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DOFFER COMB MECHANISM

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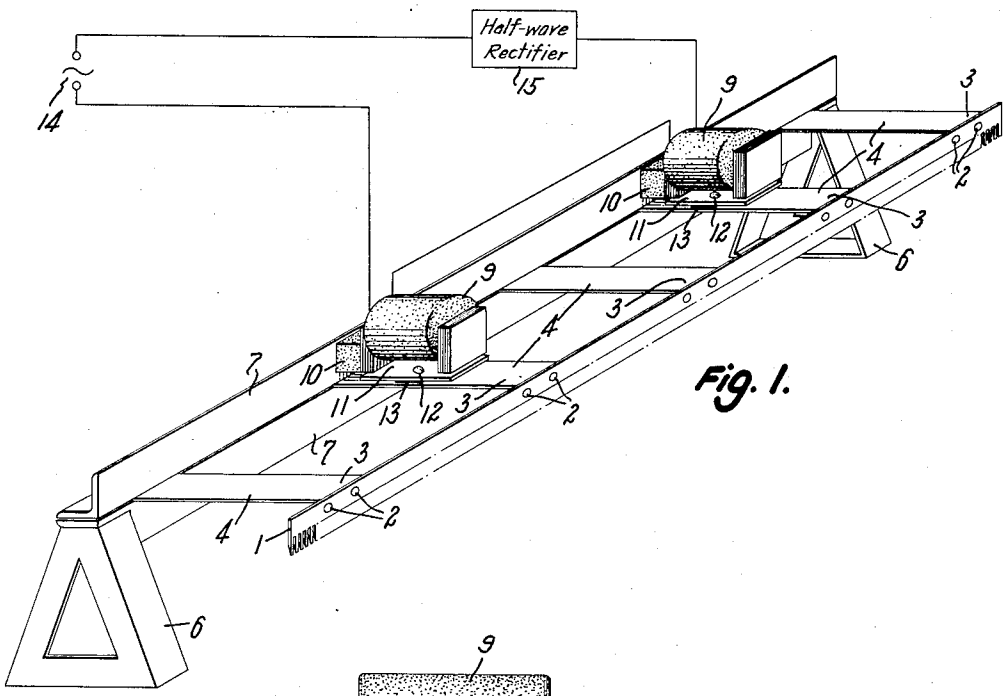


Fig. 1.

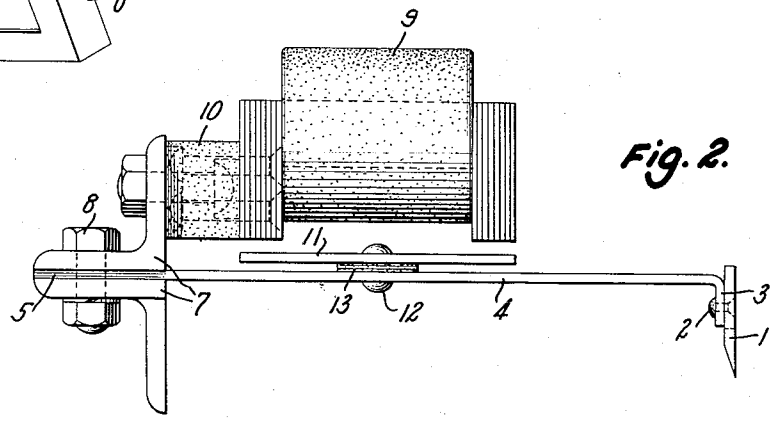


Fig. 2.

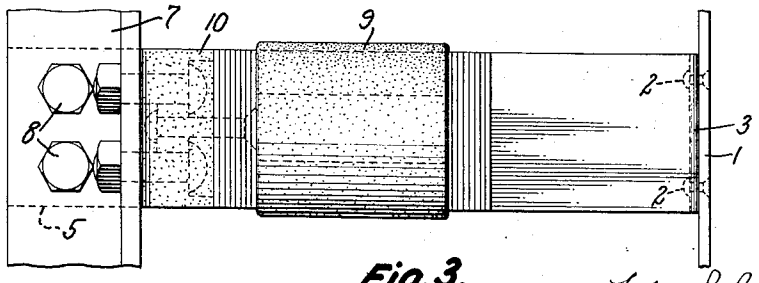


Fig. 3.

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DOFFER COMB MECHANISM

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5 Claims. (Cl. 19—106)

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This invention relates to doffer comb mechanism for carding machines, and it has special reference to the means for mounting and oscillating, reciprocating or vibrating the doffer comb.

As is well known in the art, the conventional doffer comb mechanism includes a thin, toothed comb member or blade supported, for operative oscillating, reciprocating or vibrating motion in relation to the card clothing of the carding machine, upon the free ends of arms or levers extending radially from a rock shaft mounted for oscillation in bearings fixed to the machine frame and having at least one of its ends provided with oscillation-imparting means, commonly called the "comb box," which include mechanically driven cam and yoke means running in a bath of lubricant.

Obviously, such a mechanism, which normally functions to oscillate or vibrate the doffer comb through an arc of about 20° at a frequency of between 20 and 30 cycles per second, is subject to considerable wear and, in normal operation, must be oiled at least once a day and overhauled at least once a year. Moreover, leakage of oil at the "comb box," which it is practically impossible wholly to prevent, sometimes results in fouling, discoloring or other injury of the material operated upon by the machine, with accompanying annoyance and possible loss.

One object of the present invention is to provide means for mounting and actuating the doffer comb whereby the disadvantages of the conventional mechanism are overcome and materially improved operating characteristics attained.

Another object is to furnish a doffer comb mechanism in which all rotating, oscillating and similarly operating mechanical parts of a more or less conventional nature, and subject to friction and wear which necessitate lubrication, are dispensed with, thus affording longer operative life and obviating the need for periodic overhaul, to thus provide for more efficient and continuous operation.

A further object is to substitute for the conventional rather heavy and cumbersome doffer comb mechanism a light-weight comb member and actuating mechanism therefor by virtue of which the periodicity of vibration, reciprocation or oscillation of the comb member may be measurably increased, the extent of the arc of its stroke reduced, and the efficiency of the carding machine thereby enhanced.

The invention comprises a doffer comb mechanism for carding machines, including a comb member mounted upon the free oscillatable ends

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of flexible, inherently resilient or springy, arm means the opposite ends of which are rigidly carried by a support preferably affixed to the machine frame, and electromagnetic means for inducing controlled, vibratory oscillation in the arm means, whereby the desired motion of the comb member relatively to the card clothing of the machine may be obtained, all as will be explained hereinafter more fully and finally claimed.

In the accompanying drawing illustrating the invention, in the several figures of which like parts are similarly designated,

Fig. 1 is a perspective view of the mechanism of the invention viewed from that face of the comb member which is normally in proximity to the card clothing of the carding machine,

Fig. 2 is a greatly enlarged end elevation of essential parts of the mechanism shown in Fig. 1, and

Fig. 3 is a fragmentary top plan view of parts shown in Figs. 1 and 2.

The mechanism of the invention comprises essentially a doffer comb member 1 of somewhat conventional form preferably rigidly affixed as by rivets 2, or the like, to the free ends 3 of flexible, inherently resilient or springy, thin, flat arm means 4 having their opposite ends 5 rigidly mounted in fixed support means 6 preferably carried by the frame (not shown) of the carding machine and including similar rails 7 between which the ends 5 of the arm means 4 may be securely clamped by bolts 8.

In order to impart to the arm means 4 controlled vibratory oscillation which will result in the desired oscillation or reciprocation of the comb means or member 1 relatively to the card clothing (not shown), electromagnetic means are provided comprising, preferably, electromagnet 9 mounted upon, but insulated from, the rail means 7 of the support means 6 by blocks 10, and armatures 11 for these magnets 9 secured as by rivets 12 to the arm means 4 but spaced therefrom by insulator blocks 13.

The electromagnets 9 may be intermittently energized from a source 14 of alternating current through a suitable circuit including a conventional half-wave rectifier 15, as indicated diagrammatically in Fig. 1.

It will be understood that the length of lever afforded by the spring arm means 4, their thickness and width, the weight of the comb member 1, and the normal spacing of the magnet armature 11 from the poles of the magnet 9 will all be effective to determine the frequency and amplitude of oscillatory movement of the comb

member. However, all of these factors which enter into the design and assembly of the comb member and its supporting means will be so determined that the comb member and supporting means will have a natural frequency of mechanical vibration substantially equal to the frequency of energization of the electromagnetic means.

For operation of the mechanism the usual 60 cycle commercial alternating current may be used, resulting in a similar oscillating frequency of the comb member, or, if commercial current of alternating cycle which is a departure from the accepted standard of 60 cycles is prevalent, the tuning of the comb member and its supporting means may be appropriately adjusted.

As representative of a practical embodiment of the invention for operation on 60 cycle commercial alternating current, the comb member may have a weight of approximately one half lb., the arm members may number 5, have a length of 4 inches, a width of 2 inches, and a thickness of 0.0625 inch, and be made of spring steel; and a gap of ¼ inch may be provided between the poles of the electromagnet and its armature.

As will be apparent from the foregoing description, the comb member itself is the only element of the conventional doffer comb mechanism retained as a part of the apparatus of the invention, and even this element may be different from those ordinarily employed in that it may be made of material of lighter weight than that customarily used, for example aluminum or other metal lighter than the steel commonly employed, thus not only reducing the mass to be oscillated but, by virtue of the lessened weight, tending to improve the functioning of the device by permitting an increased frequency of oscillation with a reduction in the extent of the arc of oscillation.

Furthermore, by employing the principle of mechanical resonance afforded by the spring arm means, the energy required to accelerate the comb member in its change of direction at the limits of its oscillatory stroke is stored in the arm means and need not be supplied or augmented from an external source as is conventional in usual doffer comb mechanism. In fact, the efficiency of the mechanism is enhanced for the reason that it is necessary to supply only such energy as goes into the work of stripping the fiber, and that small amount dissipated in windage and heat in the springs.

Any flexible, resilient material having the required toughness, springiness and resistance to failure due to repeated flexing, may be used in the arm means for supporting the comb member. It has been found in actual practice that ordinary spring steel has the properties required for satisfactory operation over extended periods of time.

Various changes and modifications are considered to be within the principle of the invention and the scope of the following claims.

What I claim is:

1. In a doffer comb mechanism, a comb member, and means for supporting and oscillating said comb member in predetermined relation to the card clothing of a carding machine, including flexible arm means for mounting said comb member in spaced relation to a fixed support, one end of said arm means being rigidly secured to said support and the other end of said arm means being free for vibratory oscillation, said comb member being secured to the free end of said arm means, and electromagnetic means cooperative magnetically with said arm means and disposed intermediate the ends of said arm means, said electromagnetic means being capable of being intermittently energized for intermittently attracting and imparting vibratory oscillation to said arm means and therethrough to said comb member.

2. Doffer comb mechanism as claimed in claim 1, in which the supporting means has a natural frequency of mechanical vibration substantially equal to the frequency of energization of the electromagnetic means.

3. In a doffer comb mechanism, a comb member, and means for supporting and oscillating said comb member in predetermined relation to the card clothing of a carding machine, including a plurality of flat spring arm means rigidly secured at one end to a fixed support and having their other ends free for vibratory oscillation and supporting said comb member in spaced relation to said fixed support, and electromagnetic means cooperative magnetically with said arm means and disposed intermediate the ends of said arm means and capable of being intermittently energized for intermittently attracting and imparting vibratory oscillation to said arm means and therethrough to said comb member.

4. Doffer comb mechanism as claimed in claim 3, in which the supporting means has a natural frequency of mechanical vibration substantially equal to the frequency of energization of the electromagnetic means.

5. In a doffer comb mechanism, a comb assembly comprising a plurality of flat spring arms arranged in parallel spaced relation with the flat sides thereof in a common plane, a support, one end of each of said arms being rigidly secured to said support and the other ends of said arms being free for vibratory oscillation, and a comb member secured to the said other ends of said arms, the longitudinal axis of said comb member extending parallel to the plane of said arms, and electromagnetic means cooperative magnetically with certain of said arms and disposed intermediate the ends of said arms, said electromagnetic means being adapted for energization intermittently from a source of periodic current pulses to thereby effect oscillation of said comb assembly, and the natural frequency of mechanical vibration of said comb assembly being substantially equal to the frequency of energization of said electromagnetic means.

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