Dec. 8, 1953 W. G. MONTGOMERY 2,661,948

SHEET PICKUP AND FEEDER

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Fig. 1

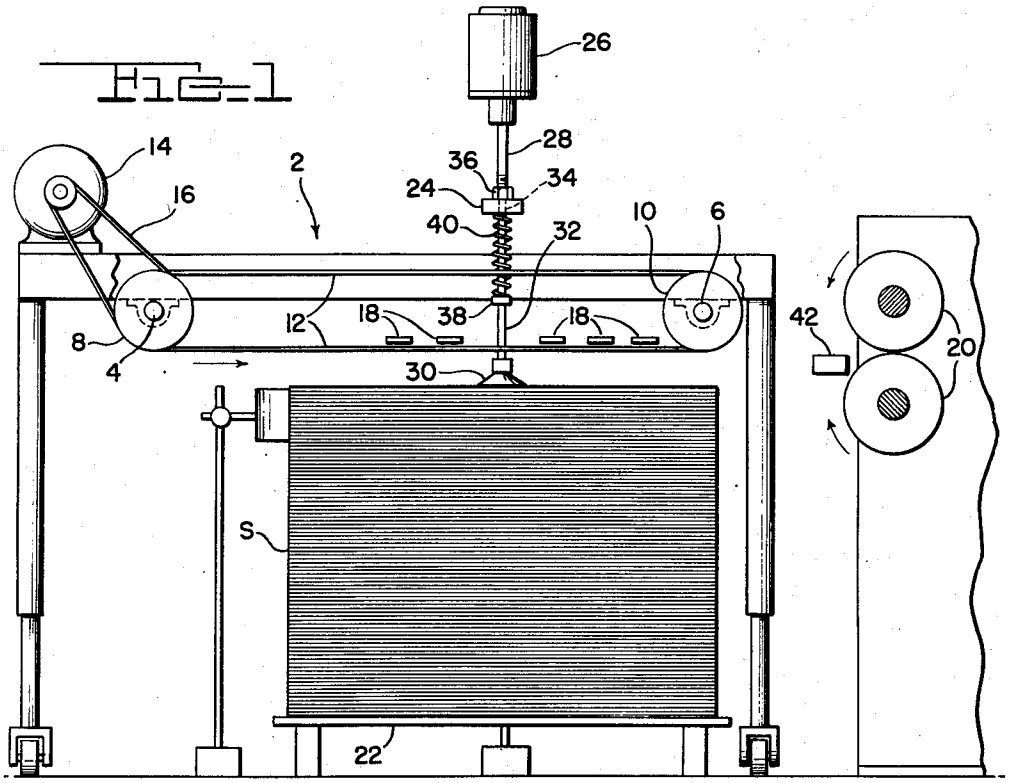
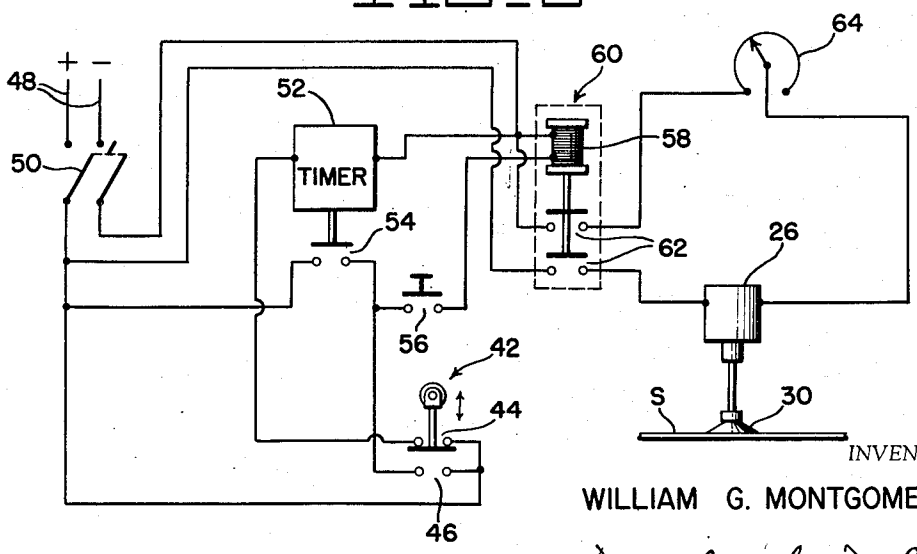



Fig. 3




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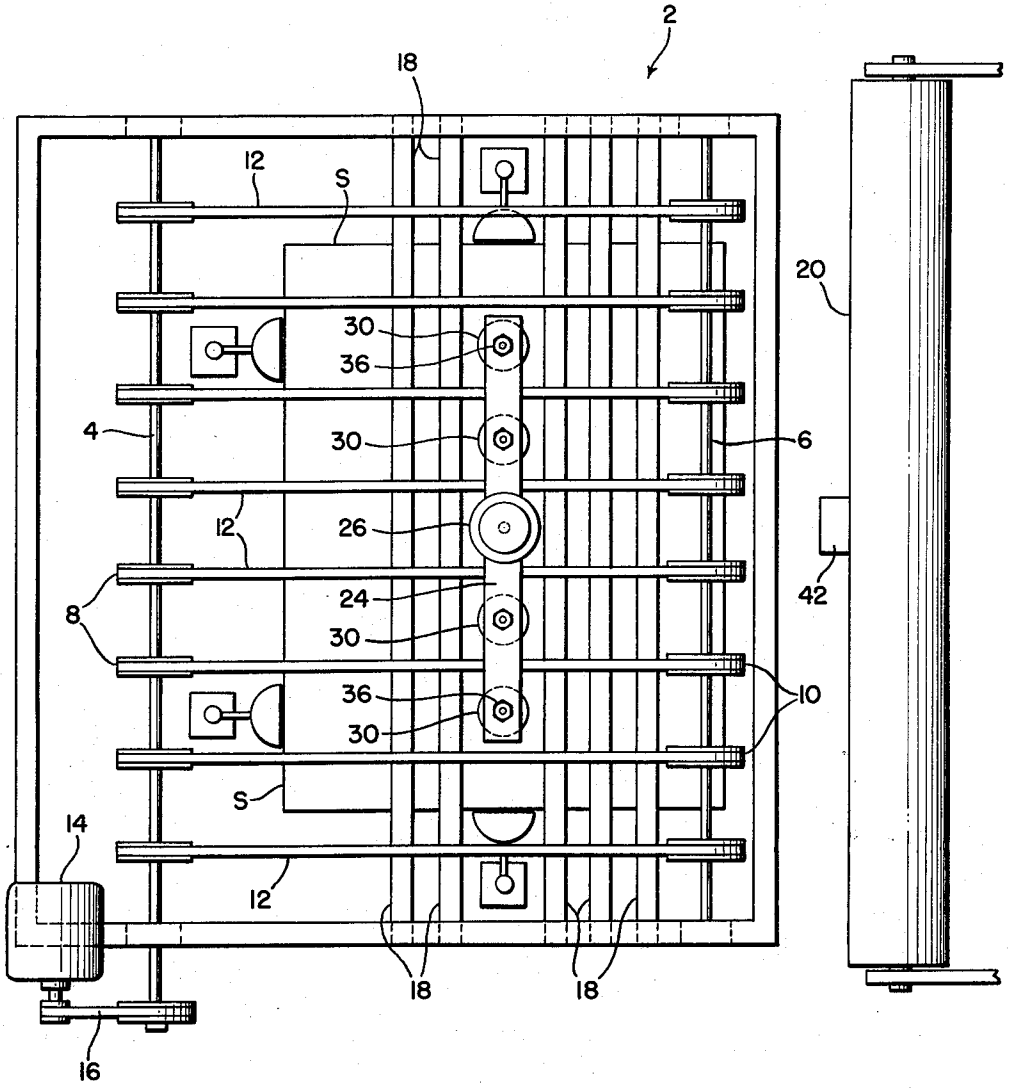
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FIG. 2




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## SHEET PICKUP AND FEEDER

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9 Claims. (Cl. 271—12)

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This invention relates to a sheet pick-up and feeder and more particularly to such a feeder for handling sheet steel. Such feeders are in common use but have various disadvantages. For example, the sheets are ordinarily fed into a processing line, the speed of which may vary. In order to provide for such variations in speed, a complicated mechanism has been used in some instances for varying the speed automatically while in other instances the rate of feed is varied manually.

It is therefore an object of my invention to provide a sheet pick-up and feeder which is simple in construction and which adjusts itself automatically to the speed of the processing line into which the sheets are being fed.

This and other objects will be more apparent after referring to the following specification and attached drawings, in which:

Figure 1 is a schematic side elevation of the sheet feeder;

Figure 2 is a plan view of the feeder of Figure 1; and

Figure 3 is a schematic wiring diagram showing the electrical equipment used with the feeder.

Referring more particularly to the drawings the reference numeral 2 indicates a substantially horizontal magnetic conveyor. As shown, the conveyor is provided with two spaced apart shafts 4 and 6. Shaft 4 has a plurality of spaced apart pulleys 8 thereon and shaft 6 has a plurality of similar pulleys 10 thereon spaced in the same manner as pulleys 8. A belt 12 extends around and between each pair of pulleys 8 and 10. The shaft 4 is driven from a motor 14 by means of a belt drive 16. A plurality of magnets 18 are provided between the pulleys 8 and 10 above the lower part of the belts 12. Spaced from the conveyor 2 at the exit end thereof are a pair of pinch rolls 20 which are driven in synchronism with the conveyor 2. Directly beneath the conveyor 2 is a vertically movable support 22 having a pile of sheets S mounted thereon. The level of the top of the pile of sheets S may be maintained in any suitable well known manner such as by means of the apparatus shown in the Free Patent No. 1,442,718. Directly above the pile of sheets of conveyor 2 is a vertically movable supporting plate 24 having its top connected to a solenoid 26 by means of a rod 28. Solenoid 26 is stationarily supported in any suitable manner. A plurality of suction cups 30 are connected to the bottom of the plate 24 by means of rods 32. The plate 24 is provided with a plurality of holes 34 for slidably receiving the rods 32. A nut 36 is threaded on

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top of each rod 32 and a collar 38 is provided intermediate the length thereof. A spring 40 surrounds the rod 32 with one end bearing against the bottom of plate 24 and the other end bearing against the top of collar 38.

A limit switch 42 is provided adjacent the entry end of pinch rolls 20. The switch 42 is provided with a pair of normally closed contacts 44 and a pair of normally open contacts 46. The limit switch 42 is connected in the control circuit shown in Figure 3. Power is supplied to the control circuit from a D. C. power source 48 having a switch 50 connected thereto. The normally closed contacts 44 are connected in series with a timer 52 which is provided with a pair of contacts 54. The contacts 54 are connected in series with an off-on switch 56 and the actuator 58 of a switch 60. The normally open contacts 46 are also connected in series with the switch 56 and actuator 58 and in parallel with timer contacts 54. The switch 60 is provided with contacts 62 which are arranged in series with the solenoid 26 and a rheostat 64.

Normally the solenoid 26 will be deenergized and the suction cups 30 will be resting on top of the top sheet S with the springs 40 urging the cups 30 into tight engagement with the top sheet. When it is desired to start the device in operation, the motor 14 is started up causing the conveyor 2 to move in the direction of the arrow in Figure 1. The switches 50 and 56 are then manually closed, thus energizing the timer 52. After a very brief period of time the contacts 54 of timer 52 will close, thus energizing actuator 58 of the switch 60 and causing its contacts 62 to close. This will energize solenoid 26 which in turn will pull up the vacuum cup assembly with the top sheet S attached thereto until the sheet contacts the bottom of the belts 12. Continued movement of the vacuum cups upwardly will release the sheet S with the magnets 18 holding it against the belts 12. The sheet S will move forward toward the pinch rolls 20 which feed it into the processing line (not shown). Prior to entering the pinch rolls 20 the sheet S will strike the operating arm of limit switch 42, thus opening the normally closed contacts 44 and closing the normally open contacts 46. Opening of contacts 44 will deenergize the timer 52. However, closing of the contacts 46 will keep the contacts 62 closed until the tail end of the sheet S passes from over the limit switch 26. When this occurs the normally closed contacts 44 again become closed, thus energizing timer 52. However, in the meantime, solenoid 26 will be deenergized, thus dropping vacuum cups 30 on the top sheet S. After a brief

preset period of time the contacts **54** of timer **52** will close, thus picking up the top sheet and starting the feeding cycle in operation again. It will be seen that when the speed of conveyor **2** in the processing line increases the sheet S will close the normally open contacts **46** for a shorter period of time, thus decreasing the interval of time between the pick-up of sheets.

While one embodiment of my invention has been shown and described, it will be apparent that other adaptations and modifications may be made without departing from the scope of the following claims.

I claim:

1. A sheet pick-up and feeder comprising a substantially horizontal conveyor, means for imparting motion to said conveyor, magnetic means for holding sheets against the under side of the conveyor, means for supporting a pile of sheets below said conveyor, a support above said conveyor and the pile of sheets, a plurality of suction cups mounted on said support on the side adjacent said pile of sheets and adapted to normally rest on and grip the top sheet of said pile, electrical means connected to said support to move the suction cups and sheet upwardly, said movement first bringing the sheet into contact with the under side of the conveyor and further movement of the suction cups causing release of the sheet therefrom, a limit switch at the discharge end of said conveyor in the path of travel of sheets fed therefrom and adapted to be contacted thereby for operation thereof, a timer in series with said limit switch, a pair of contacts operable by said timer, a switch having its actuator in series with said timer contacts and its contacts in series with said electrical means.

2. A sheet pick-up and feeder comprising a substantially horizontal conveyor, means for imparting motion to said conveyor, magnetic means for holding sheets against the under side of the conveyor, means for supporting a pile of sheets below said conveyor, a support above said conveyor and the pile of sheets, a plurality of suction cups mounted on said support on the side adjacent said pile of sheets and adapted to normally rest on and grip the top sheet of said pile, electrical means connected to said support to move the suction cups and sheet upwardly, said movement first bringing the sheet into contact with the under side of the conveyor and further movement of the suction cups causing release of the sheet therefrom, a limit switch at the discharge end of said conveyor in the path of travel of sheets fed therefrom and adapted to be contacted thereby for operation thereof, said limit switch having a normally closed pair of contacts and a normally open pair of contacts, a timer in series with said normally closed pair of contacts, a pair of contacts operable by said timer, a switch having its actuator in series with said timer contacts and its contacts in series with said electrical means, the said normally open pair of contacts being connected in parallel with said timer contacts.

3. A sheet pick-up and feeder comprising a substantially horizontal conveyor, means for imparting motion to said conveyor, magnetic means for holding sheets against the under side of the conveyor, means for supporting a pile of sheets below said conveyor, a support above said conveyor and the pile of sheets, a plurality of suction cups mounted on said support on the side adjacent said pile of sheets and adapted to normally rest on and grip the top sheet of said pile, a solenoid connected to said support, said solenoid adapted to move the suction cups above the bottom of said conveyor when it is energized, said movement first bringing the sheet into contact with the under side of the conveyor and further movement of the suction cups causing release of the sheet therefrom, a limit switch at the discharge end of said conveyor in the path of travel of sheets fed therefrom and adapted to be contacted thereby for operation thereof, a timer in series with said limit switch, a pair of contacts operable by said timer, a switch having its actuator in series with said timer contacts and its contacts in series with said solenoid, and an off-on switch in series with said timer contacts.

4. A sheet pick-up and feeder comprising a substantially horizontal conveyor, means for imparting motion to said conveyor, magnetic means for holding sheets against the under side of the conveyor, means for supporting a pile of sheets below said conveyor, a support above said conveyor and the pile of sheets, a plurality of suction cups mounted on said support on the side adjacent said pile of sheets and adapted to normally rest on and grip the top sheet of said pile, a solenoid connected to said support, said solenoid adapted to move the suction cups above the bottom of said conveyor when it is energized, said movement first bringing the sheet into contact with the under side of the conveyor and further movement of the suction cups causing release of the sheet therefrom, a limit switch at the discharge end of said conveyor in the path of travel of sheets fed therefrom and adapted to be contacted thereby for operation thereof, a timer in series with said normally closed pair of contacts, a pair of contacts operable by said timer, and a switch having its actuator in series with said timer contacts and its contacts in series with said solenoid, the said normally open pair of contacts being connected in parallel with said timer contacts.

5. A sheet pick-up and feeder comprising a substantially horizontal conveyor, means for imparting motion to said conveyor, magnetic means for holding sheets against the under side of the conveyor, means for supporting a pile of sheets below said conveyor, a support above said conveyor and the pile of sheets, a plurality of suction cups mounted on said support on the side adjacent said pile of sheets and adapted to normally rest on and grip the top sheet of said pile, a solenoid connected to said support, said solenoid adapted to move the suction cups above the bottom of said conveyor when it is energized, said movement first bringing the sheet into contact with the under side of the conveyor and further movement of the suction cups causing release of the sheet therefrom, a limit switch at the discharge end of said conveyor in the path of travel of sheets fed therefrom and adapted to be contacted thereby for operation thereof, a timer in series with said normally closed pair of contacts, a pair of contacts operable by said timer, and a switch having its actuator in series with said timer contacts and its contacts in series with said solenoid, and an off-on switch in series with said timer contacts, the said normally open pair of contacts being connected in parallel with said timer contacts.

6. A sheet pick-up and feeder comprising a substantially horizontal conveyor, means for imparting motion to said conveyor, magnetic means for holding sheets against the under side of the conveyor, means for supporting a pile of sheets below said conveyor, a support above said

conveyor and the pile of sheets, a plurality of suction cups mounted on said support on the side adjacent said pile of sheets and adapted to normally rest on and grip the top sheet of said pile, electrical means connected to said support to move the suction cups and sheet upwardly, said movement first bringing the sheet into contact with the under side of the conveyor and further movement of the suction cups causing release of the sheet therefrom, means for periodically energizing said electrical means to raise the top sheet from said pile into engagement with the under side of the conveyor, means for deenergizing said electrical means after a predetermined time interval, and means for varying the time interval between successive energizations of the electrical means according to the speed of the conveyor.

7. A sheet pick-up and feeder comprising a substantially horizontal conveyor, means for imparting motion to said conveyor, magnetic means for holding sheets against the under side of the conveyor, means for supporting a pile of sheets below said conveyor, a solenoid mounted above said conveyor and pile of sheets, a vertically movable substantially horizontal plate connected to said solenoid, said plate having a plurality of vertical holes therethrough, a rod slidably mounted in each of said holes, a suction cup mounted on the bottom of each rod, said suction cup being movable from a position above the under side of the conveyor to the top sheet of the pile of sheets, a collar on each rod intermediate the length thereof, a spring surrounding each rod and bearing against the top of the associated collar and bottom of said plate for urging the associated suction cup into engagement with the top sheet of said pile when the solenoid is not energized, means for periodically energizing said solenoid to raise the top sheet from said pile into engagement with the under side of the conveyor, means for deenergizing said solenoid after a predetermined time interval, and means for varying the time interval between successive energizations of the solenoid according to the speed of the conveyor.

8. A sheet pick-up and feeder comprising a substantially horizontal conveyor, means for imparting motion to said conveyor, magnetic means for holding sheets against the under side of the conveyor, means for supporting a pile of sheets below said conveyor, a solenoid mounted above said conveyor and pile of sheets, a vertically movable substantially horizontal plate connected to said solenoid, said plate having a plurality of vertical holes therethrough, a rod slidably mounted in each of said holes, a suction cup mounted on the bottom of each rod, said suction cup being movable from a position above the under side of the conveyor to the top sheet of the pile of sheets, a collar on each rod intermediate the length thereof, a spring surrounding each rod and bearing against the top of the associated collar and bottom of said plate for urging the associated suction cup into engagement with the top sheet of said pile when the solenoid is not energized, means for periodically energizing said solenoid to raise the top sheet from said pile into engagement with the under side of the conveyor, a limit switch at the discharge end of said conveyor in the path of travel of sheets fed therefrom and adapted to be contacted thereby for operation thereof, a timer in series with said limit switch, a pair of contacts operable by said timer, a switch having its actuator in series with said timer contacts and its contacts in series with said solenoid, and an off-on switch in series with said timer contacts.



9. A sheet pick-up and feeder comprising a substantially horizontal conveyor, means for imparting motion to said conveyor, magnetic means for holding sheets against the under side of the conveyor, means for supporting a pile of sheets below said conveyor, a solenoid mounted above said conveyor and pile of sheets, a vertically movable substantially horizontal plate connected to said solenoid, said plate having a plurality of vertical holes therethrough, a rod slidably mounted in each of said holes, a suction cup mounted on the bottom of each rod, said suction cup being movable from a position above the under side of the conveyor to the top sheet of the pile of sheets, a collar on each rod intermediate the length thereof, a spring surrounding each rod and bearing against the top of the associated collar and bottom of said plate for urging the associated suction cup into engagement with the top sheet of said pile when the solenoid is not energized, means for periodically energizing said solenoid to raise the top sheet from said pile into engagement with the under side of the conveyor, a limit switch at the discharge end of said conveyor in the path of travel of sheets fed therefrom and adapted to be contacted thereby for operation thereof, a timer in series with said normally closed pair of contacts, a pair of contacts operable by said timer, and a switch having its actuator in series with said timer contacts and its contacts in series with said solenoid, the said normally open pair of contacts being connected in parallel with said timer contacts.

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