May 7, 1935. C. R. BIRDSEY 2,000,272

KILN FEED MECHANISM

Filed Nov. 30, 1928 4 Sheets-Sheet 1

Fig-1

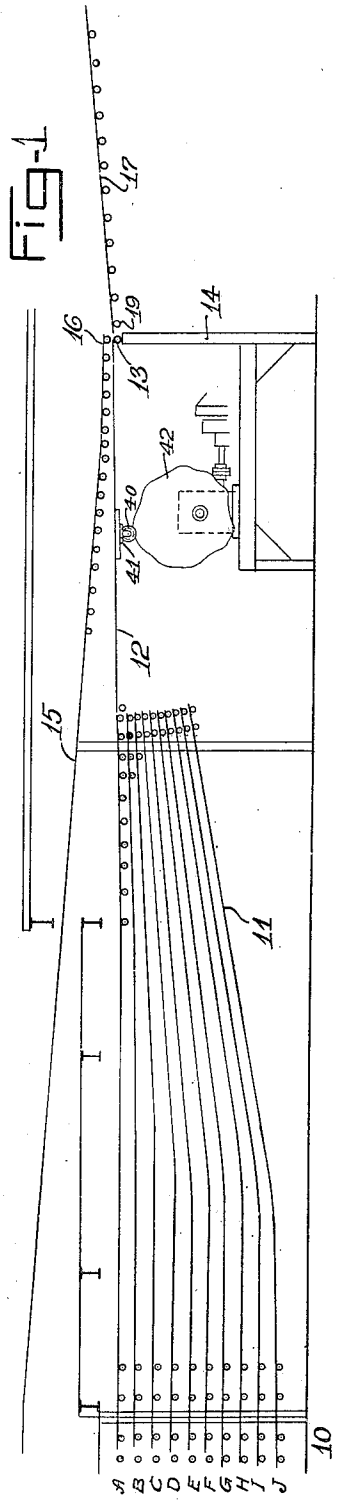
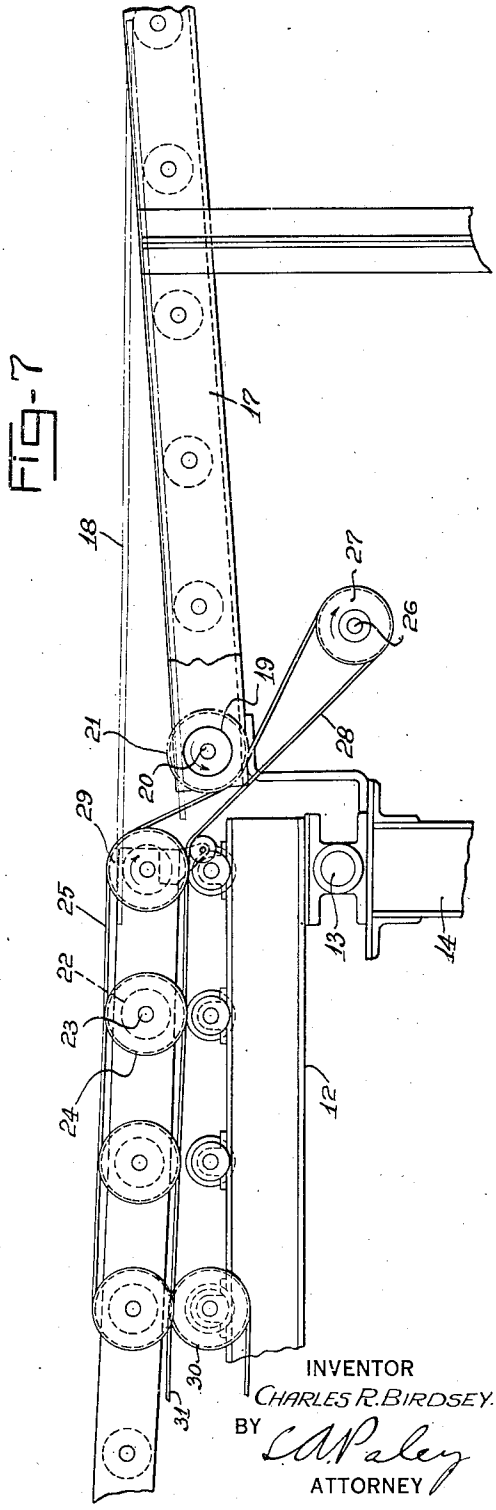


Fig-7



INVENTOR
CHARLES R. BIRDSEY.
BY C. A. Paley
ATTORNEY

May 7, 1935. C. R. BIRDSEY 2,000,272

KILN FEED MECHANISM

Filed Nov. 30, 1928 4 Sheets-Sheet 2

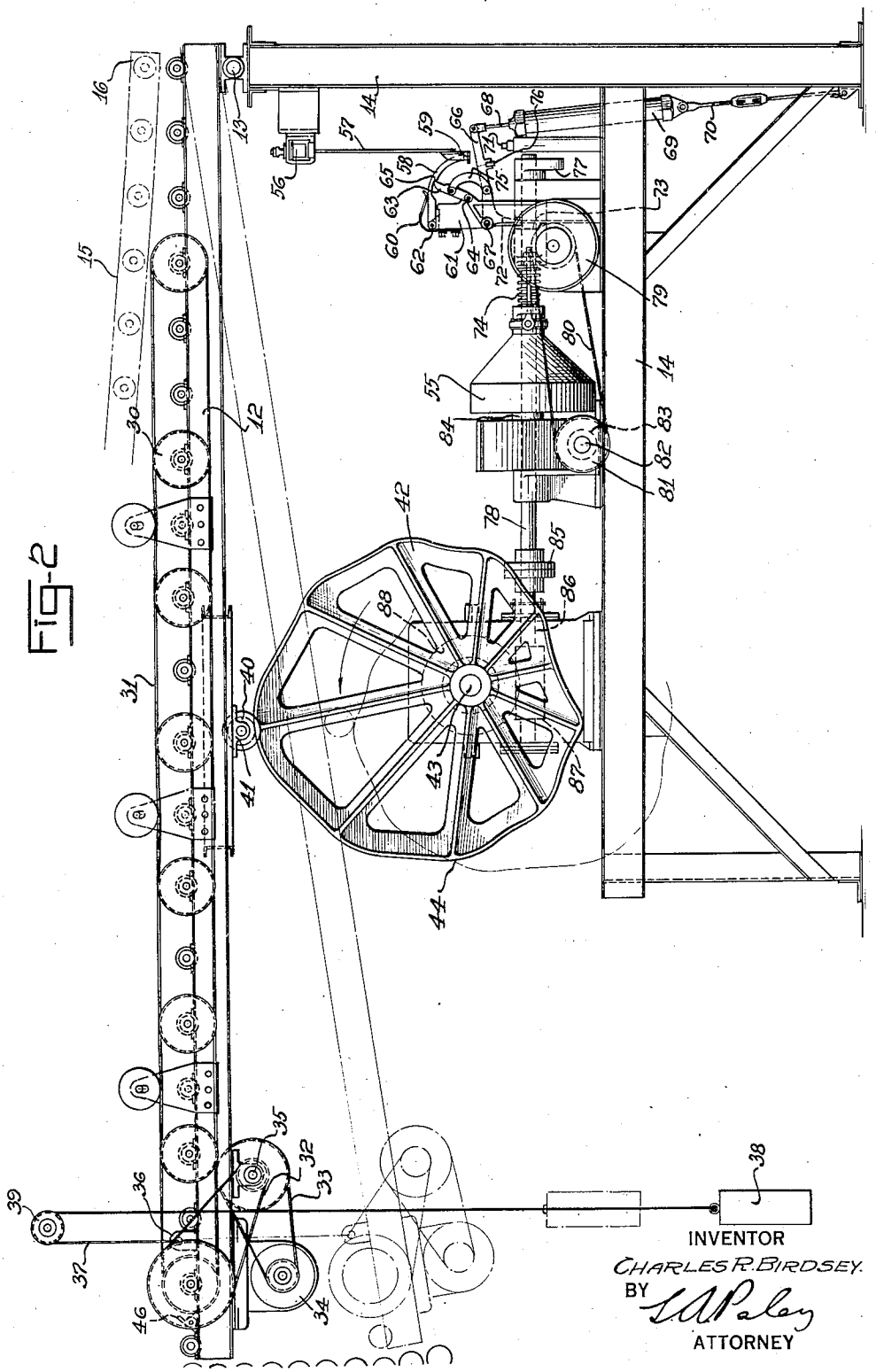


Fig-2

INVENTOR
CHARLES R. BIRDSEY.
BY
ATTORNEY

May 7, 1935. C. R. BIRDSEY 2,000,272

KILN FEED MECHANISM

Filed Nov. 30, 1928 4 Sheets-Sheet 3

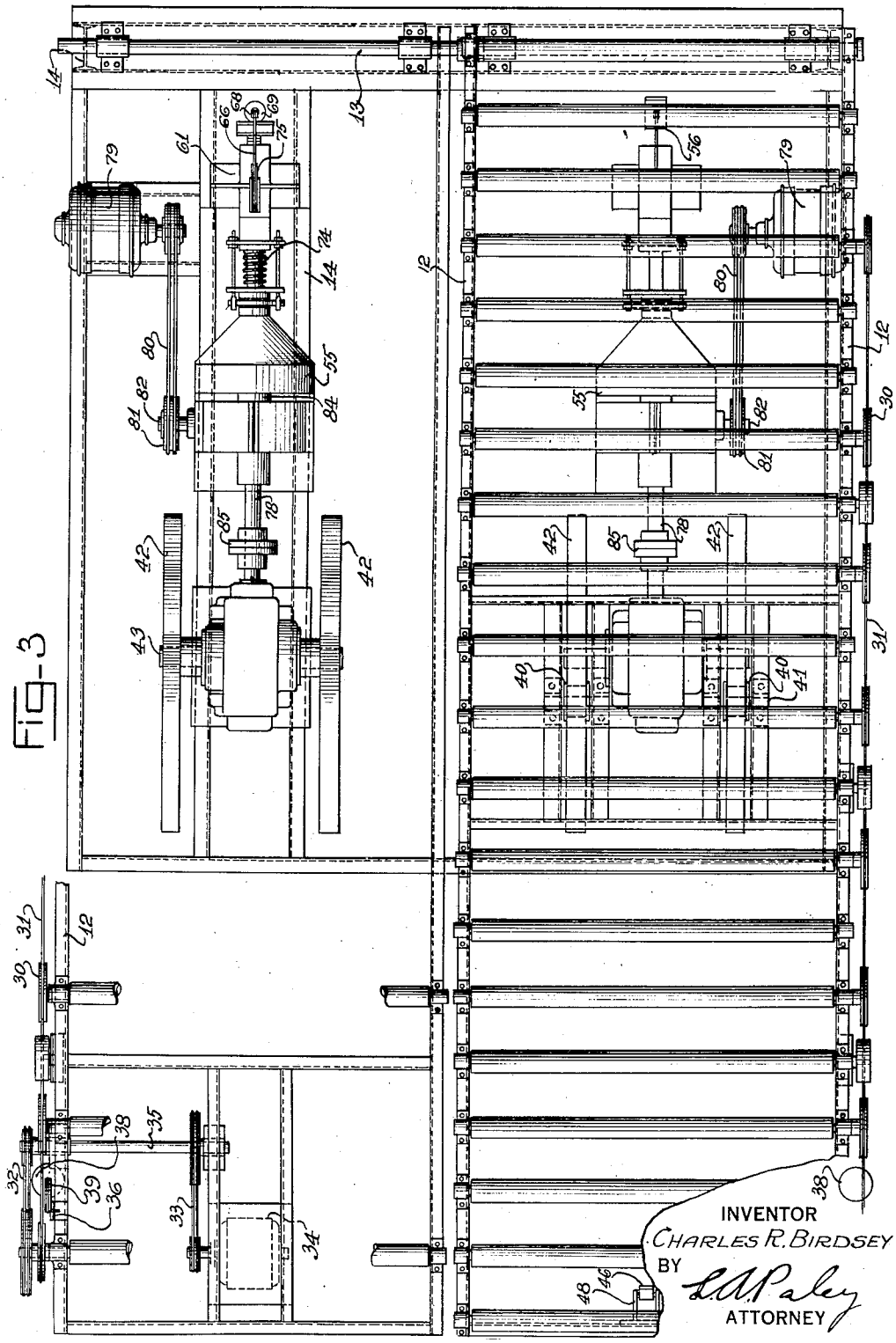


Fig-3

INVENTOR
CHARLES R. BIRDSEY
BY
ATTORNEY

May 7, 1935. C. R. BIRDSEY 2,000,272

KILN FEED MECHANISM

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Fig-5

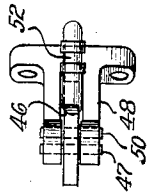


Fig-6

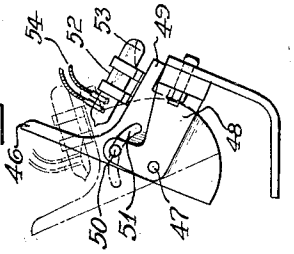
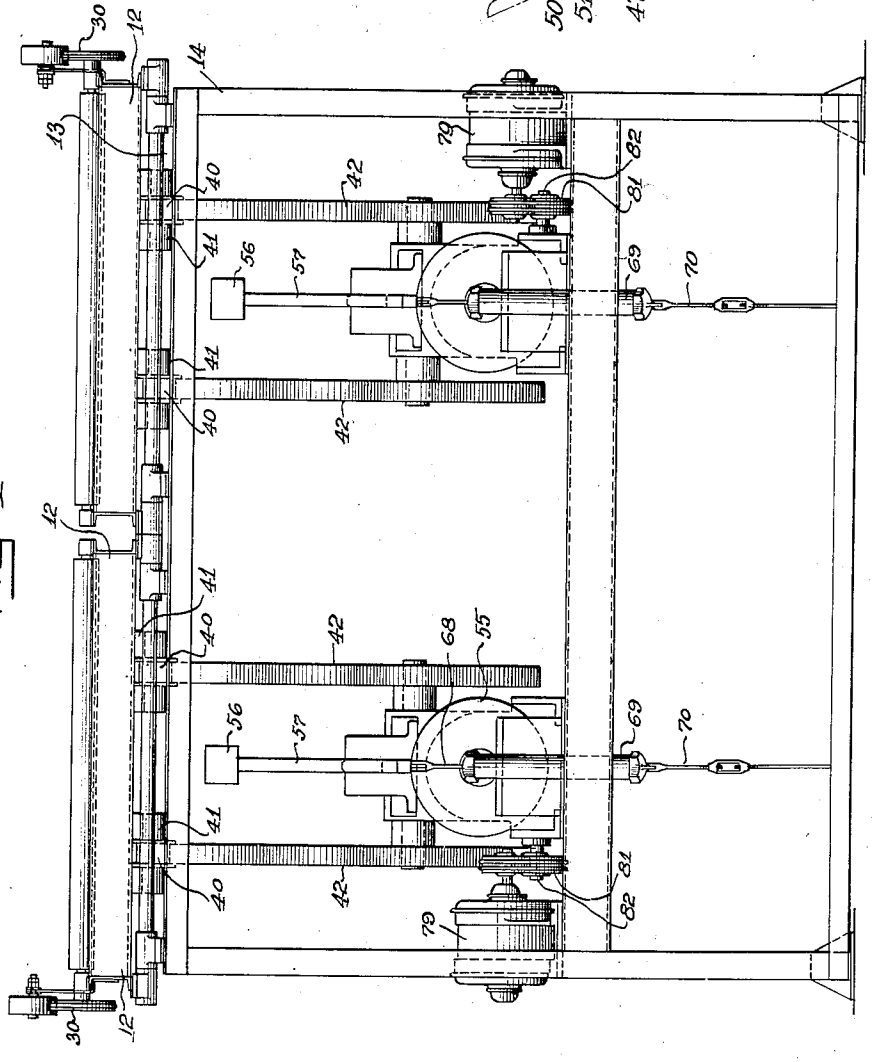


Fig-4



INVENTOR
CHARLES R. BIRDSEY.
BY
L. A. Paley
ATTORNEY

Patented May 7, 1935 2,000,272

UNITED STATES PATENT OFFICE

2,000,272

KILN FEED MECHANISM

Charles R. Birdsey, Pasadena, Calif., assignor to United States Gypsum Company, Chicago, Ill., a corporation of Illinois

Application November 30, 1928, Serial No. 322,610

18 Claims. (Cl. 198—21)

This invention relates to kiln feed mechanisms and has reference more particularly to a mechanism for feeding plaster board, or the like into multi-deck kilns.

In kilns of the multi-deck roller type for the drying of plaster board, wall board, fiber board, and other fabricated boards, it is necessary to provide a setting conveyor preferably arranged above the drying kiln and to reverse the direction of movement of the plaster board after leaving the setting conveyor so as to direct same into the drying kiln. In order to feed plaster boards into successive decks of the drying kiln, it is desirable to have a tilting frame roller conveyor which can be tilted to the different deck levels of the kiln. A simple mechanism is necessary to operate the tilting frame roller conveyor so as to properly adjust same to a predetermined deck of the drying kiln.

An object of this invention, therefore, is to provide a simple mechanism for operating the tilting frame roller conveyor which directs the plaster board into successive decks of the drying kiln.

Another object of the invention is to provide a mechanism, preferably including a cam, for operating the tilting frame roller conveyor; also to improve kiln feed mechanisms in other respects hereinafter specified and claimed.

Reference is to be had to the accompanying drawings forming a part of this specification, in which

Fig 1 is a general diagrammatic view of my improved kiln feed mechanism applied to the kiln,

Fig. 2 is an elevation of my improved kiln feed mechanism,

Fig. 3 is a fragmentary plan view of the kiln feed mechanism,

Fig. 4 is a rear elevation of the feed mechanism,

Fig. 5 is a plan detail view of the control switch,

Fig. 6 is a side elevation of the control switch, and

Fig. 7 is a fragmentary elevation on a large scale of a portion of the tilting frame roller conveyor.

A drying kiln 10 may have any number of decks such as 10 as shown in Fig. 1 and these decks or roller conveyors will be designated A, B, C, D, E, F, G, H, I, J. In order to obtain a large capacity, two drying kilns are arranged side by side as seen in Figs. 3 and 4 and two kiln feed mechanisms are provided which are substantially identical in every respect so that a description of one will apply to both. Leading to the decks of the kiln 10, are a series of inclined roller conveyors 11, the upper ends of said roller conveyors being arranged substantially in the arc of a circle. A tilting frame roller conveyor 12 is provided at one end with a pivot shaft 13 which is secured on suitable frame work 14 so that the free end of said conveyor 12 swings near the upper ends of conveyors 11.

A setting conveyor 15 is arranged preferably above the kiln 10, the lower end 16 of setting conveyor being positioned substantially above the pivot pin 13. An inclined reversing conveyor 17 is arranged with the lower end somewhat below the lower end 16 of the setting conveyor 15 so as to receive the plaster boards 18 as they are delivered from the setting conveyor and reverse the direction of movement of said plaster boards. The lower-most roller 19 of the reversing conveyor 17, is secured to a rotatably mounted shaft 20 and a pulley 21 is also secured to said shaft. The rollers 22 of the setting conveyor 15 are also secured on shafts 23 which are provided with pulleys 24 connected by belts 25. A drive shaft 26, driven by any suitable source of power not shown, is provided with a pulley 27 which is connected by a belt 28 to a pulley 29 associated with the lower-most roller of the setting conveyor 15. The belt 28 also engages the pulley 21 and causes the rotation of rollers 19 in a counterclockwise direction as seen in Fig. 7. Thus, when the rear end of the plaster board 18 falls from the lower-most roller of setting conveyor 15, it falls onto the positively driven roller 19 which quickly reverses the direction of movement of the plaster board 18 and conveys same forwardly onto tilting conveyor 12. Several of the rollers of tilting conveyor 12 may be provided with pulleys 30 connected by belt 31 so as to cause the movement of the plaster board along the tilting conveyor 17 at a definite speed regardless of the angle of inclination of same. The belts 31 are driven by suitable belts 32 and 33 which connect with a motor 34 through countershaft 35. The motor 34 is preferably secured directly to the free end of tilting conveyor 12 and moves with same.

The tilting conveyor 12 is preferably provided with an ear 36 which is connected by a cable 37 to a counterweight 38, the cable 37 passing over a pulley 39 positioned above said tilting frame 12 so that the weight of the tilting frame conveyor is counterbalanced at all positions. A roller 40 is rotatably mounted in a suitable bracket 41 secured to the lower side of tilting conveyor frame 12, a pair of said rollers 40 being provided for the tilting frame. The rollers 40 engage the

outer periphery of a pair of cams 42. The cams 42 are secured to a shaft 43 and are provided with a series of progressively varying high points 44 which are so arranged as to position the free end of tilting conveyor 12 at the various decks of the drying kiln as the shaft 43 is intermittently rotated by a mechanism to be hereinafter described. The high points 44 of the cam 42 are about equal in number on each side of the point of maximum radius so that boards are fed into alternate decks of the kiln on both the upward and downward movement of the conveyor 12, the decks skipped on the upward movement being fed on the downward movement of the conveyor, thus insuring a smooth operation of the feeding mechanism.

A switch arm 46 is pivotally mounted on pivot pin 47, the latter being secured to a bracket 48 which is mounted on the tilting frame 12. A stop arm 49 is formed on the switch arm 46, said stop arm being adapted to engage the bracket 48 and limit the rotation of the switch arm about pin 47 in a clock-wise direction as seen in Fig. 6. A fixed pin 50 in the bracket 48 engages a slot 51 formed in the stop arm 46 so as to limit the movement of said stop arm in a counter-clock-wise direction as seen in Fig. 6. Mounted upon the switch arm 46 is a glass tube 52 which contains a globule of mercury 53. Electrical connectors 54 lead from one end of the tube 52 so that when the switch arm is actuated by a plaster board traveling along the tilting frame 12, to its extreme position as shown in the dot-and-dash lines of Fig. 6, the globule of mercury 53 closes the circuit formed by the electrical connectors 54 thus operating a clutch 55 by means of a mechanism which will be more fully described.

The electrical connectors 54 lead to a solenoid 56 which is connected by a rod 57 to the free end of an arcuate shaped catch lever 58. The free end of catch lever 58 is resiliently pressed against the lower step 59 of rod 57 by means of a spring 60 secured to a bracket 61. The bracket 61 has a pivot pin 62 secured to the upper end thereof, said pivot pin serving to rotatably mount one end of the catch lever 58. A catch 63 is pivotally mounted at its lower end on a pivot pin 64 which is secured to the bracket 61, the upper end of said catch normally engaging behind a catch shoulder 65 formed on the catch lever 58. A bell-crank spring lever 66 is pivotally mounted on pivot pin 67 secured to the bracket 61 and the free end of lever 66 is pivotally connected to a rod 68 which extends into a spring cylinder 69, the latter containing a compression spring not shown engaged by a piston on the end of rod 68. The lower end of spring cylinder 69 may be connected in any suitable way to a rigid support such as by a turnbuckle rod 70 secured to the frame work 14.

The clock-wise movement of the spring lever 66 is limited by a stop lug 71. The opposite arm 72 of bell crank lever 66 is forked so as to enclose a clutch collar 73 provided adjacent the clutch 55. A spring 74 is also provided adjacent the clutch 55 so as to normally hold said clutch in inoperative position unless actuated by the lever arm 72. An arcuate shaped link 75 pivotally connects the catch 63 with the bell crank lever 66 so that the catch 63 follows the movement of the bell crank lever 66. A roller 76 is rotatably mounted on the lower side of the bell crank lever 66, said roller being adapted to engage a cam 77 secured to a shaft 78 on which the clutch 55 is mounted. Thus, for every complete revolution of shaft 78, the cam 77 will engage the roller 76 and restore catch 63 to its normal position behind shoulder 65. A motor 79 is connected by a belt 80 to a pulley 81 on a worm shaft 82. The worm wheel not shown meshing with a worm 83, is secured on a sleeve 84, the latter being rotatably mounted on the shaft 78 and engaging certain plates in the clutch 55. The shaft 78 is connected by a coupling 85 to a worm shaft 86, the latter carrying a worm 87 which meshes with a worm gear 88 secured to shaft 43 so as to accomplish the intermittent rotation of the shaft 43.

In operation, the plaster boards move down the inclined setting conveyor 15 and slide on to the reversing conveyor 17, the rear edge of each plaster board dropping onto driven roller 18 which reverses the direction of movement of the plaster board and moves same onto the tilting conveyor 12. The tilting conveyor 12 is rocked about the pivot 13 by means of cam 42 engaging roller 40, the cam 42 being rotated intermittently to accomplish the rocking movement of said tilting conveyor. Some of the rollers of tilting conveyor 12 are positively driven by motor 34 operating through belt 33, countershaft 35 and belt 32. The rotation of the cam 42 rocks the tilting conveyor 12 to successive decks of the inclined roller conveyors 11 which lead to the corresponding decks on the drying kiln 10.

As the plaster boards move down the tilting conveyor 12, the forward edge of each board engages the switch arm 46 which moves said switch in a counter-clock-wise direction about a pivot 47 as seen in Fig. 6 so that the mercury globule 53 closes the circuit formed by electrical connectors 54 to cause the actuation of solenoid 56 and the upward movement of rod 57 and catch lever 58 to disengage the catch 63 from shoulder 65. After the release of the catch 63 the lever 66 moves downwardly under the action of a spring in the spring cylinder 69 so that lever arm 72 engages the clutch 55 thus causing the rotation of shaft 78 through one revolution. The cam 77 engages the roller 76 for each revolution of shaft 78, thus causing the lever 66 to move upwardly until catch 63 is restored to normal position behind the shoulder 65. The shaft 78 is driven by motor 79 operating through belt 80, pulley 81, and worm 83 on worm shaft 82. The worm 83 engages a worm wheel on sleeve 84 which is secured to plates in the clutch 55. The shaft 78 also is connected to a worm shaft 86 having a worm 87 meshing with a worm wheel 88 on shaft 43.

I would state in conclusion that while the illustrated example constitutes a practical embodiment of my invention, I do not wish to limit myself precisely to these details, since manifestly the same can be considerably varied without departing from the spirit of the invention as defined in the appended claims.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:—

1. In a kiln feed mechanism, a multi-deck drying kiln, a tilting conveyor pivotally mounted to deliver sheets of material to the decks of said drying kiln, cam means associated with said tilting conveyor, and means for rotating said cam with an intermittent movement controlled by the movement of said sheets of material.

2. In a kiln feed mechanism, the multi-deck drying kiln, a pivotally mounted tilting frame associated with said drying kiln adapted to deliver sheets of material to the decks of said drying kiln, means for intermittently rocking said tilting frame about the pivot thereof, and electrical

means controlled by the movement of said sheets of material for controlling the rocking of said tilting frame.

3. In a kiln feed mechanism, a multi-deck drying kiln, a tilting conveyor pivotally associated with said drying kiln, a cam movably associated with said tilting conveyor, a clutch, and an electrical switch arm lying in the path of travel of sheets of material passing along said tilting conveyor and adapted to be actuated thereby so as to intermittently actuate said clutch and cause the intermittent rocking of said tilting conveyor to deliver said sheets of material to the decks in said drying kiln.

4. In a kiln feed mechanism, a multi-deck drying kiln, a tilting conveyor pivotally associated with said drying kiln, rollers on said tilting conveyor, a motor secured to said tilting conveyor and adapted to rock with said conveyor, driving means connecting said motor and a roller and adapted to cause the continuous rotation of said roller so as to cause a uniform movement of plaster boards along the tilting conveyor regardless of the inclination thereof, and means for rocking said tilting conveyor with an intermittent movement so as to deliver said plaster boards to the decks of said drying kiln.

5. In a kiln feed mechanism, a multi-deck drying kiln, a tilting conveyor pivotally associated with said kiln, an electric switch adapted to be actuated by plaster boards moving along said conveyor, and means associated with said switch for causing the intermittent rocking of the tilting conveyor so as to deliver plaster boards to the decks of said multi-deck kiln.

6. In a kiln feed mechanism, a multi-deck drying kiln, a tilting conveyor pivotally associated with said drying kiln, a switch arm associated with said tilting conveyor and lying in the path of travel of sheets of material passing along said conveyor, a solenoid, and means associated with said switch arm and solenoid for causing the intermittent rocking of said tilting conveyor so as to deliver plaster boards to the decks of said kiln.

7. In a kiln feed mechanism, a multi-deck drying kiln, a tilting conveyor pivotally associated with said drying kiln, a cam having a plurality of high points around the periphery thereof, means for intermittently rotating said cam so as to cause the intermittent rocking of said tilting conveyor to predetermined positions relative to the decks of said drying kiln, and electrical control means adapted to be actuated by the movement of sheet material along said tilting conveyor so as to control the intermittent movement of said cam.

8. In a kiln feed mechanism, a multi-deck drying kiln, a pivotally mounted tilting conveyor associated with said drying kiln, a rotatably mounted shaft associated with said tilting conveyor, a clutch, a lever adapted to be intermittently actuated so as to engage said clutch and cause the intermittent rotation of said shaft and the intermittent rocking of said tilting conveyor, and a cam associated with said shaft and adapted to restore said lever to normal position after each actuation of said shaft.

9. In a mechanism of the class described, the combination with a multi-deck drying kiln, a setting conveyor for plaster boards, an inclined conveyor adapted to receive plaster boards from said setting conveyor, a pivotally mounted tilting conveyor adapted to receive the plaster boards from said inclined conveyor, and means for intermittently rocking the tilting conveyor about the pivot thereof so that said plaster boards are delivered to the decks of said drying kiln, of a continuously driven roller associated with said inclined conveyor, said roller being adapted to receive the plaster boards from said setting conveyor and reverse the direction of movement of said plaster boards.

10. In a mechanism of the class described, the combination with a setting conveyor, an inclined conveyor adapted to receive plaster boards from said setting conveyor, a tilting conveyor adapted to receive the plaster board from said inclined conveyor, a drying kiln having superposed decks, said tilting conveyor being adapted to deliver plaster boards to the decks of said drying kiln, of a continuously driven roller associated with said inclined conveyor and adapted to move said plaster boards from said inclined conveyor to said tilting conveyor.

11. In a mechanism of the class described, the combination with a multi-decked drying kiln, a tilting conveyor pivotally associated with said drying kiln, and an inclined conveyor associated with said tilting conveyor and adapted to receive plaster boards moving in one direction, of cam means associated with said tilting conveyor adapted to cause the intermittent rocking of said tilting conveyor so as to deliver plaster boards to the decks of the drying kiln, and a continuously driven roller associated with said inclined conveyor and adapted to receive said plaster boards and reverse the direction of movement of said plaster boards so that said plaster boards are moved onto said tilting conveyor.

12. In a kiln feed mechanism for plaster boards, a multi-deck drying kiln, a pivotally mounted tilting frame associated with said drying kiln and adapted to rock in a vertical plane and deliver sheets of board to the decks of said drying kiln, means for intermittently rocking said tilting frame about the pivot thereof, and means controlled by the movement of said board for controlling the rocking of said tilting frame.

13. In a kiln feed mechanism for fabricated boards, a multi-deck drying kiln, a pivotally mounted tilting frame associated with said drying kiln, adapted to rock in a veritcal plane and deliver sheets of board to different decks of said drying kiln, a cam for rocking said tilting frame about the pivot thereof, and means for rotating said cam intermittently to permit discharge of a board from the tilting conveyor during a dwell in the rotation of said cam.

14. In a kiln feed mechanism for fabricated boards, a multi-deck drying kiln, a tilting conveyor adapted to be progressively moved in a vertical plane into proximity with selected decks of said drying kiln, and a cam for automatically moving said conveyor into proximity with different decks of said kiln, said cam being so designed as to feed alternate decks of said kiln on both the upward and downward movements of said conveyor.

15. In a kiln feed mechanism for fabricated boards, a multi-deck drying kiln, a conveyor frame pivoted at one end and adapted to rock in a vertical plane and deliver boards to the decks of said drying kiln, means for counterweighting most of the weight of said frame, and intermittently, motor operated means for automatically rocking said frame into proximity with said decks at predetermined intervals.

16. In a machine for the manufacture of plaster boards, a setting conveyor, a drying kiln having a plurality of conveyor decks, a conveyor

frame pivotally mounted adjacent said setting conveyor adapted to receive plaster boards from said setting conveyor, and means actuated by the plaster boards for moving said conveyor frame on the pivot thereof in order to deliver plaster boards to successive decks in said drying kiln in a predetermined sequence.

17. In a machine for the manufacture of plaster boards, a setting conveyor, a movable conveyor frame adapted to receive a plaster board from said setting conveyor, a drying kiln having a plurality of conveyor decks, a clutch operatively connected to said movable frame, and means automatically actuated by the movement of the plaster boards for actuating said clutch at predetermined intervals, thus causing the movable conveyor frame to deliver plaster boards to successive decks of said drying kiln.

18. In a machine for the manufacture of plaster boards, the combination with a drying kiln, of a setting conveyor, a movable conveyor frame associated with said setting conveyor, means for transferring plaster boards from said setting conveyor to said movable conveyor frame, driving means, a clutch associated with said driving means and operatively connected to said movable frame, and automatic means for actuating said clutch at predetermined intervals so as to cause said conveyor frame to deliver a plaster board to a predetermined deck of said drying kiln.

CHARLES R. BIRDSEY.