. 2. Fig. 5 is a perspective view of the heating-plate and the polished plates. Figs. 6 and 7 are sectional

views of the heating-plate and the polishing-plates, Fig. 6 being enlarged. Fig. 8 is a section of a portion of the celluloid removed from the wood after the two strips have been united.

The drawings illustrate the press in duplex form. It may, however, be made duplex or single.

In said drawings, A is a bench composed of the body A' and the legs A², supporting said body. Upon this bench are arranged transversely and vertically a series of double clamp-arches A³, each having the upper horizontal arm A⁴ and the lower horizontal arm A⁵. The arms A⁴ on each side of the press are horizontally in line, and the same is true of the arms A⁵. A screw A⁶ extends vertically through each arm A⁴ and terminates at its upper end in a hand-wheel A⁷. The alternate screws A⁶ are made longer than the rest, in order that the hand-wheels A⁷ may overlap and yet be far enough from each other to avoid contact when being turned up or down. The lower end of each screw A⁶ is hemispherical, and each such end rests loosely in a corresponding socket A⁸ in a plate A⁹, the latter being of sufficient length to extend beneath the entire series of screws, and its lower side forming the surface which is to rest against the key-board blank A¹⁰ from above. The rear edge of the lower side of the plate A⁹ is provided with a longitudinal groove *a*⁹ of proper width and depth to receive the lip *a*¹⁰ of the key-board blank A¹⁰. By making the ends of the screws A⁶ hemispherical and fitting them into corresponding sockets in the plate A⁹ the latter is allowed to oscillate and adapt itself to any slight departure from uniformity in thickness of the key-board blank, whereby the plate is prevented from pressing excessively upon one side of the key-board and insufficiently upon the other side—in other words, by this construction the plate is caused to press evenly upon every portion of the key-board blank. Since the screws A⁶ and plate A⁹ are not joined to each other, the raising of said screws will not lift said plate. I have provided a counter-balance to draw upwardly on said plate and cause it to follow the screws A⁶ when the latter ascend.

A cord B, attached to the plate A⁹ near one end of the press, extends upwardly over one

or more rollers B', and thence downwardly to a weight B². Said weight drawing upon said cord counterbalances one end of the plate A⁹ and holds it against the screws A⁶. A similar cord, roller or rollers, and weight are arranged at the other end of the plate A⁹. Referring to Figs. 1 and 4, it will be seen how the adjacent ends of the two plates of a duplex press may be counterbalanced by a single weight B². A single cord B may extend from one plate A⁹ over the roller or rollers B', toward the middle of the clamp-arch A³, and thence downwardly around a roller b², attached to the weight B², and thence upwardly over the other rollers B' to the other plate A⁹. Under this arrangement the weight B² will draw equally upon both ends of the cord B at all times, and consequently draw equally upon both plates A⁹, whether they are raised or lowered. If one plate A⁹ is raised or lowered while the other remains stationary, the weight B² changes its position upon the cord B to occupy the lowest point.

For the sake of convenience in operation, the side of the key-board blank to which the top strip of celluloid, marked A¹¹, is to be applied is turned downward in the press and the edge (called the "front") which is to receive the "front strip" of celluloid, marked A¹², is placed inward in the press. For the purpose of applying the pieces of celluloid to the top and front of the key-board blank at one operation by the process described herein, I have made provision in this press for simultaneously pressing against said top and front a polished surface which may be first heated uniformly and then rapidly cooled. To this end the lower plate C has a broad horizontal upper surface C', and at the rear an upward extension C², having at its front a surface C³, continuous with the surface C'. Upon the surface C' lies a highly-polished and even metal plate C⁴, extending almost to the surface C³. From the space between the rear edge of the plate C⁴ and the surface C³ rises a plate C⁵, which extends a short distance above the extension C², and is thickened above to extend forward and downward to form a lip C⁶ and channel c⁶. Said plate C⁵ may extend below into a channel c⁸ formed in the plate C. From within said channel c⁶ another polished metal plate C⁷ extends downwardly along the plate C⁵ almost to the plate C⁴. Said plate C⁷ is held in said channel c⁶ by pins c⁷, and the space between its lower edge and the upper surface of the plate C⁴ is equal to the desired thickness of the lip a¹¹ of celluloid projecting outwardly as a continuation of the top strip A¹¹ of the key-board. A series of arms C⁸ extend rearwardly from the extension C² a few inches, and from the rear end of each such arm C⁸ a spring C⁹ extends forward and has its front end joined to the upper edge of the plate C⁵ by extending through the latter or otherwise. Immediately behind the plate C⁵ an eccentric rock-shaft C¹⁰ lies beneath the

spring C⁹. Said shaft is held in place in bearings C¹¹, Fig. 5, or merely in grooves in the arms C⁸. One of the ends of said rock-shaft is provided with a handle C¹², by which it may be rocked. By rocking said shaft all the springs C⁹ are crowded upwardly a little and the plates C⁵ and C⁷ are raised sufficiently to allow the rear edge of the top strip A¹¹ of celluloid to be inserted beneath the lower edge of said plate C⁷. The relative size of the parts should be such as that the plate C⁵ will not be raised sufficiently to allow its lower edge to escape from behind the plate C⁴, nor from the channel c⁸, when the latter is used. The plate C⁴ may be retained in place upon the plate C by blocks c'. To provide for the heating and cooling of the polished surfaces, said plate C is made hollow to receive first steam and afterward cold water.

D is a pipe for the induction, and D' a pipe for the eduction, of steam and water. In hollowing said plate C, I prefer to extend a passage D² lengthwise through said plate from the front edge back and forth, as shown in Fig. 7, thence transversely upward into one end of the extension C², thence lengthwise through said extension and out at the opposite end, the pipes D and D' being tapped into the ending and beginning, respectively, of said passage. The steam or water entering the pipe D passes first through the extension C² and thence through every portion of the body of the plate and out through the pipe D'. The pipe D communicates with other pipes (not shown) leading to sources of steam and water supply, and are provided with suitable valves whereby the steam and water may be turned on or off at pleasure. The pipe D' is continued as a waste and exhaust pipe for conducting the steam and water escaping from the plate C out of the room or building.

The plate C may be fixed immovably upon the arms A⁵ directly beneath the plate A⁹; but for convenience in operation I have provided for the shifting of said plate forward upon the arms A⁵, in which position the pieces of celluloid and the key-board blank to which they are to be attached and the adhesive which is to produce the adhesion may all be put in place. The plate with its work is then returned to its position beneath the plate A⁹.

In shifting the plate C it is important that it be kept parallel. For this purpose I attach a toothed rack E to the lower surface of the plate C at each end of the latter, and I extend a rotatory shaft E' horizontally through the arms A⁵, parallel to said plates C, and mount upon each end of said shaft a spur-wheel E², which is of sufficient diameter to mesh with the rack E. The wheels E² being mounted upon the same shaft E' must rotate in unison; consequently the racks E and the ends of the plate C must also move in unison, the result being that the plate shifts parallel. To allow for this shifting of the plate C the

pipes continued from the pipes D and D' may be suitably hinged or provided with sections of hose.

Since, as above stated, the operation requires pressure against the front strip A¹² of celluloid as well as against the top strip A¹¹, I provide another series of screws F, extending inwardly in the horizontal plane in which the key-board lies when in the press. Said screws bear against the outer edge of the key-board blank A¹⁰ and force it against the front strip A¹², whereby the latter is in turn forced against the polished plate C⁷. To adapt the press to receive key-boards of different widths it is desirable that the seats of the screws F be adjustable. To this end I have formed a channel a⁵ into the upper face of each arm A⁵, and have loosely fitted into each such channel a chair F', which latter supports the screw F. Said chair may be shifted back and forth in said channel and secured in any one of several positions by a transverse pin F², extending through one of the holes F³ in the arm A⁵. A board G may be interposed between the screws F and the key-board A¹⁰ to prevent said screws from indenting the edge of the key-board.

The operation is as follows: The steam and water being both turned off and the screws A⁶ being all raised and the plate A⁹ raised by the weights B², and the screws F being retracted and the plate C shifted forward from beneath the plate A⁹, and the plates A⁵ and A⁷ being raised by the rocking of the shaft C¹⁰, the top strip of celluloid A¹¹ is laid upon the polished plate C⁴, with its rear edge extending beneath the polished plate C⁷ and against the plate C⁵. The front strip A¹² is then placed against the polished plate C⁷, its lower edge resting upon the other sheet of celluloid. The shaft C¹⁰ is now turned and the plates C⁵ and C⁷ let down, so that the lip C⁶ will be pressed with considerable force down upon the front strip A¹² by the springs C⁹. By means of a brush an adhesive containing a latent solvent of celluloid, as described in said Letters Patent to William Carl Zeidler, is now applied to the exposed surfaces of the celluloid, or the adhesive may be applied to the surface of the key-board blank. The key-board blank A¹⁰ is next placed with its top down against the top sheet of celluloid and its front against the front strip of celluloid. The plate C with the work is now shifted rearwardly beneath the plate A⁹, the screws F driven inward against the key-board blank, and the screws A⁶ driven downward, so as to force the plate A⁹ upon the key-board. By this means both pieces of celluloid are simultaneously pressed closely against the wood of the key-board, and the adhesive is caused to penetrate and incorporate itself with the fiber of the wood and to enter the joint between the two strips of celluloid, and the outer faces of both pieces of celluloid are simultaneously brought

into close contact with the polished metal surfaces, while the lower edge of the front strip of celluloid is being forced into close contact with the upper face of the top strip of celluloid. Steam is now turned on from the source of steam-supply and allowed to fill every portion of the plate C, including its extension C². Thus said plate is quickly heated and heat transmitted therefrom to the plates C⁴ and C⁷, whereby the celluloid is softened and made to conform to the polished surface of the plates C⁴ and C⁷, and the alcohol in the adhesive is rendered fully active, so that it will soften or liquefy the adjacent surface of the celluloid to a sufficient degree to establish a continuity or union between said adhesive and said celluloid, and whereby the excess of alcohol is finally dissipated and the adhesive and the celluloid reduced to a form in which they will solidify under ordinary temperature—that is to say, when the heat is withdrawn and the adhesive, the celluloid, and the wood allowed to cool. In the joint between the strips A¹¹ and A¹² the adhesive, thus rendered active by the heat, softens or liquefies both of the meeting surfaces of the celluloid, so that, aided by the pressure of the springs C⁹, a continuity is established between the two strips of celluloid and they become virtually one piece; in other words, the two pieces may be said to be welded together. In forcibly tearing the celluloid from the board when taken from the press the two strips adhere to each other and a section cut through the two strips shows a continuous mass of celluloid. This is illustrated in Fig. 8. By repeated experiment I have found that this union cannot be effected without bringing the two strips into very close contact. I therefore cut the strip A¹² in a machine which will make it of uniform width and strictly straight and then press said strip upon the strip A¹¹. The strip A¹² would, when softened by the heat, bend in response to the pressure of the springs C⁹ were it free to do so, but the plate C⁷ retains it at the side.

When it is desired to make the lip a¹¹ thicker than the body of the strip A¹¹, the plate C⁷ is set at such height as that its lower edge will not quite reach the edge of the strip forming said lip. Then when heat and pressure are applied the softened celluloid will be pressed into the space beneath the lower edge of the plate C⁷. Thus the two pieces are united and the lip a¹¹ is thickened at one operation. The steam is now turned off and the cold water turned on and allowed to run through the plate C, whereby the latter and the plates C⁴ and C⁷ are cooled. The cooling of said plates cools the celluloid, the adhesive, and the wood, and entirely overcomes the softening action of the heat, the ordinary constituents of the celluloid being hardened and the small portion of alcohol remaining being rendered latent or non-solvent.

In the operation the channel c⁸ retains the lower edge of the plate C⁵ and prevents it

from being drawn forward and bent by the withdrawal of the key-board, when, as is occasionally the case, a little of the adhesive has been pressed through the joint between the strips of celluloid and adheres to the plate C⁵. On now removing the board from the press the strips of celluloid are both well secured to the surface of the wood and are highly polished and hardened, so that the board may be at once sawed into keys and shipped to customers. It is obvious that the uniting of the two strips of celluloid adds greatly to the strength and finish of the work, and experience has proven to me that it is not practicable to make a perfect lip *a*¹¹ without confining it between solid surfaces while pressure and heat are applied and while normal temperature is being restored.

I claim as my invention—

20 A process for the manufacture of key-

boards and similar articles, said process consisting of interposing an adhesive containing a latent solvent of celluloid between the inner sides of the front and top strips of celluloid and the wood, the upper edge of the front strip meeting and being pressed against the lower face of the top strip before the cohesion to the wood is effected, then applying pressure to the outer faces of said strips of celluloid, then subjecting the whole to heat while under pressure, and then withdrawing the heat and restoring the whole to normal temperature, substantially as herein described.

In testimony whereof I affix my signature in presence of two witnesses.

AUGUSTUS NEWELL.

Witnesses:

SAMUEL DESPRES,
CYRUS KEHR.