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Title of Invention: Writing Board

SPECIFICATION

Writing Board

Technical Field

The present invention relates to writing boards such as the wall-hanging type, stand-supported type, and desktop type of blackboards, white boards, and green boards, in which writing is made on a recording medium on their surfaces using writing tools such as felt-tip markers.

Background of the Invention

Conventionally, these types of writing boards have included the ones, as illustrated in Japanese Patent Application KOKAI No. 7-90214 (Laying open No. 7-90214), in which letters, characters, pictures are written on the writing board by a writing tool. When all the information produced by a writing tool are to be erased, the surface of the writing board is wiped with a wiping tool soaked with a cleaning liquid such as water, taking advantage of a chemical reaction for erasing the letters, etc.

However, these conventional writing boards have required all the information on the board to be erased by hand to wipe the board with the erasing tool.

An object of the present invention therefore is to provide a writing board in which all the information is written in ink erasable with a cleaning liquid, on the surface of the recording medium of the board and is erased automatically with a cleaning liquid.

Disclosure of the Invention

In a writing board of the present invention, like the electric board, wherein information is written on the surface of the recording medium using ink that is erasable with a cleaning liquid, an opening of a cleaning

instrument is contacted against the surface of the recording medium, the cleaning instrument and/or surface of the recording medium can relatively be moved with respect to each other. On the other hand, a storage container holds a cleaning liquid. A pump is provided and circulates the cleaning liquid through the cleaning instrument and an erasing switch allows the pump to operate and the cleaning instrument and/or recording medium to make relative movement.

For erasing all the information written on the writing board, the erasing switch is turned ON to make the cleaning instrument or recording medium to begin relative movement with respect to each other, while the pump is actuated to allow the cleaning liquid in the storage container to circulate through the cleaning instrument. The surface of the recording medium is then applied with the cleaning liquid through the opening of the cleaning instrument. After the written information has been erased, the recording medium and the cleaning instrument stop relative movement, and the pump stops to operate.

In the above mentioned writing board, it is preferable to provide a valve such as a solenoid valve that shuts off the supply of the said cleaning liquid into the cleaning instrument. After the written information has been erased, supply of the cleaning liquid into the cleaning instrument is thus shut off by closing the solenoid valve. The cleaning liquid is then sucked and removed from the cleaning instrument and the pump is then stopped. This prevents the leakage of the cleaning liquid from the opening of the cleaning instrument after the erasing is performed.

According to the present invention, it is preferable that the cleaning instrument can freely be contacted or kept apart from the recording medium. Namely, by switching the members to be switching means and by operating the erasing switch, the cleaning instrument is squeezed against the recording medium when the written information is to be erased or

otherwise kept apart from the recording medium. Thus the written information may be erased or not when desired.

According to the present invention, it is preferable that the contact surface of the cleaning instrument that comes into contact with the recording medium is coated with Teflon. This prevents friction-caused damage to the surface of the recording medium and reduces frictional resistance between the recording medium and the cleaning instrument during their relative movement.

According to the present invention, the surface of the recording medium is preferably treated with the mat. The recording medium can thus increase the surface roughness in the recording medium, facilitate writing information on the recording medium, and reduce glare to provide visibility of the written information even from the side of the recording medium.

According to the present invention, a filter is preferably provided halfway in the passage of the circulating cleaning liquid, so that impurities can be removed from the cleaning liquid.

Brief Description of the Drawings

Fig. 1 is a view showing an embodiment of the writing board of the present invention, a view of the wall-hanging type in the case of the electric blackboard. Fig. 2 is a perspective view of the general configuration of the internal mechanism of the electric blackboard according to the embodiment of Fig. 1 of the present invention. Fig. 3 is a cross-sectional view of the cleaning instrument used for the electric blackboard shown in Fig. 1. Fig. 4 is a cross-sectional view of another example of the cleaning instrument used for the electric blackboard. Fig. 5 is a cross-sectional view of a further example of the cleaning instrument used for the electric blackboard. Fig. 6 is a vertical section of a storage

container used for the electric blackboard. Fig. 7 is an explanatory drawing of the flow of the cleaning liquid in erasing the written information on the electric blackboard. Fig. 8 is an explanatory drawing of the flow of the cleaning liquid in sucking and removing the remaining cleaning liquid after the written information has been erased. Fig. 9 is an explanatory drawing of the cleaning instrument kept apart from the recording medium in the electric blackboard. Fig. 10 is an explanatory drawing of the above electric blackboard being used in the state supported by a stand. Fig. 11 shows another embodiment according to the present invention and is a perspective view of the general configuration of the internal mechanism of the electric blackboard. Fig. 12 is a perspective view of a further embodiment of the present invention of the electric blackboard of the stand-supported type. Fig. 13 is a partial cross-sectional view of the electric blackboard as viewed in the A-A direction in Fig. 12. Fig. 14 is a vertical section of the electric blackboard as viewed in the B-B direction of Fig. 12. Fig. 15 is a side view of the electric blackboard with the traveling body in the rotated state.

Preferred Embodiments of the Invention

The preferred embodiments of the present invention will hereinafter be described in detail with reference to the attached drawings.

Fig. 1 shows a first embodiment of the writing board according to the present invention. The writing board illustrated is an electric blackboard 10, hung on the wall in a conference room.

A frame case 11 of the electric blackboard 10 is flat and rectangular in shape. The electric blackboard 10 is hung on the wall with the longer side at the top and with a large window-type opening 11a in front. A flat recording medium 12 for writing is fitted into the window-type opening 11a, and a part of the recording medium 12 is seen from the opening 11a, as will

be described later. In the front of the said frame case 11 is provided a long and narrow tray 13 along the bottom edge of the said frame case 11. The tray 13 holds a writing tool 14 and a wiping tool 15.

The writing tool 14 is for writing letters, characters and pictures on the recording medium 12 and uses ink erasable instantly by applying with a liquid (cleaning liquid) such as water, as described in the Japanese Patent Application KOKAI No. 7-90214. The wiping tool 15 wipes the recording medium 12 to erase the information written with the writing tool 14, which holds a cleaning liquid that is capable of erasing the ink of the writing tool 14.

Below the frame case 11 are also provided with a printer 17 having a paper receiver 16 in front and two storage cases 18 and 19 in that order. On one of the side edges of the frame case 11 are provided a group of switches 20. The switch group 20 includes a feed switch for moving the above-mentioned recording medium 12, a reading switch for reading the information written on the recording medium 12, and an erasing switch 20a for erasing the information written on the recording medium 12.

Inside the above-mentioned frame case 11 are provided a driving roller 22 on the left side and a driven roller 23 on the right side, both standing vertically and in parallel with each other, as shown in Fig. 2. Between these rollers 22 and 23 is passed an endless recording medium 12. A spring, not shown, preloads the driven roller 23 with tension, thus keeping the recording medium tight between these rollers 22 and 23. By operating the feed switch of the switch group 20, rotation of the driving source, not shown, is transferred to make the driving roller 22 and the driven roller 23 rotate, thus moving the recording medium 12 in the left or right direction, as illustrated in the arrow of the figure. A plate 24 behind the recording medium 12 is a backing plate to line the portion appearing from the window-type opening 11a.

As shown in Fig. 2, inside the frame case 11 is provided a reading mechanism 25 on one side. The reading mechanism 25 is one well known in the field of copying machines and writing boards of this type, and therefore an explanation on the detail is not made here. The reading mechanism 25 reads the information written on the recording medium 12 while the recording medium 12 is moved. The signals from the reading mechanism 25 are fed into the printer 17, the read information in a reduced size is recorded on a recording paper housed in the printer 17, and then the recording paper is discharged onto the paper receiver 16.

In the present invention, as shown in Fig. 2, the cleaning instrument 26 is pushed from back against the back surface of the tight endless recording medium 12. The cleaning instrument 26 is of square rod and has a face portion 26a that has a vertical opening 26b. As seen from the cross-sectional view shown in Fig. 3, the opening 26b has a concave groove 26c. Inside the concave groove 26c are mounted brushes 27, in vertical two lines. The leading ends of these brushes reach the face portion 26a.

In the above-mentioned example, the concave groove 26c has two brushes in vertical two lines. These two brushes can be replaced with two partition plates provided in two lines, as shown in Fig. 4, for example. Or, they can be replaced with a rotatable roller 29, as shown in Fig. 5. In this case, the roller should preferably have the diameter whose outer surface almost reaches the face portion 26a.

This type of cleaning instrument 26, as shown in Fig. 2, has at the top an inductive port 26d that leads to the concave groove 26c. To the inductive port 26d is connected a tube 30. The tube 30 is connected through a solenoid valve 31 to a storage container 32. At the bottom, similarly, the cleaning instrument 26 has a discharge port 26e that leads to the concave groove 26c. To the discharge port 26e is connected another tube 33. The tube 33 is connected through a pump 34 to the storage

container 32.

The storage container 32, for example, has a bottle-shaped container 36 that contains a cleaning liquid 37, as shown in Fig. 6. A cap 38 is attached to a mouth 36a of the container 36. In the container a filter 39 is hung down from the cap 38. A discharge pipe 40 and inductive pipe 41 is hung down from the cap 38. The tube 30 and the other tube 33 are connected to the discharge pipe 40 and the inductive pipe 41, respectively. The discharge pipe 40 reaches the bottom of the container 36 through the filter 39 while the inductive tube 41 reaches the same level as the mouth 36a.

This forms the following circulation route: the cleaning liquid circulates from the storage container 32 through the discharge pipe 40 into the tube 30. The cleaning liquid then flows through the solenoid valve 31 and leads to the inductive port 26d of the cleaning instrument 26. Through the concave groove 26c of the cleaning instrument, the cleaning liquid reaches up to the discharge port 26e. The cleaning liquid then passes the other tube 33 through the pump 34 and the inductive pipe 41 back to the storage container 32. The pump 34 is operated to allow the cleaning liquid 37 to circulate through the above circulation route while filtrated by the filter 39.

In the embodiment shown in the drawings, the storage container 32 shown in Fig. 2 is housed in the storage case 18, and the pump 34 shown in Fig. 2 in the storage case 19, respectively.

In the embodiment, it is preferable to provide a valve that shuts off the flow of the cleaning liquid 37 into the cleaning instrument 26, such as the above solenoid valve 31. It is needless to say that the valve is not necessarily limited to the solenoid valve as illustrated. For example, the solenoid valve can be replaced with a cam-operated mechanical valve that shuts off the cleaning liquid. In the embodiment of the present invention,

it is preferable to provide a filter such as the above filter 39, in the circulation route for the cleaning liquid. As illustrated, the filter is not necessarily installed inside the container 32, but it can be installed somewhere else in the circulation route for the cleaning liquid. By installing the filter 39 in the circulation route as above, the filter 39 removes impurities from the cleaning liquid 37.

The embodiment of the electric blackboard according to the present invention as above explained is used as described below. When the electric blackboard of the present invention is used, as in the case of the ordinary electric blackboard, the writing tool 14 on the tray 13 is held by hand. Letters, characters and pictures are written on the surface of the recording medium 12 while using the wiping tool 15 as required for erasing. When more writing space is required on the recording medium within the window-type opening 11a, the feed switch is operated in the switch group 20. The recording medium 12 is then fed and moved until a blank space desired appears within the window-type opening 11a. Then writing is restarted in the blank space obtained.

When the information written on the blackboard is to be printed out, the reading switch in the switch group 20 is pushed to feed the recording medium 12. All the information written on the recording medium 12 is read by the reading mechanism 25. The read information is recorded on a recording paper by the printer 17. The recording paper is then fed out onto the paper receiver 16.

When all the information written on the recording medium 12 is erased at a time, the erasing switch 20a is pushed in the switch group 20. The recording medium 12 moves and the pump 34 is actuated. A negative pressure is produced in the concave groove 26c of the cleaning instrument 26. The tension pulls the recording medium toward the cleaning instrument 26 for further tight contact between the recording medium 12

and the cleaning instrument 26. The recording medium 12 eventually comes into close contact with the contact face portion 26a of the cleaning instrument and its opening 26b. At the time, the leading tips of the brushes 27 come into contact with the surface of the recording medium 12, as shown in Fig. 3, to keep the recording medium 12 in shape and to keep the recording medium 12 out of the concave groove 26c. With the pump 34 operated, as shown by arrows in Fig. 7, the cleaning liquid 37 circulates from the storage container 32 through the concave groove 26c of the cleaning instrument 26 and flows back to the cleaning instrument, thus applying or coating the surface of the moving recording medium 12 with the cleaning liquid 37 that leaves the opening 26c of the cleaning instrument 26. In the example illustrated, the brushes 27 provided in the concave groove 26c help to evenly apply the surface of the recording medium 12 with the cleaning liquid 37 because the brushes can hold a sufficient amount of cleaning liquid 37.

After the written information has been erased, the erasing switch 20a is pushed to stop the moving of the recording medium 12 and the operation of the pump 34. In the embodiment shown, the solenoid valve 31 is closed by a timer for some period of time to shut off the cleaning liquid 37 that flows into the cleaning instrument 26 from the storage container 32, as shown in Fig. 8. The cleaning liquid 37 as well as ink sticking to the surface of the face portion 26a is then removed forcibly by suction from the cleaning instrument 26. When the cleaning liquid 37 has been completely removed from the face portion 26a after the lapse of the specified length of time, the pump 34 is stopped and the solenoid valve 31 is opened. This prevents the leakage of the cleaning liquid 37 from the cleaning instrument 26 after erasing is performed.

When the solenoid valve 31 of, for example, a three-port valve is used and the remaining cleaning liquid is removed by suction, the passage from

the storage container 32 to the cleaning instrument 26 is shut off, the opening of a passage to the atmosphere could all the more be effective for the incoming air in sucking the residual cleaning liquid.

In the embodiment, by operating the switches and levers provided as required, or when the erasing switch 20a is operated, the cleaning instrument 26 may automatically be contacted with or be kept apart from the recording medium 12. In other words, when the written information is erased, the tension of the recording medium 12 makes it contact against the cleaning instrument 26, as shown in Fig. 7. When the written information is not to be erased, operation of the solenoid valve, although not shown, allows the link mechanism to move the cleaning instrument 26, thus keeping the cleaning instrument 26 apart from the recording medium 12, as shown in Fig. 9.

In the illustrated embodiment, the contact face portion of the cleaning instrument 26 that comes into contact with the recording medium 12 is coated with Teflon, for example, by sticking a Teflon tape. This prevents friction-caused damage to the surface of the recording medium 12 and reduces frictional resistance between the recording medium 12 and the cleaning instrument 26.

Further, in the embodiment, the surface of the recording medium 12 is treated with sand mat by blasting sand. This increases the surface roughness in the recording medium 12, facilitates the writing of information on the recording medium 12, and provides glare-free visibility for the written information, for example, from the side of the recording medium 12.

In the embodiment as above-mentioned is shown as the wall-hanging type blackboard. According to the present invention, however, the writing board is not limited to the wall-hanging type, but can be of the stand-supported type in which the blackboard is supported by the stand, as

shown in Fig. 10. Alternatively, it may be of desk-top type, not shown, with smaller size.

In the above-mentioned embodiments, the recording medium 12 is designed to move in the left or right direction, but the top to or top from bottom direction structure is also another choice, as shown in Fig. 11. That is to say, in Fig. 11, the driving roller 22 and the driven roller 23 are set in the horizontal position and the guide roller 43 is added. These rollers 22, 23, and 43 are set in such a way that the recording medium 12 is passed between and around the rollers 22, 23, 43 to form a triangle. The cleaning instrument 26 in this embodiment is contacted from below against the back of the part of the recording medium 12 that forms a base of the triangle between driving roller 22 and the guide roller 43. The cleaning instrument 26 is provided on a liquid receiving plate 44 and unexpected leakage of the cleaning liquid 37 from the cleaning instrument 26 drops into the liquid receiving plate 44. The cleaning liquid 37 in the plate 44 flows back to the storage container 32 through the tube 45. In Fig. 11, same reference numerals are used for showing the same parts and any detailed description will not be repeated.

In addition, in the embodiments above mentioned, an endless type recording medium 12 has been shown to move in loop movement. According to the invention, however, not an endless belt can be an alternative to the above type of recording medium 12. The ended belt type can be designed to be reciprocated tight between two and more rollers. A roll-up screen type recording medium can be another alternative. When this type is used, the recording medium is unfolded and hooked, being kept tight like a screen. After use, the recording medium is unhooked and automatically rolled up, for example. The cleaning instrument 26 is placed, for example, where the recording medium is pulled out, in such a way that the recording medium is placed between a back plate and the

cleaning instrument 26. When rolled up after use, the recording medium is touched and applied with the cleaning liquid by the cleaning instrument and the written information is erased.

In addition, in the above mentioned embodiments of the writing board of this invention the recording medium is moved with the cleaning instrument 26 fixed. However, the invention is not limited to the fixed type cleaning instrument. In short, the cleaning instrument can be relatively moved along the surface of the recording medium. As shown in Fig. 12, when the written information is erased, for example, the plate-like recording medium 12 can be fixed instead so that the cleaning instrument 26 can be moved along the recording medium 12. In the example of Fig. 12, the frame case 11 has a rail 50 on the top edge thereof. A slider 51 can move in a horizontal direction to right or left along the rail. The upper part of a traveling body 52 is attached to the slider 51.

As seen from the cross-sectional view shown in Fig. 13, the traveling body 52 incorporates a combination of the reading mechanism 25 and the cleaning instrument 26 as a single unit in a case 53. The cleaning instrument is preloaded by a spring 54 and is made to contact against the plate-like recording medium 12. The case 53 has a lever-shaped switching member 55 on its outer surface. By turning the switching member 55, the spring 54 is allowed to contact the cleaning instrument 26 against the recording medium 12 when the written information is to be erased. When the written information is not to be erased, the recording medium 12 is moved against the force of the spring 54, thus keeping the cleaning instrument 26 apart from the recording medium 12.

The upper portion of the above-mentioned traveling body 52 is mounted to the above-mentioned slider 51 through an attaching shaft 56, and the outer periphery of a roller 57 provided at the bottom of the traveling body 52 is made to contact with the front bottom edge of the frame

case 11, as shown in Fig. 14. The roller 57 is supported rotatably around a vertical shaft 58, at the bottom of the traveling body 52. In addition, the traveling body 52 is rotatable around the attaching shaft 56 and can be opened in a way shown in Fig. 15. In the embodiment shown in Figs. 12 to 15, the same reference numerals for the same parts already described are used, and any detailed description is not made again.

Availability in Industry

As fully explained above, the present invention relates to writing boards such as the wall-hanging type, stand-supported type, and desktop type of blackboards, white boards, and green boards, in which writing is made on a recording medium on their surfaces by the use of writing tools such as felt-tip markers.



WHAT IS CLAIMED IS:

(1) In a writing board on which writing is made on a surface of a recording medium (12) in ink that can be erased by cleaning liquid (37), the writing board comprising:

an opening (26b) of a cleaning instrument (26) that is contacted against a recording medium (12);

the cleaning instrument being movable relatively with respect to the surface of the recording medium;

a storage container (32) that holds the cleaning liquid (37);

a pump (34) that allows the cleaning liquid to circulate through the cleaning instrument (26); and

an erasing switch (20a) that actuates the pump and allows the cleaning instrument (26) to move relatively with respect to the recording medium.

(2) The writing board as claimed in Claim (1) further provided with a valve (31) that shuts off the cleaning liquid (37) that enters into the said cleaning instrument (26).

(3) The writing board as claimed in Claim (1), in which the said cleaning instrument (26) can be brought into contact with or kept apart from the said recording medium (12) as required.

(4) The writing board as claimed in Claim (1), in which the said cleaning instrument (26) that comes into contact with the recording medium (12) has a surface treated with Teflon.

(5) The writing board as claimed in Claim (1), in which the recording medium (12) has a surface treated with sand mat.

(6) The writing board as claimed in Claim (1), in which a filter (39) is provided in a circulation route for the said cleaning liquid (37).

