April 29, 1969 C. R. YEAMAN 3,440,675

SCORE CARD CLEANING APPARATUS

Filed Sept. 22, 1966 Sheet 1 of 3

Fig. 1

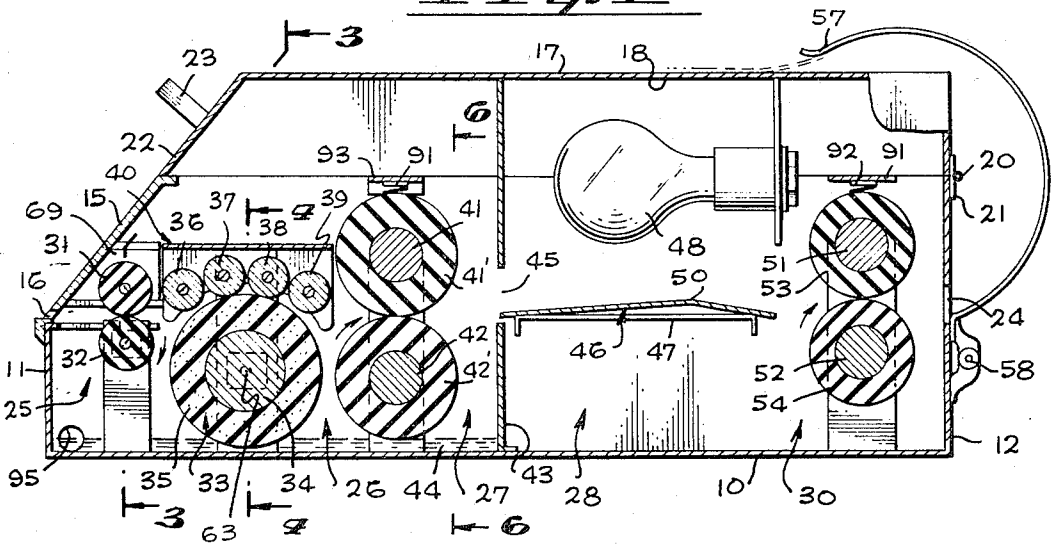
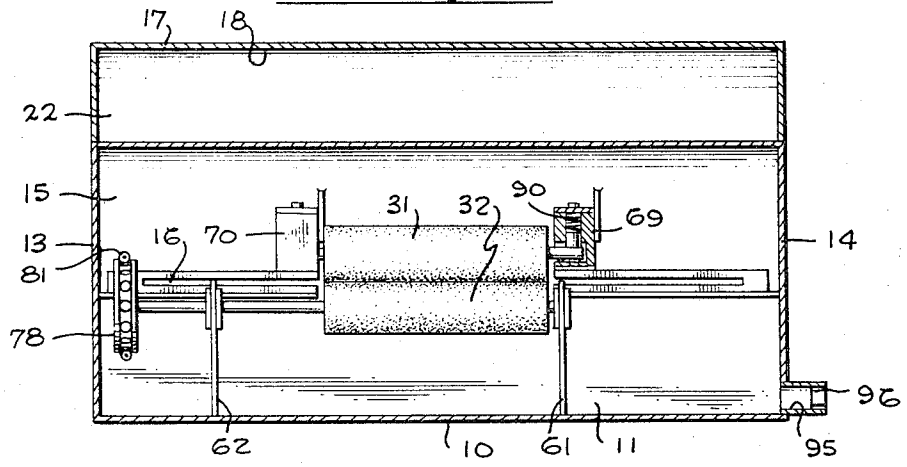


Fig. 3



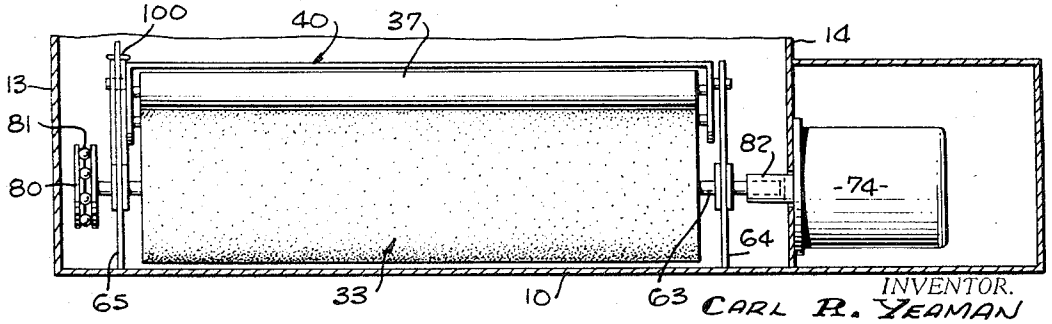


Fig. 4

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SCORE CARD CLEANING APPARATUS

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Fig. 2

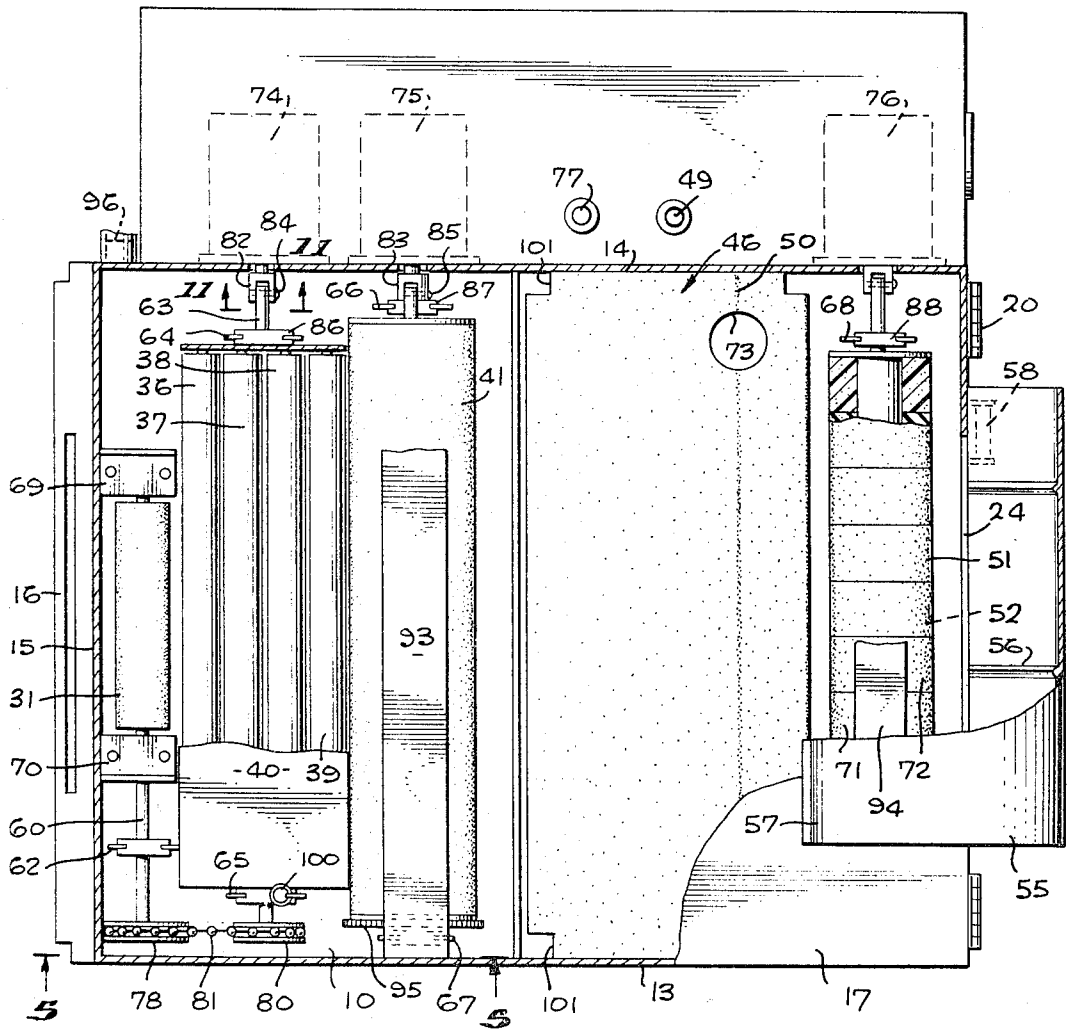


Fig. 10

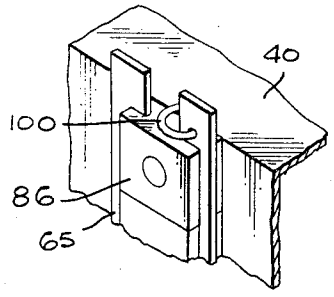


Fig. 12

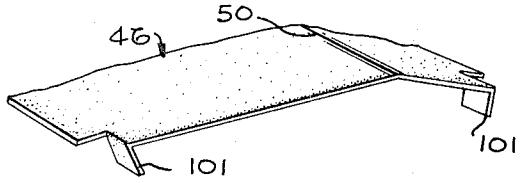
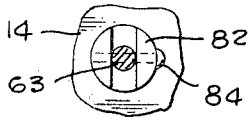


Fig. 11



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SCORE CARD CLEANING APPARATUS

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Fig. 5

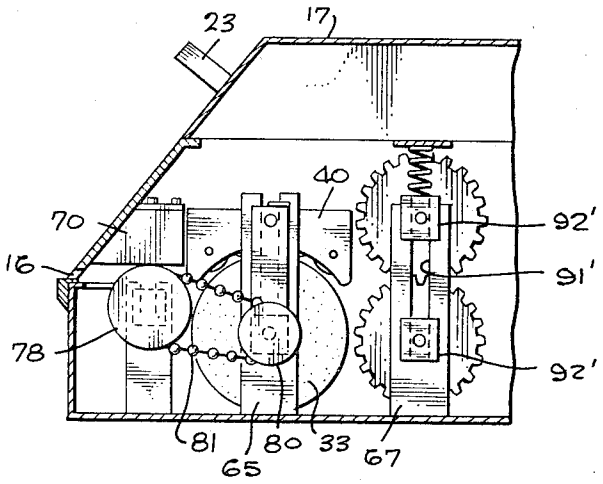


Fig. 6

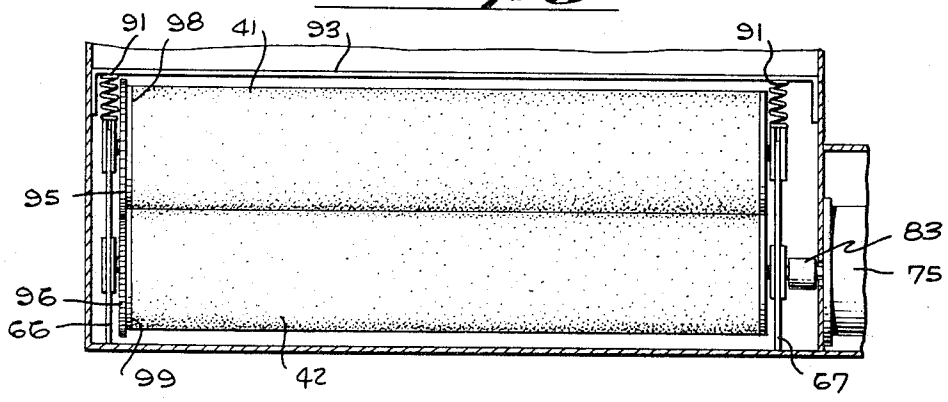


Fig. 7

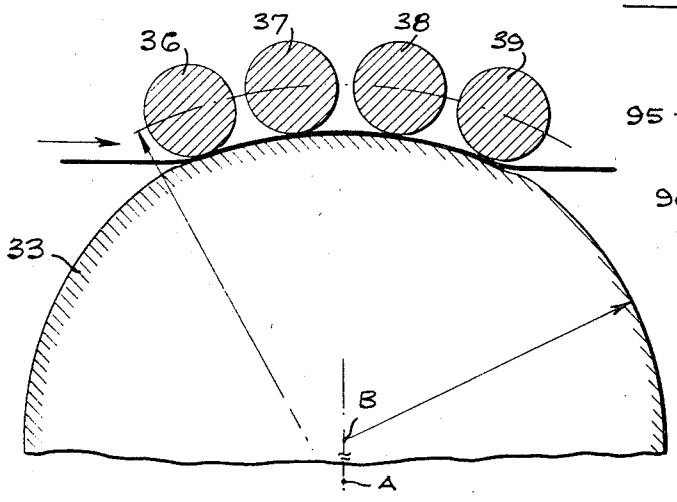


Fig. 8

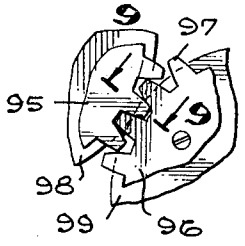
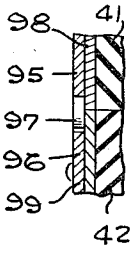


Fig. 9



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SCORE CARD CLEANING APPARATUS

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U.S. Cl. 15—4 6 Claims

ABSTRACT OF THE DISCLOSURE

The score card cleaning apparatus disclosed herein includes a cabinet having a cleaning chamber for holding a quantity of cleaning solution and a drying chamber including radiant heating means for drying the card after cleaning. A first pair of rollers are provided having a predetermined peripheral surface speed and a second pair of rollers are provided having a peripheral surface speed substantially equal to the surface speed of the first pair of rollers. A single cleaning roller is disposed in the cleaning chamber between the first and second pairs of rollers in communication with a cleaning solution. The cleaning roller has a peripheral surface speed in excess of the surface speed of the first and second pairs of rollers so as to effect a scrubbing action on the surface of the score card and driving means are operably coupled to the pairs of rollers and to the cleaning roller for rotating the rollers to transport the score card along a linear path through said cabinet.

This invention relates to score card cleaning apparatus and, more particularly, to a novel apparatus for effectively removing the wax pencil markings from the surface of a score card, for drying the card and returning the card to a player in condition for immediate reuse.

In the playing of some games and sports, such as bowling, golf, shooting or the like, it is sometimes the conventional practice to employ a score card to record the values or scores made by individual participants during the course of the play so that a tally can be maintained in order to determine the winner at the conclusion of the play. It has been the conventional practice to employ score cards usually made of sheet plastic on which markings are inscribed by a score keeper or by the players themselves with a water soluble wax pencil. Inasmuch as the initial cost of such cards is expensive when a plurality of cards are employed, it has been found desirable and certainly more economical to clean the cards after each use so that the cards may be reused in another course of play.

Many attempts have been made to provide apparatus for cleaning used score cards that generally involve time consuming washing and drip drying operations which, of course, adds to the labor and maintenance of the cost of operating the game or sport concession.

Another attempt to provide a suitable device for cleaning score cards is disclosed in U.S. Patent 3,237,231 wherein a card cleaning apparatus is described within which a card is inserted in one end and is picked up by feed-in rollers, advanced between cleaning rollers and then introduced into cooperating push-out rollers which also serve the purpose of wringing the washing fluid from the card being dealt with. However, many problems and difficulties have been encountered when employing such a conventional device which reside in the fact that a positive scrubbing action is not achieved so that the assurance of a clean card cannot be had and, it has been determined that the wringing out of the washing fluid from the card is an ineffective procedure in the conventional device to adequately dry the cleaned card within a suitable time so that the card is immediately ready for reuse. Another disadvantage with the apparatus immediately described above resides in the fact that exit of the cleaned card from the apparatus is in a relatively awkward orientation so that the entire apparatus requires working space exteriorly of the apparatus.

Accordingly, the novel card cleaning apparatus of the present invention obviates the problems and difficulties encountered with the conventional equipment by providing a sequence of powered rollers that move the card through a plurality of operating zones in which successive steps in the cleaning and drying procedures occur. Initially, the marked up card is introduced through feed rollers into a washing zone where the card is held in intimate contact with the surface of a cleaning roller by a plurality of hold-down rollers after which the card is introduced to a pair of squeegee rollers for removing substantially all of the cleaning fluid employed in the cleaning zone. Next, a drying zone is employed whereby the card is introduced into an area of relatively high temperature suitable to cause the evaporation of any moisture remaining on the card as well as to be drawn across a porous surface of a drying plate to further remove any large droplets of fluid which may be present. The cleaned and dried card is caused to exit from the apparatus via exit rollers and is redirected to the forward end of the machine by means of an arcuate return plate in a condition ready for immediate reuse. A feature resides in the fact that means are provided on the return plate to prevent the occurrence of a vacuum which would normally cause the cleaned and dried card to cling or adhere to the plate. Also, the particular arrangement of rollers as well as their mounting and power drive trains are such that the speed of the sheet being processed through the various zones is adequately maintained so as to produce the most desirable effect upon the card during the cleaning and drying operations in the respective zones through which the card passes.

Therefore, it is a primary object of the present invention to provide a novel score card cleaning apparatus that provides a plurality of rollers for advancing the score card through successive zones within a cabinet whereby the score card is cleaned, squeezed, dried and driven exteriorly of the cabinet.

Another object of the present invention is to provide a novel score card cleaning apparatus that provides a novel means for holding the score card against the wiping surface of a cleaning roller whereby the score card is effectively cleaned of any marks previously applied thereto by wax pencil.

Another object of the present invention is to provide a novel score card cleaning apparatus capable of applying a cleaning solution onto the marked surface of a score card via a scrubbing action and then to a squeezing zone for effectively removing the major portion of the cleaning agent and exiting from the machine through a drying area or zone that conditions the score card for immediate reuse upon exit from the machine.

Still a further object of the preesnt invention is to provide a novel score card cleaning apparatus that provides means for guiding a score card through a plurality of procedure zones without mutilating or otherwise alter-

ing or modifying the score card except for the removal of temporary markings thereon.

The features of the present invention which are believed to be novel are set forth with particularity in the appended claims. The present invention, both as to its organization and manner of operation, together with further objects and advantages thereof, may best be understood by reference to the following description, taken in connection with the accompanying drawings, in which:

FIGURE 1 is a cross-sectional view, in elevation, of the score card cleaning apparatus of the present invention;

FIGURE 2 is a cross-sectional plan view of the card cleaning apparatus illustrated in FIGURE 1;

FIGURE 3 is a transverse cross-sectional view of the card cleaning apparatus of FIGURE 1 as taken in the direction of arrows 3—3 thereof and illustrating the card feed rollers incorporated therein;

FIGURE 4 is a transverse cross-sectional view of the card cleaning apparatus of FIGURE 1 as taken in the direction of arrows 4—4 thereof and showing the card cleaning and hold-down rollers employed in the apparatus;

FIGURE 5 is a sectional view of the driving train for the rollers incorporated in the card cleaning apparatus as taken in the direction of arrows 5—5 of FIGURE 2;

FIGURE 6 is a transverse cross-sectional view of the squeegee rollers employed in the card cleaning apparatus as taken in the direction of arrows 6—6 of FIGURE 1;

FIGURE 7 is an enlarged fragmentary view of a portion of the cleaning roller and the hold-down rollers illustrating maxium card surface engagement therebetween;

FIGURE 8 is an enlarged fragmentary view illustrating means for interlocking the pair of squeegee rollers together for synchronous rotation;

FIGURE 9 is a sectional view taken in the direction of arrows 9—9 of FIGURE 8;

FIGURE 10 is an enlarged perspective view of the means for detachably mounting the hold-down roller assembly to the cabinet;

FIGURE 11 is an enlarged sectional view of means for detachably securing the shaft of the cleaning roller to its driving source as shown in the direction of arrows 11—11 of FIGURE 2; and

FIGURE 12 is a perspective view of a portion of the drying plate employed in the drying zone provided in the card cleaning apparatus.

Referring now to FIGURES 1 and 2, a novel card cleaning apparatus is illustrated in accordance with the present invention which includes a box-like cabinet having a bottom wall 10, front and rear walls 11 and 12 and side walls 13 and 14. Front wall 11 includes a rearwardly sloping portion 15 having an elongated slot 16 provided therein adjacent the upper edge of the front wall 11 so as to accommodate the insertion of a score sheet or card intended to be cleaned. A lid in the form of a hood 17 having side walls downwardly depending from a top wall 18 is coextensive in length and width with the top of the cabinet and is hingeably attached as indicated by numeral 20 to the rear end thereof by suitable brackets 21. The lid includes a sloping portion 22 that is coextensive with the portion 15 on the lower half of the cabinet. To facilitate the raising of the lid 17 about its hinge 20, a handle 23 is fastened to the rearwardly sloping portion 22 of the lid.

Within the cabinet, there is a plurality of operating zones through which the card inserted through the slot 16 progresses from the front end of the machine to an exit slot 24 formed in the rear wall 12. In general, the plurality of operating zones are indicated respectively by numerals wherein numeral 25 indicates the card feed zone, numeral 26 indicates the cleaning zone, numeral 27 indicates the squeegee or preliminary drying zone, a drying zone is indicated by numeral 28, and a card exit zone by numeral 30. Within each zone, there are provided means for transporting the card and for performing various operating procedures to effect the cleaning and drying of the card.

Within the feed zone 25, a pair of feed rollers 31 and 32, preferably composed of hard rubber, are provided with roller 31 being slaved to drive roller 32 so that the rollers are in counter-rotation and in surface engagement so that when a card is inserted therebetween, the card is moved into the cleaning zone 26. Within the cleaning zone, there is provided a large diameter cleaning roller 33 that comprises a driving portion 34 covered by a relatively soft and absorbent polyurethane roller portion 35. The cleaning roller is oriented in such a fashion that a substantial portion of its periphery extends into the path of score card travel as the score card is introduced into the cleaning zone via the feed rollers. To ensure that the surface of the card is in scrubbing engagement with the periphery of the cleaning roller, a plurality of hold-down rollers, such as rollers 36–39 are carried as an assembly on a frame 40 in such a fashion that a portion of the rollers' periphery are, in combination, slightly curved about the upper periphery of the cleaning roller surface so that the hold-down rollers press against the upper surface of the score card as it passes over the cleaning roller. This aspect will be described further in detail with reference to FIGURE 7.

Within the preliminary drying zone 27, a pair of squeegee rollers 41 and 42 are provided whereby the roller 42 drives the slaved roller 41. The rollers 41 and 42 are arranged so that the leading edge of the score card, after having been cleaned in the cleaning zone, engages with the drive roller 42 and is urged between the peripheral surface of the two squeegee rollers. Preferably, the cleaning roller rotates at approximately 60 r.p.m. while the squeegee rollers rotate at approximately 25 r.p.m.

Preferably, the squeegee rollers 41 and 42 are covered with portions 41′ and 42′ composed of neoprene in which the roller portion 42′ is made harder than the idler roller portion 41′. For example, roller portion 42 may be fabricated to a hardness of 60 shore while the idler roller portion 41′ is fabricated to a hardness in the order of 40 shore. The lower roller portion 42′ has a ground surface to assure as perfect a cylindrical configuration as possible. The upper roller portion 41′ is fabricated in such a fashion so as to conform to the surface of the harder roller portion 42′ with the score card disposed therebetween.In one embodiment of the present invention, the roller portion 42′ is in contact not only with the surface of roller portion 41′ but is in contact with the surface of cleaning roller 33 so that its surface is constantly being operated upon by the cleaning roller so that the surface of roller portion 42′ is maintained clean.

It is to be noted that the feeder zone 25, cleaning zone 26 and pre-drying zone 27 are confined between the front wall 11 and an upright bulkhead 43 so that in combination with the side walls 13 and 14, a tank is constructed in which a quantity of cleaning solution or agent 44 is disposed. Preferably, the solution is non-flammable and is chosen so as not to attack the printing on the score sheet but at the same time chosen so as to be able to dissolve and adequately remove the wax crayon placed on the surface of the card. A sufficient quantity of solution 44 is maintained in the tank so that the cleaning roller 33 is in communication therewith and capable of carrying sufficient solution to the surface of the score card where the scrubbing action takes place.

It is to be particularly noted that bulkhead 43 includes a slot 45 formed approximately mid-way between its opposite ends so that the leading edge of the score card will travel therethrough under the powered direction of the squeegee rollers 41 and 42. After the score card passes through the squeegee rollers, the card is approximately 90% dry because of the squeezing action of the two roll-

ers. The card will enter into the chamber **28** and pass over a drying plate **46** that is mounted on a frame **47** secured on its opposite ends to the inside surface of sidewalls **13** and **14**, respectively. Preferably, the drying plate is covered with a terrycloth material or, in some instances, coated with a porous flocking material or other material which is moisture absorbing. As the score card passes over the drying plate, it is directed beneath a pair of heating lamps, including a lamp **48** which, in the present instance, may be a conventional 100 watt light bulb. The lamps are energized by depressing a push button switch **49**. Therefore, the score card is subject to radiant heat from the light source which causes any moisture on the card to evaporate and in addition, in the event there are any droplets of moisture, such droplets will be absorbed by the material on the drying plate **46**.

In the present embodiment, it is to be noted that the drying plate **46** is crowned at point **50** which causes the leading edge of the score card to approach a pair of exit rollers **51** and **52** at an angle. However, when the leading edge of the card strikes the upper roller **51**, the card will be pulled down between the two rollers and introduced to the exit slot **24**. This crown construction **50** places a slight tension on the score card when one end of the card is disposed between the squeegee rollers while the opposite end of the card is disposed between the exit rollers so that a wiping action occurs on the porous surface of the drying plate **46**. The exit rollers **51** and **52** are covered with polyurethane material **53** and **54**, respectively, which act as blotters to absorb any moisture that might possibly be present on either surface of the score card after leaving the drying chamber.

As the leading edge of the score card passes through the exit slot **24** under the powering force of the exit rollers, the leading edge will contact an arcuate return plate **55** so that as the travelling card progresses along the curved surface thereof, the card will be introduced back over the hood of the apparatus to a resting position on the top of the hood **17** as shown in broken lines. It is to be particularly noted that the arcuate return plate **55** includes a pair of parallel inwardly projecting ribs **56** that serve to maintain a suitable air gap between the surface of the card and the return plate so that the creation of a vacuum is prevented which would normally hold the card to the plate. The extreme end **57** of the return plate extends a suitable distance past the end or rear wall **12** and is spaced from the wall **18** of the hood a sufficient distance to permit the card as shown in broken lines to be passed therebetween. In order to permit the hood to be rotated about its hinge **20** without interfering with the return plate, the return plate is hingeably mounted on the exterior rear wall **12** by means of a hinge **58** so that plate end **57** will not interfere with the rotation of the hood.

Referring now in detail to FIGURE 2, it can be seen that the respective shafts of the various rollers within the plurality of zones are mounted between brackets carried on the bottom **10** of the cabinet. For example, a shaft **60**, mounting the drive roller **32**, is mounted between spaced apart brackets **61** and **62**, while a shaft **63**, carried on roller **34**, is mounted between bracket **64** and **65**. The squeegee rollers **41** and **42** are mounted between brackets **66** and **67** while the exit rollers **51** and **52** are mounted between brackets **68**. The idler roller **31** of the feed roller combination is rotatably carried between a bracket **69** on one end and a bracket **70** on its opposite end. Mounting brackets **64** and **65** are also employed to mount the hold-down roller assembly carried on frame **40**. It is also to be noted that the exit rollers **51** and **52** are covered with a plurality of polyurethane foam coverings such as is represented by numerals **71** and **72**. Preferably, the drying plate **46** is provided with a finger hole **73** to permit the removal of the plate for maintenance and servicing procedures.

The cleaning roller **33** is driven by a conventional motor **74** while the squeegee roller **42** is driven by a separate conventional motor **75**. The exit rollers are driven by a conventional motor **76** and the motors are connected in parallel so that all three motors are hooked together for operation by a single push button motor switch **77**. Preferably, the squeegee rollers are operated at 25 r.p.m. while the cleaning roller is operated at 60 r.p.m. so that the card is stretched therebetween to achieve a scrubbing action.

The feed rollers **31** and **32** are driven by the motor **74** via a gear reduction train comprising pulley wheel **78** carried on the extreme end of shaft **60** and a pulley **80** carried on the extreme end of shaft **63** whereby the pulleys **78** and **80** are operably coupled by a chain **81**. By means of the pulley transmission path, the feed rollers are arranged to rotate at approximately 50 r.p.m. so as to attain a slight stretching of the score card as it is extended between the feed rollers and the cleaning roller. By this arrangement, the score card sheet is progressing relatively slowly but the surface speed of the cleaning roller is quite rapid so as to achieve a definite scrubbing action on the surface of the tensioned score card sheet. The exit rollers are arranged to rotate slightly faster than the squeegee rollers so that a small degree of stretching action is present between the squeegee rollers and the exit rollers. However, there is sufficient slippage to maintain the score card sheet taut over the drying plate.

It is to be noted that the shaft **63** and the shaft of the squeegee rollers may be readily removed by means of disengaging couplings **82** and **83** employed to connect the driving shaft of the respective motors to the shafts. Disconnection is readily achieved by removing pins **84** and **85** so that the roller shafts are disengaged with the couplings. At this time, the shafts may be readily lifted upward through the mounting brackets **64** and **65** with respect to the cleaning rollers and brackets **66** and **67** with respect to the squeegee rollers to completely remove the rollers from their respective zones and the cabinet. Disposed between the brackets and the shaft of each assembly, there is provided a suitable bearing, such as bearings **86**, **87** and **88**.

Referring now in particular to FIGURE 3, it can be seen that the idler roller **31** of the feed rollers is resiliently mounted within brackets **69** and **70** by means of springs such as spring **90**. The resilient mounting of the idler rollers **41** and **51** is shown in FIGURE 1 by springs **91** and **92** urging against mounting roller plates **93** and **94**. A port **95** is provided for draining the fluid **44** from within the cabinet, when desired. A suitable plug **96** may be seated within the port **95** to hold the fluid within the cabinet.

Referring now to FIGURE 4, it can be seen that the cleaning roller **33** and the hold-down rollers on the frame **40** are arranged to rotate between brackets **64** and **65** as driven by motor **74**. The mountings of the cleaner roller, squeegee roller and the feed roller **32** are more clearly shown in FIGURE 5 wherein the mounting bracket is shown as incorporating a central slot such as slot **91'** in bracket **67** that receives the terminating ends of the roller shafts. The terminating end of each shaft rests in the bearings, such as is indicated by numeral **92'**, that include slots on the opposite edges so as to be received in sliding engagement with the bracket **67**.

Referring now to FIGURE 6, the mounting arrangement for the squeegee rollers **41** and **42** is illustrated whereby the rollers are rotatably disposed between mounting brackets **66** and **67** wherein roller **42** is driven by motor **75**.

In FIGURES 5, 6 and 8, an interlocking means is shown between the rollers **41** and **42** that maintain the rollers in fixed relationship and prevents end-wise or longitudinal displacement from occurring between the two rollers. Such interlocking mechanism comprises a gear **95** and a gear **96** that are intermeshed by means

of a plurality of teeth, such as tooth **97**, formed in the peripheral edges thereof. By this means, rotation of the drive roller **42** causes rotation of the idler roller **41**. Longitudinal displacement is prevented by means of discs **98** and **99** each of which includes an edge marginal region arranged to be disposed beneath the meshed teeth of both gears. In other words, the edge marginal region of disc **99** is disposed beneath the teeth of the gear **95** while the edge marginal region of disc **98** is disposed beneath the teeth of the gear **96** when the teeth are intermeshed as illustrated in FIGURES 8 and 9. By the use of the interlocking means, roller **41** is maintained in a positive rolling relationship with respect to roller **42**. The periphery of roller **42'** carries the solution **44** which is very slippery and without the interlocking means, the upper roller **41** will have a tendency to remain motionless or to become laterally displaced. By employing the self-locking and self-aligning teeth engaging means and the overlapping discs, the rollers are kept from moving relative to one another.

Referring now in detail to FIGURE 7, it is noted that the radius of the axis of rotation of the plurality of hold-down rollers follows a curvature which is greater than the radius of the cleaning roller **33**. The reason for this distinction resides in the fact that as the score card is passed between the engaging portions of the roller surfaces, the resilient cover **35** surrounding the roller **33** has a tendency to flatten out and if the hold-down rollers were not properly positioned, only the two outer rollers or the two adjacent inner rollers would engage the side of the score card opposite to its side being scrubbed. By employing the radius of curvature on which the axis of rotation of the hold-down rollers rotate, the curvature is flattened slightly so that all of the rollers are employed to press against the score card as it passes between the hold-down rollers and the cleaning roller. The plane of curvature on which the rotating axis of the hold-down rollers lie is formed about a center indicated by the letter A while the curvature of the scrubbing surface represented by the periphery of the rollers **34–35** is indicated at the center shown by letter B.

With reference to FIGURE 10, it can be seen that the hold-down assembly bracket **40** is detachably carried on the mounting bracket **65** by means of the bearing **85** which is situated within the slot of the bracket and is maintained therein by means of a readily removable ring **100**. When the ring **100** is removed, the bearing **86** may be slid out of the slotted coupling with mounting **65**. With reference to FIGURE 12, it can be seen that the corners of the drying plate **46** include downwardly extending tabs **101**. These tabs are employed to detachably engage with the bracket **47** so that the drying plate may be readily removed from installation within the cabinet. Referring to FIGURE 11, an enlarged view is shown of the coupling **82** whereby the roller shaft **63** may be readily detached from the driving shaft of the motor **74** by removing the pin **84**.

In view of the foregoing, it can be seen that the score card cleaning apparatus of the present invention provides a novel apparatus for effectively and efficiently removing pencil marks present on one surface of the score card. The device is arranged so that the cleaning wheel not only carries a quantity of solution **44** for effecting cleaning, but creates a scrubbing action in combination with the hold-down roller assembly so that a thorough washing is achieved. Inasmuch as the direction of roller rotation within the various zones is the same, the card or portions thereof cannot be directed or diverted from the intended path of travel. The differential of roller surface speed maintains the card taut and assures a good scrubbing and wiping action. Preliminary drying of the score card occurs by inserting the wet card between the squeegee rollers so that a major portion of the cleaning solution or agent is pressed from the score card. By subjecting the cleaned score card to the heating zone **28**, moisture or solution remaining on the card is effectively removed and the cleaned card is returned to the user for additional use by means of the exit rollers and the return plate **56**. Throughout the cleaning and drying operation, the score card is completely protected from damage either through mechanical engagement or from thermal environmental conditions.

While particular embodiments of the present invention have been shown and described, it will be obvious to those skilled in the art that changes and modifications may be made without departing from this invention in its broader aspects, and, therefore, the aim in the appended claims is to cover all such changes and modifications as fall within the true spirit and scope of this invention.

What is claimed is:

1. Apparatus for cleaning the surface of a score card comprising:

a cabinet having a cleaning chamber for holding a quantity of cleaning solution and having a slotted partition disposed interiorly thereof mid-way between its opposite ends so as to define a drying chamber adjacent to said cleaning chamber and adapted to pass the score card through said slot from said cleaning chamber;

means disposed in said drying chamber for effecting the removal of said cleaning solution from the score card which includes radiant heating means adapted to selectively elevate the temperature of said drying chamber as the score card passes therethrough;

a first set of rollers having a predetermined peripheral surface speed;

a second set of rollers having a peripheral surface speed substantially equal to said surface speed of said first set of rollers;

a cleaning roller disposed in said cleaning chamber between said first and second sets of rollers in communication with said cleaning solution and having a peripheral surface speed in excess of said surface speed of said first and said second sets of rollers so as to effect a scrubbing action on the surface of the score card; and

driving means operatively coupled to said sets of rollers and to said cleaning roller for rotating said rollers to transport the score card through said cabinet.

2. The invention as defined in claim **1** wherein

said drying means further includes a plate having a crown portion mounted in said cabinet within said drying chamber in thermal communication with said radiant heating means and having a porous moisture absorption surface in sliding relationship with the score card as it travels over said plate through said drying chamber.

3. The invention as defined in claim **2** including

a third set of rollers mounted in said cabinet with said drying chamber immediately adjacent said exit slot for forcibly expelling the score card therethrough; and

wherein the direction of roller rotation is in the same direction as the rotation of said first and said second sets of rollers and said cleaning roller.

4. The invention as defined in claim **3** including

a separate power means for driving said cleaning roller, said second set of rollers and said third set of rollers; and

gear train means coupling said cleaning roller to said first set of rollers for the driving thereof.

5. The invention as defined in claim **3** including

an interlocking means detachably coupling said second set of roller together effective to prevent longitudinal displacement therebetween.

6. The invention as defined in claim **5** wherein

said interlocking means includes a toothed gear carried by each of the rollers in said second set which are intermeshed; and

a disc carried adjacent each of said gears having edge

marginal regions disposed adjacent the teeth of each of said gears in overlapping relationship.

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