To all whom it may concern:

Be it known that we, FREDERIC E. KIP, a citizen of the United States, and a resident of Montclair, county of Essex, State of New Jersey, and EDWIN C. SMITH, a citizen of the United States, and a resident of Seekonk, State of Massachusetts, have invented certain new and useful Improvements in Traveling-Flat Carding-Engines, of which the following is a specification.

The present invention relates to revolving flat carding engines. In cotton processes from the opening and picking machinery the cotton goes to the carding engine in the form of a lap which contains a considerable percentage of husk and motes. The function of the flats in a carding engine is a dual one; first to remove the neps and motes that have been left from the picking operation and to remove the short staple, and second, to parallelize the staple the latter being of importance in that it increases the strength of the yarns. As is well known the carding action in revolving flat carding engines is most efficient in proximity to the licker-in because of the clean condition of the flats at that point, the usual practice being to locate the stripping comb for the flats in proximity to the doffer. The efficiency of the flats depending upon the degree of their cleanliness one object of the present invention is to increase the product of the card and to improve the general characteristics of the sliver and consequently of the yarns by dividing the flats into two or more independent sets or sections each set having its individual stripping comb. By such means while maintaining substantially the same extent of flat surface extending over the carding cylinder we are enabled to shorten the travel of the flats thereby decreasing the time that they are in working relation with the carding cylinder and permitting of the employment of individual stripping or cleaning mechanisms. Furthermore, the division of the flats admits of driving the sets of flats at different rates of speed.

Our invention also includes automatic means for removing the stripplings, said means comprising an endless belt or apron located so as to take the stripplings from the combs and preferably running transversely of the direction of movement of the flats. These and other features of the invention will be understood by reference to the accompanying drawings in which:

Figure 1 is a side elevation of a traveling flat carding engine constructed according to our invention; Fig. 2 a central vertical section thereof, partly diagrammatic; Fig. 3 a vertical section on the plane of the line 3—3 of Fig. 1; Fig. 4 a view similar to Fig. 2 to illustrate a modification; Fig. 5 a detail view of the mechanism for driving the belt or apron which receives the stripplings; Fig. 6 a detail view of part of the mechanism for driving the flats; and Fig. 7 a modified construction adapted to receive the stripplings from both sets of flats on the same apron.

Similar reference numerals indicate similar parts in the several views.

Referring to the drawings the numeral 1 designates the frame of the engine, 2 the main cylinder, 3 the licker-in, and 4 the doffer. These parts, constituting no part of the present invention, may be constructed and operated as usual, the cylinder being covered with card clothing suitable to the purpose and mounted on a suitable shaft 7 connected to a source of power by which the cylinder is rotated.

In carrying out our invention we provide a plurality of sets of flats according to the particular conditions obtaining in the engine to which they are applied. For the sake of simplicity we have shown two sets in the drawings, designated respectively 5 and 6, although it is to be understood that we do not limit ourselves to that number. In practice two sets will generally be sufficient. The flats as usual consist of bars covered with card clothing and are mounted on and attached to endless chains which pass over suitable sheaves and are driven from the main shaft 7. The flats 5, as shown, enter into working relation with the main cylinder at a point in proximity to the licker-in and leave it at a point a little in advance of the uppermost position of a given section of the main cylinder, and the flats 6 enter into working relation with the main cylinder to the right of said position and leave it in proximity to the doffer. This relative length of travel of the two sets of flats is stated merely by way of illustration as it is obvious it may be greater or less. In practice, however, the length of travel should be substantially equal for the different sets. The separation of the
flats at their proximate points is essential in order to afford space for a belt or apron adapted to remove the stripplings from the flats 5 as will be presently explained.

The flats 5 and 6 are guided in their movements by suitable idler sheaves 8 supported upon brackets attached to the frame. Inasmuch as the mechanisms for driving the flats and for actuating the combing combs are similar for the different sets it will only be necessary to describe the same with relation to the flats 5, the numerals designating the corresponding parts for the flats 6 being primed. Referring more particularly to Fig. 3, a pulley 9 on the driving shaft 7 is connected by belt 10 to a pulley 11 on the shaft of one of the members of a variable speed motion. The motion selected for illustration is well known and comprises two cones 12 and 13 having a shiftable belt 14 between them, it being readily understood that as said belt is moved longitudinally of the driving cone 12 a variable speed will be imparted to the driven cone 13. On the shaft of the latter is keyed a bevel gear 15 which meshes with a similar gear 16 on the end of a short vertical shaft 17 having bearings in suitable brackets. On the shaft 17 is a worm 18 which meshes with a wheel 19 (see Fig. 7) fast on a drive sheave 20 around which pass the flats 5.

It will be obvious from the foregoing description that as the sheave 20 is rotated the flats 5 will be caused to travel in the direction of the arrow in working relation with the main cylinder 2, performing their well known function. The flats 6 are actuated by mechanism similar to that above described with reference to flats 5. The two sets of flats may be caused to travel at the same or at different rates by simply shifting the belts 14 and 15. This feature is of importance in that it enables the flats 5 to be driven faster or slower than the flats 6 to meet varying conditions of staple. In practice the main cylinder is driven at the rate of about 150 revolutions per minute and the flats are caused to travel at the rate of about 2 inches per minute. These relative rates may, however, be varied to meet varying conditions.

The cleaning or stripping of the flats is effected by the following means. Supported in brackets 21 attached to the frame is a shaft 22 carrying at one end a pulley 23 which is connected by belt 24 to a pulley 25 on the main shaft 7. On the shaft 22 are eccentrics 26 to the rods of which is secured the stripping comb 27. This comb which may be of the usual type, is carried by a bar 28 in a bracket 29 connected to the eccentric rod as shown in Fig. 2. It will thus be seen that as the shaft 22 is rotated a reciprocating movement will be imparted to the comb to effect the cleaning of the flats in a well known manner. The parts may be so timed as to impart to the combs about 75 beats per minute. The cleaning or stripping mechanism for the flats 6 in the machine illustrated in Figs. 1 and 2 is the same in all respects as just described with reference to the flats 5, the corresponding parts being primed.

For the purpose of removing the stripplings from flats 5 we provide an endless belt or apron 35 which is in position to receive the stripplings as indicated in Fig. 2. The periphery of the main cylinder between the point at which the flats 5 leave and the flats 6 enter into working relation with said cylinder is covered by a plate 36 having edges as shown, there being sufficient space between the main cylinder and said plate to permit of the passage of the web of cotton. The belt 35 may be conveniently located above the plate 36, side walls 37 secured to said plate extending over the belt to confine the stripplings laterally. The belt 35 passes around two rollers 38 and 39, the former having bearings in a bracket 40 which is adjustable through its threaded stem 41 seated in a base forming part of the frame. By adjusting the bracket 40 the belt may be kept taut as will be readily understood. Roller 39 is supported in bearings in a bracket 42 and on the side of said roller is fixed a ratchet wheel 43 engaged by a spring pressed actuating pawl 44 and a back lash pawl 45. The pawl 44 is pivoted on an arm 46 loosely mounted on the roller shaft. A link 47 is connected to the arm 46 and to an eccentric 48 on the shaft of cone 13. An intermittent feeding movement will thus be imparted to belt 35 for each revolution of the crank disk 48. The parts may be timed to feed the belt 35 at any desired rate, a movement of not exceeding six feet per minute being sufficient in practice. The stripplings are removed from the apron in a manner similar to that by which they are removed from the flats. Attached to the arm 46 is a stripper comb or blade 51, its working edge being closely adjacent the face of the apron. As the arm 46 is oscillated to feed the apron forward, the blade 51 is vibrated with it, separating the stripplings from the apron and causing them to fall into the trough or chute 52, 53 by which they are conveyed to the can 53 as indicated in Fig. 1.

In Figs. 1 and 2 we have shown a stationary receptacle 54 to receive the stripplings from flats 6, although if desired a belt similar to that above described may be used as indicated in Fig. 4. We have also indicated diagrammatically in Fig. 4 a belt 55 connecting the sheaves 20 and 20' of the flats 5 and 6 respectively. Such means may be employed when the sets of flats are to be driven at the same speed thus doing away with independent driving mechanism for the flats 6. It is preferred, however, to equip the machine with the two driving mechanisms.
as thereby the sets of flats may be driven at different speeds through the variable speed motions as well as at the same speed.

In Fig. 8 we show a modified construction in which the proximate faces of the two sets of flats 5 and 6 are so related as to permit the mounting of a comb 56 for cleaning the latter set of flats opposite the comb 27, both of said combs being connected in the manner before described to the eccentrics 26 on shaft 22. This arrangement provides for the cleaning of flats 6 immediately before they enter into working relation with the cylinder and requires but a single belt 55 to receive and convey the stripping from both sets of flats.

We prefer to use for the apron or belt 35 a suitable textile but any other suitable material may be employed. If desired the belt 35 may be manually advanced from time to time thus doing away with the mechanism for automatically effecting an intermittent movement as described.

When the cards are clean, their efficiency is materially increased, and by dividing the flats into a plurality of sets, as described in the foregoing specification, we obtain a product equal to or exceeding double carding, due to the increased efficiency of the cleaner flats, and the removal thereby of a greater amount of foreign material from the product, and also we are enabled to increase the production of the carding engine fully 25 per cent. to 35 per cent. more than heretofore, thereby materially cutting down the cost of production. Notwithstanding this increase of production, the product is decidedly improved in quality, because of the capability of removing from the cotton a greater percentage of the foreign matter, and also of the better parallelization of the staple, making both a cleaner, better and stronger yarn.

We have shown our invention as applied to the manufacture of cotton yarns; we wish however to have it understood that same may be used on any material where applicable.

What we claim and desire to secure by Letters Patent is:

1. In a traveling flat carding engine the combination of a cylinder, a plurality of sets of flats, means to cause said flats to travel in working relation with the cylinder, a stripping or cleaning device for each set of flats, and conveyers adapted to receive and remove the strippings located below the respective cleaning devices.

2. In a traveling flat carding engine the combination of a cylinder, two sets of flats, means to cause said flats to travel in working relation with the cylinder, a stripping or cleaning device for each set of flats, conveyers adapted to receive the strippings from the sets of flats located at the points where said flats leave the cylinder, and means for moving said conveyor.

3. In a traveling flat carding engine the combination of a cylinder, a plurality of sets of flats, means to cause said flats to travel in working relation with the cylinder, stripping or cleaning devices for each set of flats, a conveyor located so as to take the strippings from two contiguous sets of flats, and means for moving said conveyor.

4. In a traveling flat carding engine the combination of a cylinder, a plurality of sets of flats, means to cause said flats to travel in working relation with the cylinder, stripping or cleaning devices for each set of flats, a conveyor located so as to take the strippings from two contiguous sets of flats, said conveyor running transversely of the direction of travel of the flats, and means for moving said conveyor.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

FREDERIC E. KIP.

Witnesses:
ROBERT W. ASHLEY,
MAY S. AVERY.

In witness whereof, I have hereunto signed my name in the presence of two subscribing witnesses.

EDWIN C. SMITH.

Witnesses:
WILBER T. REYNOLDS,
CHARLES E. COPeland.