Dec. 29, 1925. 1,567,541

A. E. OXLEY

REVOLVING FLAT CARDING ENGINE

Filed April 14, 1925. 5 Sheets-Sheet 1

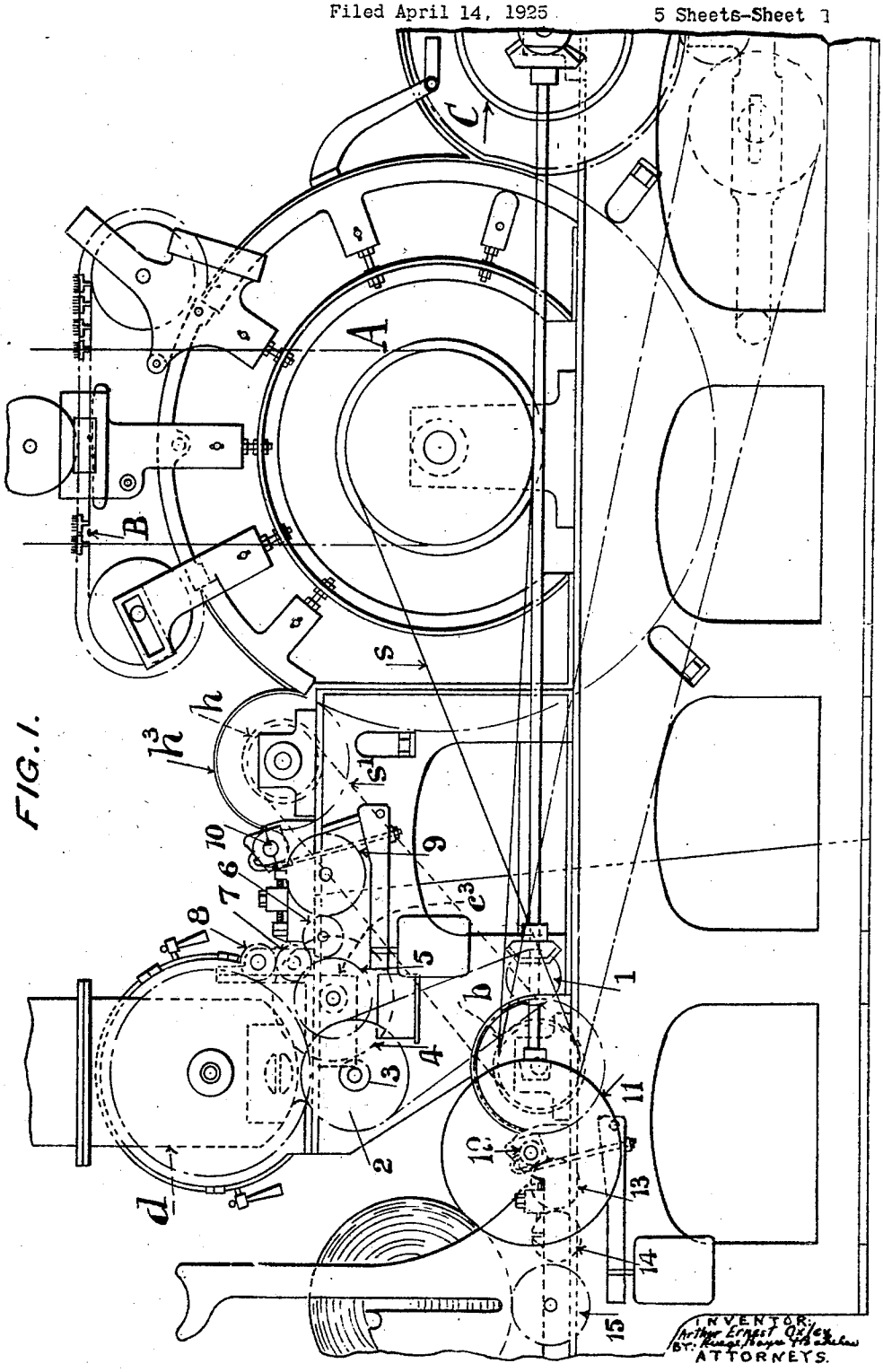


FIG. 1.

INVENTOR:
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REVOLVING FLAT CARDING ENGINE

Filed April 14, 1925 5 Sheets-Sheet 2

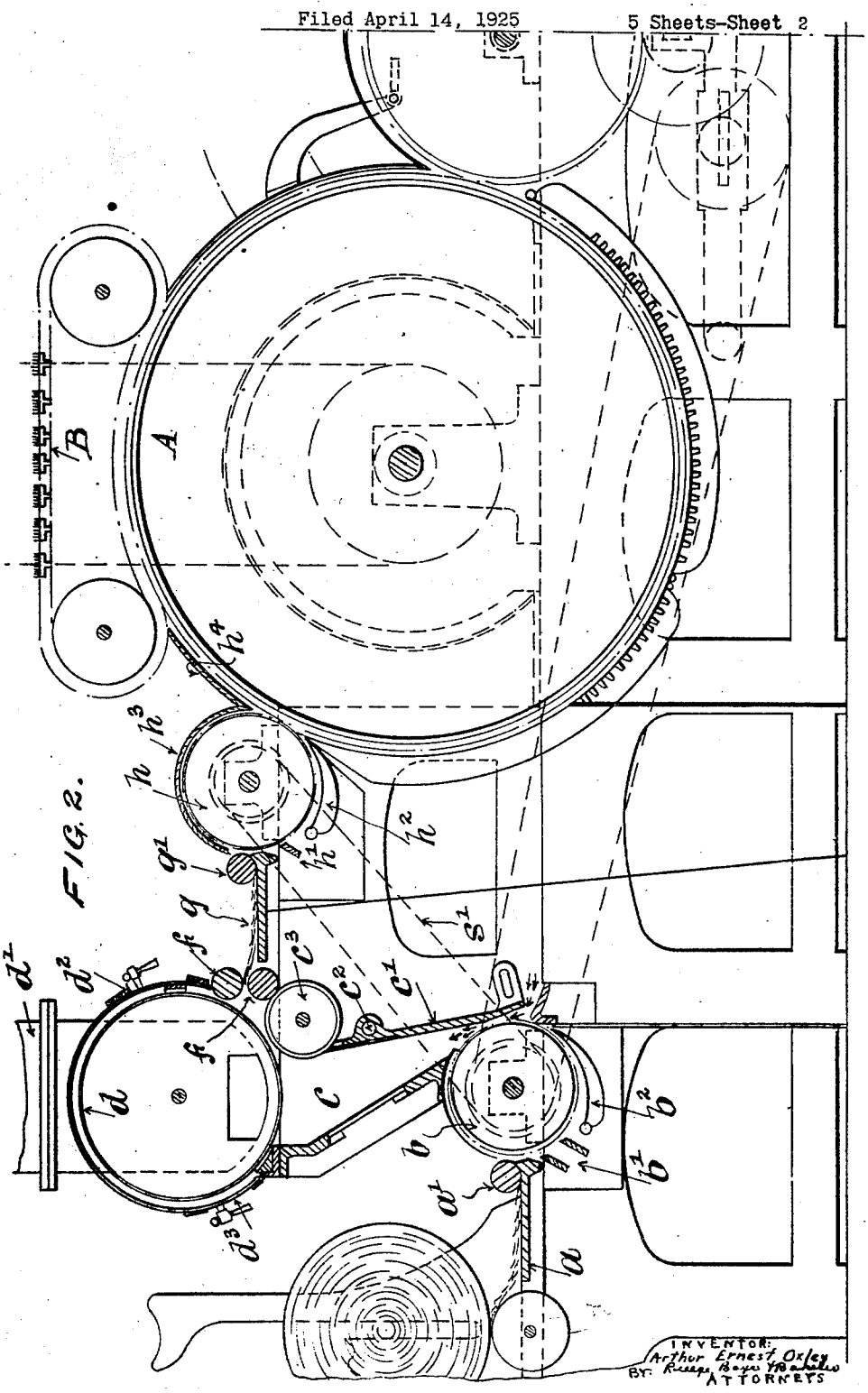


FIG. 2.

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REVOLVING FLAT CARDING ENGINE

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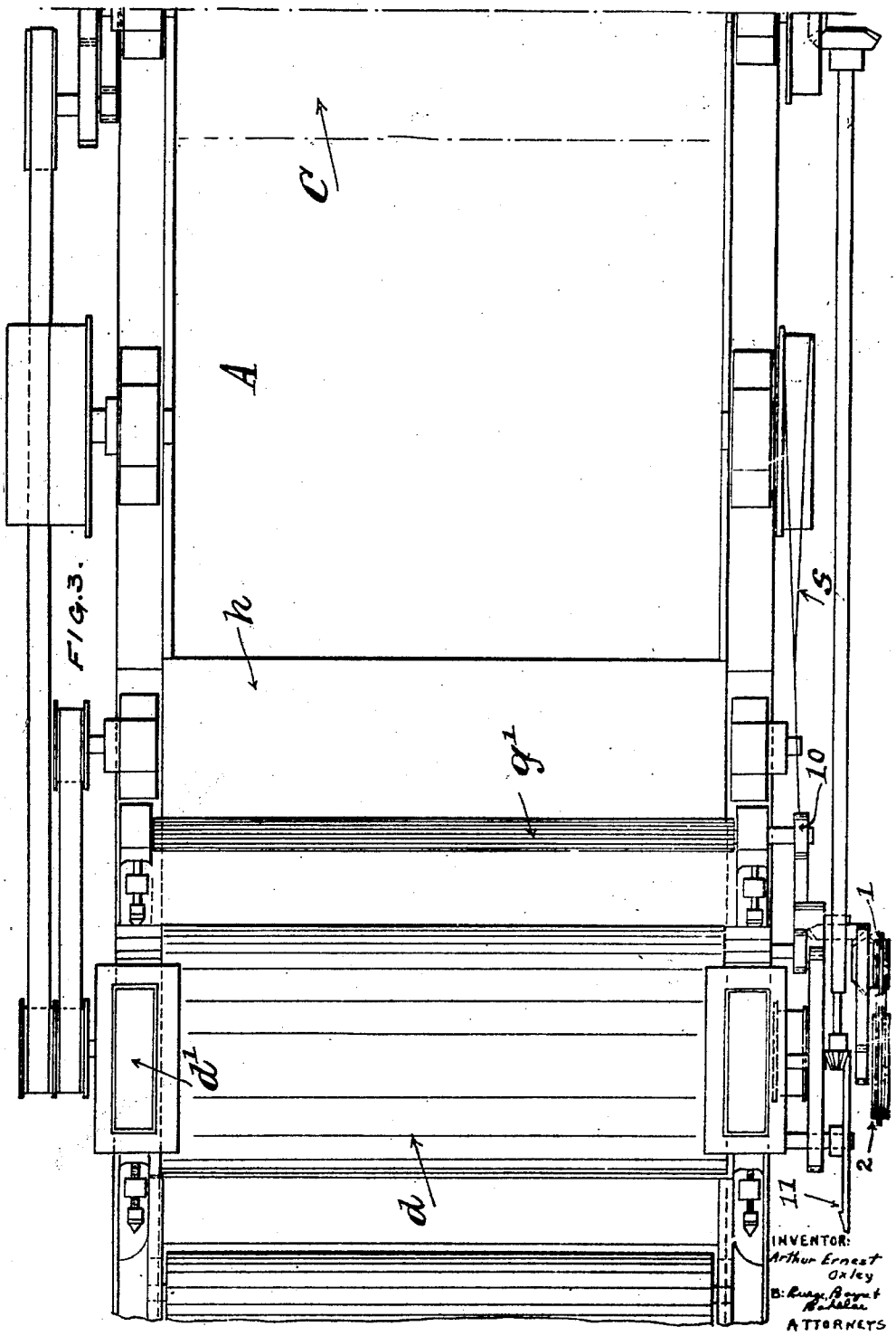


FIG. 3.

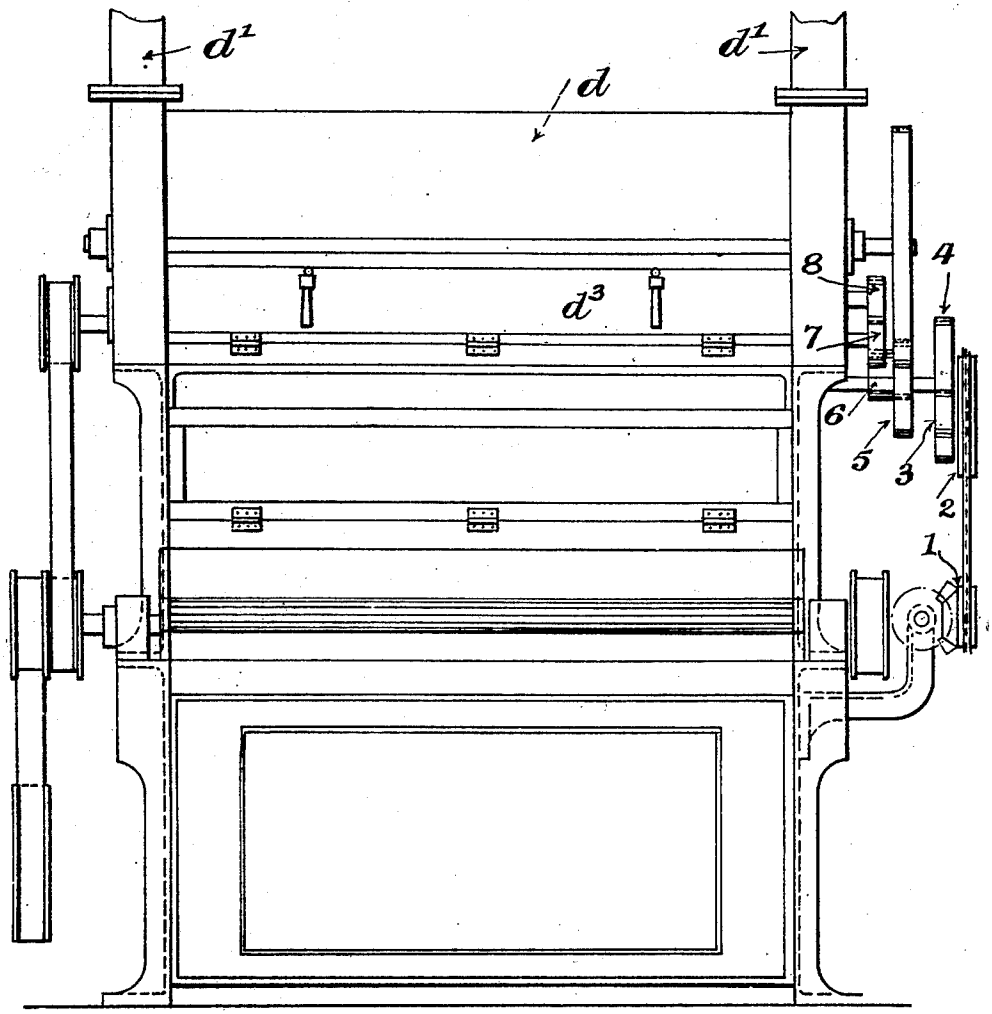
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REVOLVING FLAT CARDING ENGINE

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FIG. 4.



INVENTOR:
Arthur Ernest Oxley
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Dec. 29, 1925. 1,567,541

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REVOLVING FLAT CARDING ENGINE

Filed April 14, 1925 5 Sheets-Sheet 5

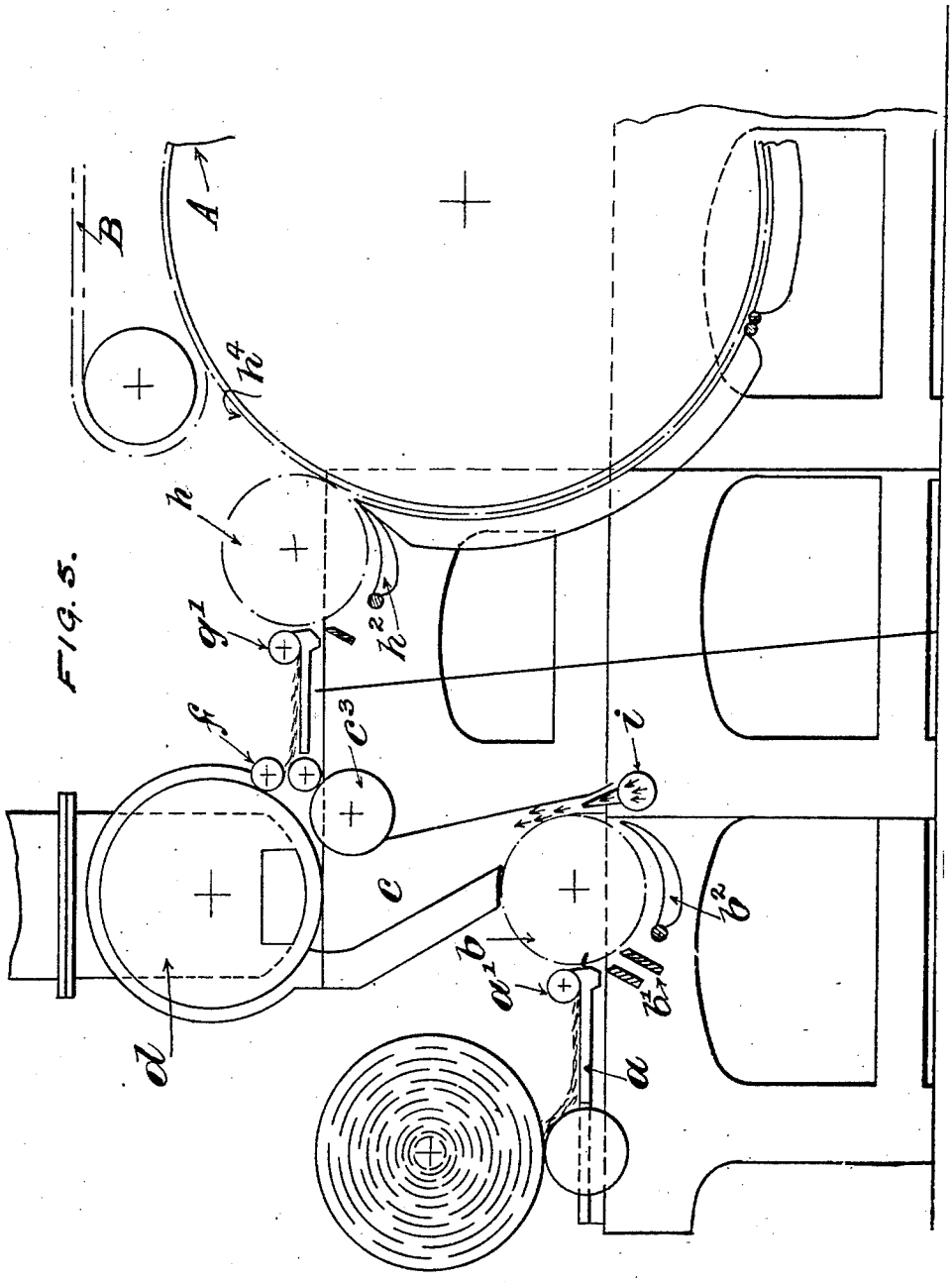


FIG. 5.

INVENTOR:
Arthur Ernest Oxley
BY: Rieg, Boyce & Bakelaar
ATTORNEYS

Patented Dec. 29, 1925. 1,567,541

UNITED STATES PATENT OFFICE.

ARTHUR ERNEST OXLEY, OF MANCHESTER, ENGLAND, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, OF ONE-HALF TO THE BRITISH COTTON INDUSTRY RESEARCH ASSOCIATION, OF MANCHESTER, ENGLAND, AND ONE-HALF TO PLATT BROTHERS AND COMPANY, LIMITED, OF OLDHAM, ENGLAND.

REVOLVING-FLAT CARDING ENGINE.

Application filed April 14, 1925. Serial No. 22,957.

To all whom it may concern:

Be it known that I, ARTHUR ERNEST OXLEY, a subject of the King of Great Britain and Ireland, residing at 57 Kingston Road, Didsbury, Manchester, in the county of Lancaster, England, have invented new and useful Improvements in Revolving-Flat Carding Engines, of which the following is a specification.

This invention has reference to carding engines of the revolving flat type and concerns an improved method of working the fibrous material passing therethrough and means to that end.

As the result of elaborate tests and investigations I am convinced that practically no step by step treatment of the fibre from flat to flat takes place in the revolving flat carding engine. The outstanding fact following my research is, that the fibre is blown into or delivered to each successive flat as the same comes into position upon the bends and the carding action obtained is the action of the cylinder with respect to such particular flat as same travels over the bends. The delivery of the fibre may be to a degree to adjacent flats coming into position upon the bends but, broadly, my view is that the cotton after passing the licker-in is dragged either by the cylinder or conducted by air currents or both and blown into the flats, successively and one by one as they reach the bends. The cylinder proceeds to comb the charged flats and it is probable such combing action goes on while the flat is moving from the first to somewhere near the second setting bracket. Once, however, the cylinder gathers fibres from a flat it does not hand the fibre by a step by step process to forward flats except in the case of the presence of neps or as a result of mechanical agency.

I have made many experiments by introducing sections of dyed lap or cotton into the card.

As examples of simple tests 12 inches of brown lap were fed into the card, and 24 inches of brown lap each preceded and followed by a white lap. The setting need not be dealt with. Photographs of the material on the flats show that in the one case the brown cotton is distributed mainly over two flats, and, in the other case, over four flats, which is what I should expect as the result of my theory and experiments. Traces of brown occurred on 10 flats ahead of the one which came into position on the bends as the brown lap entered. This I set down partly to the effect of eddy currents, as also traces of brown stain due to the blow over at the front stripping plate. As a general result I have found that the amount of introduced brown cotton carried forward step by step as regards the flats, during the whole time the flats are travelling over the bends is negligible compared with the brown cotton on the flats receiving the brown lap initially as such flats take their position on the bends while the brown lap is being fed through. The sum total of my investigations proves, that substantially the flats ahead of those actually receiving the cotton blown or carried by the main cylinder from the licker-in are not performing any true carding action. This being so, there seems no justification for the use of some 46 flats (at present an ordinary number) in contact with the bends, and, I propose to materially reduce the number of flats which pass over the bends at any particular time as for example I may employ about 48 flats in total having about 16 or slightly more or less contacting with the bends at any particular time. Such a procedure will result in a number of advantages such as saving in the cost of flat bars, such cost being more than halved, less power to drive the flats and simplification of setting, etc. Further, the diameter of the main cylinder can be materially reduced—say to 40 inches or more or less. The power to reduce the cylinder considerably in diameter possesses a number of advantages in so much as it allows me to introduce into the card, apparatus or means which are calculated to enable me to produce a more uniform lap or more uniform fibrous feed for the card and one more nep free or in better condition for action of the flats and main cylinder. Such apparatus or means can become part of the mechanism of the improved card without the necessity of requiring substantially greater or even any greater space than is now occupied by the present revolving flat card. Said apparatus or means are intended to act upon the material before same reaches the main

cylinder and their construction and arrangement is such as to ensure a more uniform lap or uniform feed of material and one which is to a large extent nep free and in better condition for subsequent treatment.

I therefore make use of a comparatively small main cylinder say about 40 inches diameter or more or less and I employ a chain of flats as for example 46 in number or less or more as against about 110 as usual. About 16 of said flats contact with the bends or are in working position and these are connected by chains and supported in ordinary manner by brackets, etc., and have the usual stripping brushes, cleaning comb, and the like. The doffer may be of ordinary or smaller size, and the doffing comb, rollers, coiler, and sliver forming mechanism with coiler-can supporting mechanism at the delivery end of the card are of ordinary type.

Whether the main cylinder be reduced in diameter or not, along with the use of a greatly reduced number of flats as already indicated, I locate between the initial feed device at the back of the card and intermediate of such initial feed devices and the main cylinder and flats mechanism which subjects the material to additional preparatory combing or cleaning treatment.

I do not claim per se the use of a comparatively small number of flats or a main cylinder of small diameter, save in so far as it enables me to utilize in normal space (thereby rendered available) additional preparatory combing or cleaning mechanism of a suitable kind located above the horizontal centre line of the main cylinder as hereafter fully disclosed and whereby better carding results are obtainable.

I am also aware, it has been proposed to use an advance licker-in located in line with a second dish feed and licker-in the advance licker-in having the fibres removed therefrom by a rotating brush running at a higher surface speed than said licker-in and that a suction mechanism removes the fibres from the brush and delivers same to lap rollers both licker-ins having mote knives. The suction mechanism comprised a chute and one or two cages with dampers and a fan. Such an arrangement could not however be used in a carding engine of normal dimensions and was not used with a cylinder furnished with a greatly reduced number of flats. Also I do not claim per se the use of an air blast with carding apparatus.

My improvements will be clearly appreciated from a consideration of the attached drawings and the detailed description which follows.

In the accompanying drawings:

Fig. 1 is a side elevation of a revolving flat carding engine embodying my improvements in practical form.

Fig. 2 is a sectional elevation.

Fig. 3 shows a plan view, and,

Fig. 4 an end elevation.

Fig. 5 is a section indicating the application of an air blast arrangement or equivalent device in connection with the first licker-in.

In carrying my invention into practical effect, and in accordance with the most approved arrangement at present known to me, I apply at or about the usual level a dish feed comprising shaped feed plate a (see Fig. 2) and roller a' and in connection with which works a primary licker-in b, the latter having mote knife or knives b' and a suitable grid such as b^2 or other equivalent. In connection with such preliminary licker-in b I provide a trunk or passage way c the same leading upwards and conveniently slightly backwards to a revolving lap forming cage d. The trunk c has an adjustable front plate c' fulcrumed at c^2 as the sectional view Fig. 2 shows. The cage d is shown disposed above the primary licker-in b and conveniently at a considerably higher level. Instead of a single cage I may use more than one cage or any other lap forming combination. The lap forming cage or cages may be suction and/or air blast controlled and of the usual type with internal baffles as known.

In the drawing, the single lap cage b is exhausted by a fan or blower located in a junction pipe which couples the two trunks d' and such lap cage is enclosed in a sheet metal casing having front and back hinged inspection covers such as d^2, d^3. The lap forming cage d is rotated by gear as later explained or in other fashion. Any appropriate arrangement for exhausting the air in connection with the lap forming cage or cages may be used.

A plain roller such as that marked c^3 is illustrated as co-operating with the lap forming cage d and assists in conveying the fibrous material onwards, the roller shown being driven through suitable gear wheels or such like.

In combination with the lap forming cage d or other lap forming means I provide one or more pairs of consolidating or feed rollers f or other conveying means arranged to further or progress the lap over a shaped plate or conveying means as for example the dished plate g which leads to secondary or auxiliary lap treating mechanism.

This secondary or auxiliary lap treating mechanism of whatever form is located at a higher level or out of alignment with the primary feed mechanism and licker-in or equivalent, and, according to my invention, above the horizontal centre of the main carding cylinder axis as Fig. 2 clearly indicates. Such secondary or auxiliary lap treating mechanism may be greatly varied in character but conveniently comprises (as

shown) the dished feed plate g with roller g', licker-in h mote knife h' or knives and grid h^2 with movable top shield or casing h^3. In any event its location is most material and is as stated at a higher level than the primary licker-in or equivalent, that is, above the horizontal centre line of the main cylinder. By reason of the great reduction in the number of flats, the placing of the secondary or auxiliary lap treating mechanism level with the primary mechanism would necessitate the use of a very extended back plate which, from the practical side, would be extremely difficult to make and fit and which would as certainly lead to defective working and difficulties in actual use.

It will be appreciated that with a very short chain of flats, and a licker-in ordinarily disposed, the distance upwards to the flats would necessarily be very considerable. By disposing the secondary or auxiliary cleaning mechanism in manner set forth, a normal or comparatively narrow back-plate h^4 will serve and the distance between the point of delivery from the secondary or auxiliary licker-in on to the main cylinder, and from that point to the flats, becomes a workable distance and permits of effective working with few flats.

In addition to utilizing air suction, an air blast arrangement may be made use of to assist in stripping the material from the primary licker-in and to assist in conveying the material to the means which pass the material on to the auxiliary dish feed and licker-in located above the horizontal centre of the main cylinder for the reasons already fully explained. Such a scheme of using an air blast in augmentation to convey the fibrous material is clearly indicated in Fig. 5, where an air blast nozzle or number of nozzles is indicated and marked i.

The invention includes as an essential feature the use of an auxiliary or secondary combing or cleaning mechanism interposed between suction cage or cages or equivalent intermediary and the main cylinder, the former being raised above the horizontal centre line of the main cylinder.

Wherever dust cages are provided the same are as already mentioned partly encased by sheet metal with suitable movable doors or covers to give access.

The secondary or auxiliary licker-in may be driven at the same or a higher speed than the primary licker-in. Provision is made by sheet metal plates or otherwise for the conveying or confining of material falling from the mote knives and grid of the secondary or auxiliary combing or cleaning mechanism.

The main carding cylinder is marked A and is or may be about 40 inches diameter and the chain of flats is marked B and comprises some 48 flats or thereabouts, about 13 or 14 of the said flats being in direct contact with the flexible bend. The doffer is marked C.

In starting up the card, it is an advantage to employ a hinged piece of flexible material the width of the consolidating rollers f, f which can be turned down in front of them until a proper lap is produced and thereafter turned-up and fixed out of the way.

The means for driving the revolving parts may be greatly varied and without restricting myself to such I now briefly describe the driving arrangements illustrated in the drawings. The primary licker-in b is shown driven by a crossed-strap s (Fig. 1) from a pulley on the main shaft of the card and the secondary licker-in is driven from the first by an open strap s'. The side shaft, through bevel gear, drives a chain wheel 1 which by a sprocket chain operates the chain wheel 2 on the axle of which is a spur pinion 3 and this pinion actuates the carrier wheel 4. On the same axle is the pinion 5 and so the roller c^3 and the lap cage d are driven by gear wheels as will be clearly seen from Fig. 1. The gear wheel 5 drives a carrier wheel 6 which actuates through gears 7 and 8 the fluted rollers f, f and also through the intermediate wheel 9 and a gear wheel 10 the roller g' of the secondary licker-in group. The primary licker-in feed roller a' is driven from an ordinary bevel wheel 11 actuated from the side shaft and gears 12, 13, 14 drive the lap roller 15. The means for actuating the various revolving parts are merely given as by way of example.

By using a greatly reduced number of flats and the preliminary or auxiliary mechanism, arranged as indicated, with the use of dust cage or cages and suction and/or air blast producing means I get rid of impurities or foreign matter more completely and at once, that is, before carding proper commences and in addition two separate combing or cleaning operations are performed by the double feed contrivance. Centrifugal force at each licker-in also assists the objects in view.

The indicated arrangements are extremely compact and it is possible to reduce the overall length of the cards or at least to construct the improved cards within the limits of size of normal present day revolving flat cards.

I declare that what I claim is.

1. In revolving flat carding engines the combination with a main cylinder having a comparatively small number of flats, of two preliminary combing mechanisms one located above the horizontal centre line of the main cylinder, and a comparatively narrow back plate.

2. In revolving flat carding engines, the combination with a main cylinder, of a plurality of sets of combing mechanisms each

comprising a dish feed and licker-in interconnected by an air trunk device and a lap forming device, one of the said combing mechanisms being located above the horizontal centre line of the main cylinder.

3. In revolving flat carding engines the combination with a main cylinder and a train of flats limited in number, of a plurality of combing mechanisms each comprising a dish feed and licker-in with an intermediate trunk chamber and a rotatable cage, one of the combing mechanisms being located above the horizontal centre of the main cylinder.

4. In revolving flat carding engines having a main cylinder and a chain of flats considerably less than usual, the combination therewith of a plurality of combing mechanisms and a lap forming device, and an air blast device to influence the stripping of the fibre from the first combing mechanism, the other combing mechanism being located above the horizontal centre of the main cylinder.

5. A revolving flat carding engine comprising, in combination, a main cylinder, a chain of flats greatly reduced in number, two combing mechanisms one disposed above the horizontal centre line of the main cylinder, a combined lap forming device, and means for conveying fibrous material from the first combing mechanism to the lap forming device.

6. A revolving flat carding engine, comprising a lap supplying device, a dish feed, a licker-in, mote knives, a casing for the licker-in, a trunk, a lap forming cage, a plain roller in connection therewith and lap forming rollers, and a second dish feed at a higher level, a second licker-in and casing therefor, and lower grid, and a narrow back plate.

7. A revolving flat carding engine, comprising a lap supplying device, a preliminary dish feed, a licker-in, mote knives and a grid in connection with the licker-in, a trunk, an air blast pipe in connection with the trunk, a lap forming cage and a plain roller and lap forming rollers leading to a second dish feed located in an elevated portion and a second licker-in with casing and grid bars and a narrow back plate on the main cylinder.

In testimony whereof I have signed my name to this specification.

ARTHUR ERNEST OXLEY.