Nov. 12, 1935. C. D. KNOWLTON 2,020,419

APPARATUS FOR SUPPLYING WEB MATERIAL

Original Filed Sept. 8, 1930 2 Sheets-Sheet 1

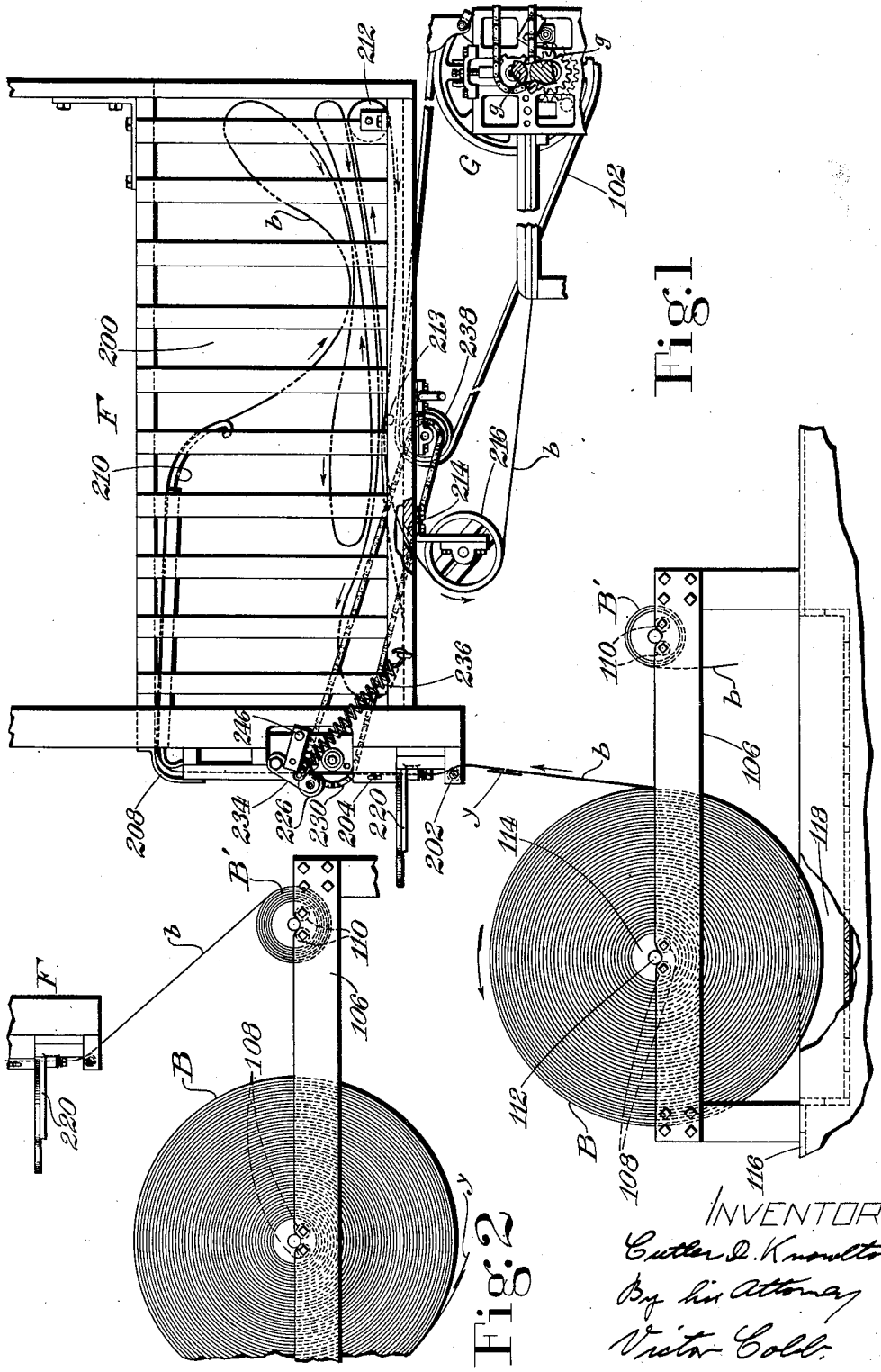


Fig. 1

Fig. 2

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Fig. 3

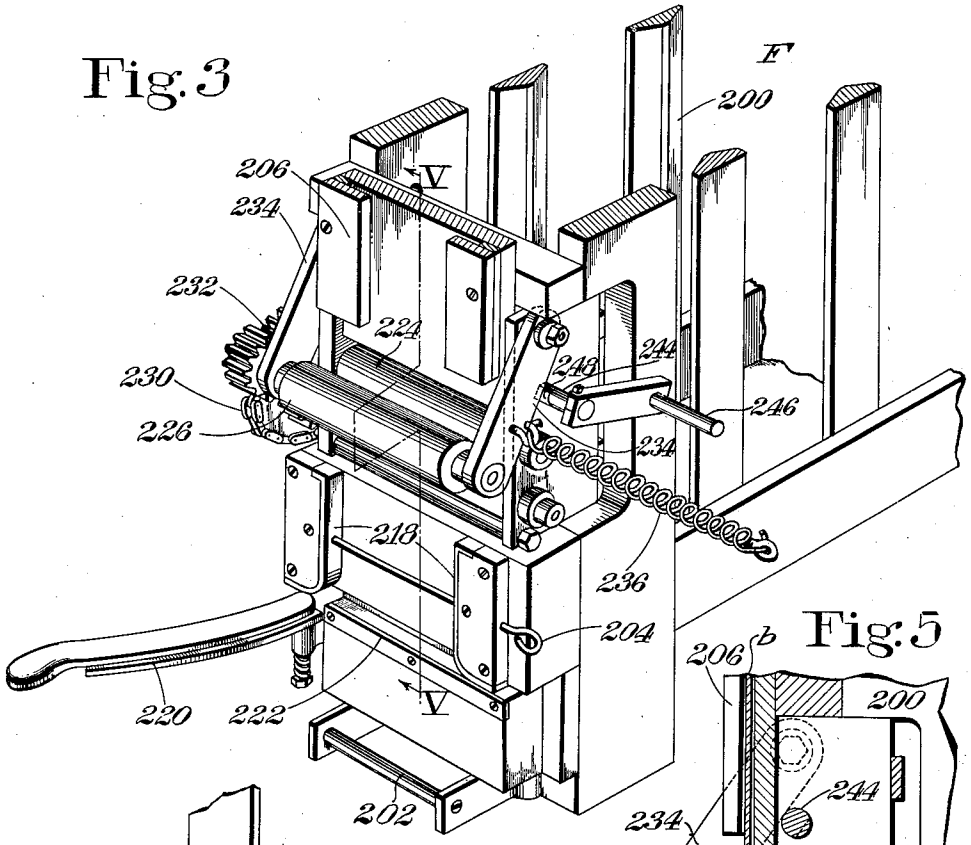
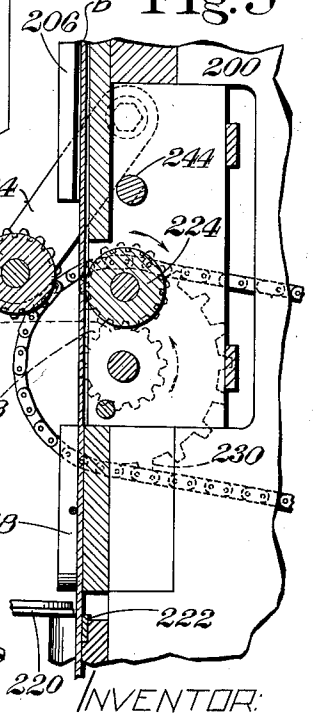


Fig. 5



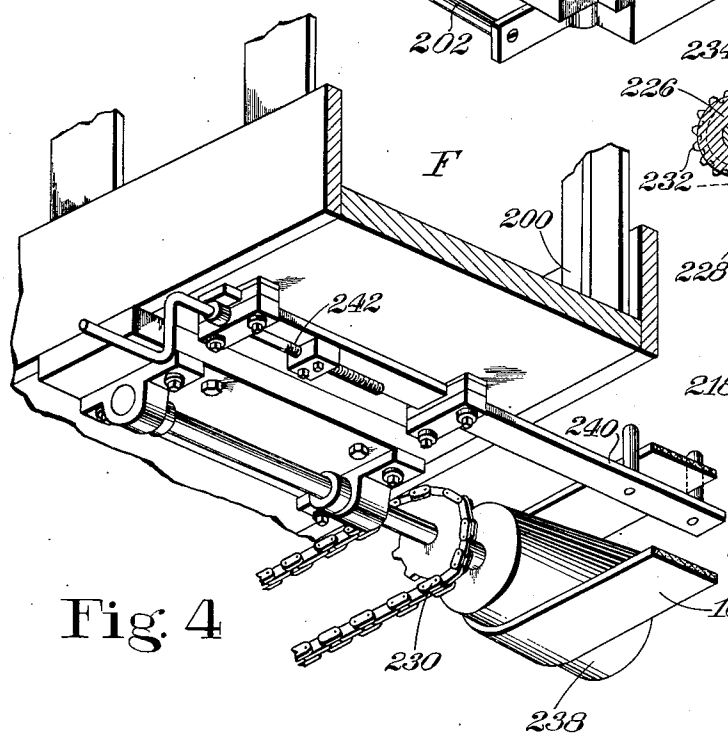


Fig. 4

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UNITED STATES PATENT OFFICE

2,020,419

APPARATUS FOR SUPPLYING WEB-MATERIAL

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Original application September 8, 1930, Serial No. 480,518. Divided and this application April 21, 1932, Serial No. 606,604

11 Claims. (Cl. 93—36)

This invention relates to apparatus for supplying web-material, as to the operating mechanism of a blank-making apparatus. It finds an appropriate field in the machine disclosed in the application filed in my name in the United States Patent Office on September 8, 1930, with the Serial No. 480,518, of which the present case is a division. On January 22, 1935, the parent case became Patent No. 1,988,451.

The above-mentioned machine is designed for the making of box-blanks, and is of the type in which webs of material advance continuously to receive various forming operations, emerging from the machines as discrete blanks. Certain of the webs, as that of the shell-material, are relatively thick and heavy, and the coils from which this web is supplied to the machine must be frequently renewed. On account of the uninterrupted travel, this renewal must be effected rapidly; and, as the pasteboard or other shell-material is more or less brittle, it cannot with safety be subjected to abrupt bending. An object of this invention is to provide for the replacement of the exhausted coils without interruption in the blank-producing action, and without injuring the blank-material.

For the attainment of this object, as a feature of my invention, I combine with a web-support and mechanism for operating upon the web, means for feeding the web from the support to the operating mechanism, and a novel intermediate receiver, preferably in the form of a cage or compartment, through which the web passes, this compartment being arranged to contain superposed loops of said web. An accumulation of the web in this receiving compartment may be drawn upon while a splice is made to the advancing portion of a coil approaching exhaustion or during similar interruptions. The form which this accumulated surplus assumes is such that no substantial breaking strains are imposed upon it, and its delivery and withdrawal are easy. By introducing the web through an opening in the upper portion of the compartment, it may be caused to fall in the desired loops, without special guiding means, and by withdrawing it through an opening in the lower portion, its advance may be effected without material resistance or disturbance of the accumulated material. To permit the supply in the compartment to be maintained to the desired amount, means, as a yieldable roll separable from a companion roll to stop the advance, is shown for feeding the web into said compartment, and with this feeding means is associated means for varying the rate at which it operates. To facilitate the division of the web in preparation for its splicing, a knife or other cutting device is arranged to act on it, as at the feeding mechanism, before it enters the receiving compartment. To support both a nearly unwound coil of the web and a fresh coil thereof, so the splicing of the latter to the advancing web may conveniently be accomplished, spaced horizontal supporting bars are preferably furnished, these bars having two pairs of alined coil-spindle-retaining means, so located that the web-receiving opening in the compartment is between them. Thus the web from either of the two coils may enter the compartment, without interference, before or after the splicing operation.

In considering this invention, reference should be had to the accompanying drawings representing one of its many possible embodiments. In these drawings,

Fig. 1 shows in side elevation my improved web-supplying apparatus;

Fig. 2 is a similar fragmentary view with coils of material in positions different from Fig. 1;

Fig. 3 is a perspective view of the entrance-end of the web-accumulating cage;

Fig. 4 illustrates in perspective the change-speed gearing for the web-feeding means associated with the cage; and

Fig. 5 is a vertical section on the line V—V of Fig. 3.

It will be assumed that there is to be supplied, for the production of box-blanks or the like, shell-material in the form of an elongated strip or web *b* from a coil B, this being delivered to one or more operating mechanisms, one of which is indicated at G in Fig. 1 of the drawings. These mechanisms include pairs of rotatable operating instrumentalities *g*, *g*, which act to feed the web forward. For the coil B is provided a mounting, which facilitates the putting in place of the relatively heavy body and transferring the connection of the portion advancing to the operating mechanisms from a coil from which the web has been nearly used to a full coil. The mounting is shown as a frame having horizontal side-bars 106 spaced to receive coils of the shell-material between them, and carrying two transversely alined pairs of rolls 108, 108 and 110, 110. These pairs of rolls are respectively arranged to retain against displacement and to facilitate the rotation of a spindle 112 projecting from a core 114 in a shell-coil B, newly introduced, and the spindle of a largely unwound coil B'. At the outer side of the frame is a platform or supporting surface 116,

the height of the top of the bars 106 above the platform being such that when a full coil of shell-material rests at its periphery upon the latter, the spindle 112 will be somewhat above the bars. That is, the height of the bars is less than the radius of the coil. Beneath the frame is a pit or depression 118, the depth of which permits the full coil B to turn without contact with the bottom. Assuming a coil B to be in place on the rolls 108 and in use, this continues until there is comparatively little of the shell-material left upon the coil. Then the operator shifts the spindle along the bars 106 until it rests upon the rolls 110 in the position B', the drawing-off of the shell-web continuing without interruption. This leaves the rolls 108 free for the support of a new coil of the shell-web, which is rolled from the platform 116 over the pit, the spindle descending on the tops of the bars and traveling along these until it is seated between the rolls 108. The elements are now as illustrated in Fig. 2 of the drawings. To the free end of the newly positioned coil may be attached a piece of adhesive-paper *y* having a projecting portion. As the last convolutions of the coil B' are being drawn off, the operator stops the feed of the web, and, holding the forward portion divides it from the short length remaining at B', and, while the apparatus draws upon excess material which is provided as will be described, splices this forward portion by the piece *y* to the end of the new coil B; see Fig. 1. The operation of the apparatus continues without interruption, and it is only necessary to reject later a single blank which contains the splice.

The supply of shell-material to be drawn upon during the splicing may be maintained in an accumulator or storage means F interposed between the support for the coils B and B' and the operating mechanism G. It preferably comprises a receiver in the form of a slatted cage or compartment 200, through the openings of which the accumulation of the material may be observed by the operator. The internal width is somewhat greater than that of the shell-web, and it is horizontally elongated, its dimensions being such that the material may fall in a number of loose, superposed, oppositely extending loops, as illustrated in Fig. 1. The web *b* runs from the coil B substantially vertically, guided at the inner side by the wall of the cage and at the outer side by a roll 202, a removable rod 204 and overhanging side-portions 206, 206. It enters the cage through a throat 208, passing over a somewhat downwardly inclined but generally horizontal supporting wall 210, terminating near the center of the cage, to gather in loops at the bottom of said cage. The throat 208 and the elements which guide the web to it are preferably so situated above and between the retaining means 108 and 110 that a coil positioned by either of said retaining means may deliver properly to the throat. The leading end of the web from the lowest loop passes over a guide-roll 212 at the forward extremity of the cage and a guide-rod 213 for supporting it above the bottom of the cage, the rod directing it through a slot 214 therein. Emerging from the slot, the web passes about one side of a drum 216 journaled horizontally below said cage, traveling on to the operating mechanism G.

At the entrance of the end of the cage below the throat 208 is a cutting device for severing the web of shell-material preparatory to splicing, and a variable-speed mechanism for determining the rate at which the web is supplied to the cage. Side-walls 218, 218 position the web transversely for both the cutting and feeding operations. The cutting device may be mounted between the roll 202 and the rod 204, and may consist of a pivoted knife 220 cooperating with a ledger-blade 222. The feeding mechanism includes rolls 224, 226, between which the web passes, both rolls having horizontal axes alined in substantially the same plane longitudinally of the cage. The roll 224 turns in fixed bearings upon the wall of the cage, and is rotated through spur-gearing 228 and sprocket-gearing 230 from belt-gearing 102 to the mechanism G. Spur-gearing 232 drives the roll 226 and the roll 224 at the same peripheral speed. The roll 226 is journaled in pivoted arms 234, 234, and is drawn toward the companion roll by a spring 236, to grip the web and advance it into the cage. The travel imparted to the web by the feed-rolls, as compared with that caused by the operating mechanisms, determines the amount of said web which accumulates in the cage. This is made variable, to permit the operator to create a sufficient excess upon which to draw during the splicing of the web, yet without overfilling the cage during the normal operation. I effect this by introducing a cone-pulley 238 driven by the belt 102 and driving the sprocket-gearing 230. A belt-shifter 240, operable by a screw 242, provides for the positioning of the belt 102 at different points along the cone, thus rotating the rolls 224, 226 at different speeds. To stop completely the feed of the web into the cage, the roll 226 may be swung back out of driving engagement with the web by a cam-shaft 244 rotatable by a crank 246 and acting upon one of the arms 234. A flattened portion 248 of the shaft allows the active cooperation of the rolls, while the remaining cylindrical periphery cams the arms and roll 226 away from the roll 224. During the delivery of the web to the cage, the knife 220 will occupy the position appearing in Figs. 1 and 3. When a fresh coil of the shell-material is to be joined to the advancing portion of the old coil, the operator throws off the feed at the rolls 224, 226, and, removing the guide-pin 204 to give access to the web, grasps the portion above the ledger-blade 222, the operating mechanism of the apparatus at this time drawing from the excess-supply in the cage. Then, swinging the blade 222 into co-operation with the ledger-blade, he severs the web and connects its forward portion by the adhesive-strip *y* to the new coil of shell-material B, as has already been described. The connection having been accomplished, the roll 226 is restored to its feeding relation, to again cause the delivery into the cage 200 of the web which is to be drawn therefrom by the operating mechanism.

It should be noted that the feeding of the web through the upper throat 208 and its guidance therefrom to the center of the cage by the wall 210 so deliver it that it may fall in long, gradually curved loops in either direction, without imposing at any point stresses which would be likely to break the often frail, brittle material. Similarly, the withdrawal of the material through the lower slot 214 minimizes distorting and rupturing strains. All this is accomplished with a simple structure having few moving elements.

Having described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. In combination, a support for a web of material, mechanism for operating upon the web, a compartment through which the web passes from the support to the operating mechanism, net-

feeding means situated at one extremity of the compartment, and a guide for the web extending from above the feeding means along the top of the compartment and terminating near the center thereof.

2. In combination, a support for a web of material, mechanism for operating upon the web, a compartment having a throat through which the web passes from the support to the operating mechanism, means including a yieldable roll for feeding the web through the throat into the compartment, and a web-supporting wall extending from the throat to a point near the center of the compartment.

3. In combination, a support for a web of material, mechanism for operating upon the web, a compartment through which the web passes from the support to the operating mechanism, and in which said web may accumulate in a substantial number of loose superposed loops, means for feeding the web into the compartment in a generally horizontal direction, and means arranged to vary the rate at which the feeding means operates and thereby change the accumulation of the loops of web in the compartment.

4. In combination, a support for a web of material, mechanism for operating upon the web, a cage situated between the support and operating mechanism, said cage having a receiving opening for the web and a delivering opening for said web, rolls rotatable upon the cage below the receiving opening to feed the web through said receiving opening to fall therein in superposed loops above the delivering opening, and means mounted upon the cage and arranged to vary the speed of the rolls and thereby alter the number of loops contained in the cage.

5. In combination, a support for a web of material, mechanism for operating upon the web, a cage situated between the support and operating mechanism, said cage having in an end wall a receiving opening for the web and in its bottom a delivering opening for said web, rolls rotatable upon the end wall of the cage to feed the web through the receiving opening, and change-speed gearing supported beneath the bottom of the cage and connecting the rolls and the operating mechanism.

6. In combination, a support for a web of material, mechanism for operating upon the web, a compartment through which the web passes from the support to the operating mechanism, said compartment having a bottom upon which the web rests in loose superposed loops and end walls arranged for contact with the opposite ends of the loops, there being an opening in one end wall to receive the web and an opening in the bottom through which said web is delivered, and means for feeding the web through the receiving opening.

7. In combination, a support for a web of material, mechanism for operating upon the web, a compartment through which the web passes from the support to the operating mechanism, said compartment having a bottom upon which the web rests in loose superposed loops and end walls arranged for contact with the opposite ends of the loops, there being an opening in one end wall to receive the web and an opening in the bottom through which said web is delivered, and a pair of rotatable rolls mounted upon the end wall of the compartment adjacent to the receiving opening and engaging the web to feed it through said opening.

8. In combination, a support for a web of material, mechanism for operating upon the web, a compartment through which the web passes from the support to the operating mechanism, said compartment having a bottom upon which the web rests in loose superposed loops and end walls arranged for contact with the opposite ends of the loops, there being an opening in one end wall to receive the web and an opening in the bottom through which said web is delivered, a roll journaled upon the end wall of the compartment adjacent to the receiving opening, arms pivoted upon said wall, a rotatable roll journaled in the arms, means for rotating the rolls in engagement with the web to feed it through the receiving opening, and a spring urging the rolls into feeding co-operation.

9. In combination, a support for a web of material, mechanism for operating upon the web, a compartment through which the web passes from the support to the operating mechanism, said compartment having a bottom upon which the web rests in loose superposed loops and end walls arranged for contact with the opposite ends of the loops, there being an opening in one end wall to receive the web and an opening in the bottom through which said web is delivered, a roll journaled upon the end wall of the compartment adjacent to the receiving opening, arms pivoted upon said wall, a rotatable roll journaled in the arms, means for rotating the rolls in engagement with the web to feed it through the receiving opening, a spring urging the rolls into feeding cooperation, and a cam rotatable upon the end wall and engaging a roll-arm to determine the relation between the rolls.

10. In combination, a support for a web of material, mechanism for operating upon the web, a compartment through which the web passes from the support to the operating mechanism, said compartment having a bottom upon which the web rests in loose superposed loops and end walls arranged for contact with the opposite ends of the loops, there being an opening in one end wall to receive the web and an opening in the bottom through which said web is delivered, means for feeding the web through the receiving opening, and cutting means movable upon the end wall and acting upon the web before it reaches the feeding means.

11. In combination, a support for a web of material, mechanism for operating upon the web, a compartment through which the web passes from the support to the operating mechanism, said compartment having a bottom upon which the web rests in loose superposed loops and end walls arranged for contact with the opposite ends of the loops, there being an opening in one end wall to receive the web and an opening in the bottom through which said web is delivered, a pair of rotatable rolls mounted upon the end wall of the compartment adjacent to the receiving opening and engaging the web to feed it through said opening, a ledger-blade fixed upon the end wall below the rolls, and a blade pivoted upon the wall for co-operation with the ledger-blade.

CUTLER D. KNOWLTON.

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CERTIFICATE OF CORRECTION.

Patent No. 2,020,419. November 12, 1935.

CUTLER D. KNOWLTON.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, second column, line 75, claim 1, for the syllable "net-" read web-; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 14th day of Januuary, A. D. 1936.

Leslie Frazer

(Seal) Acting Commissioner of Patents.