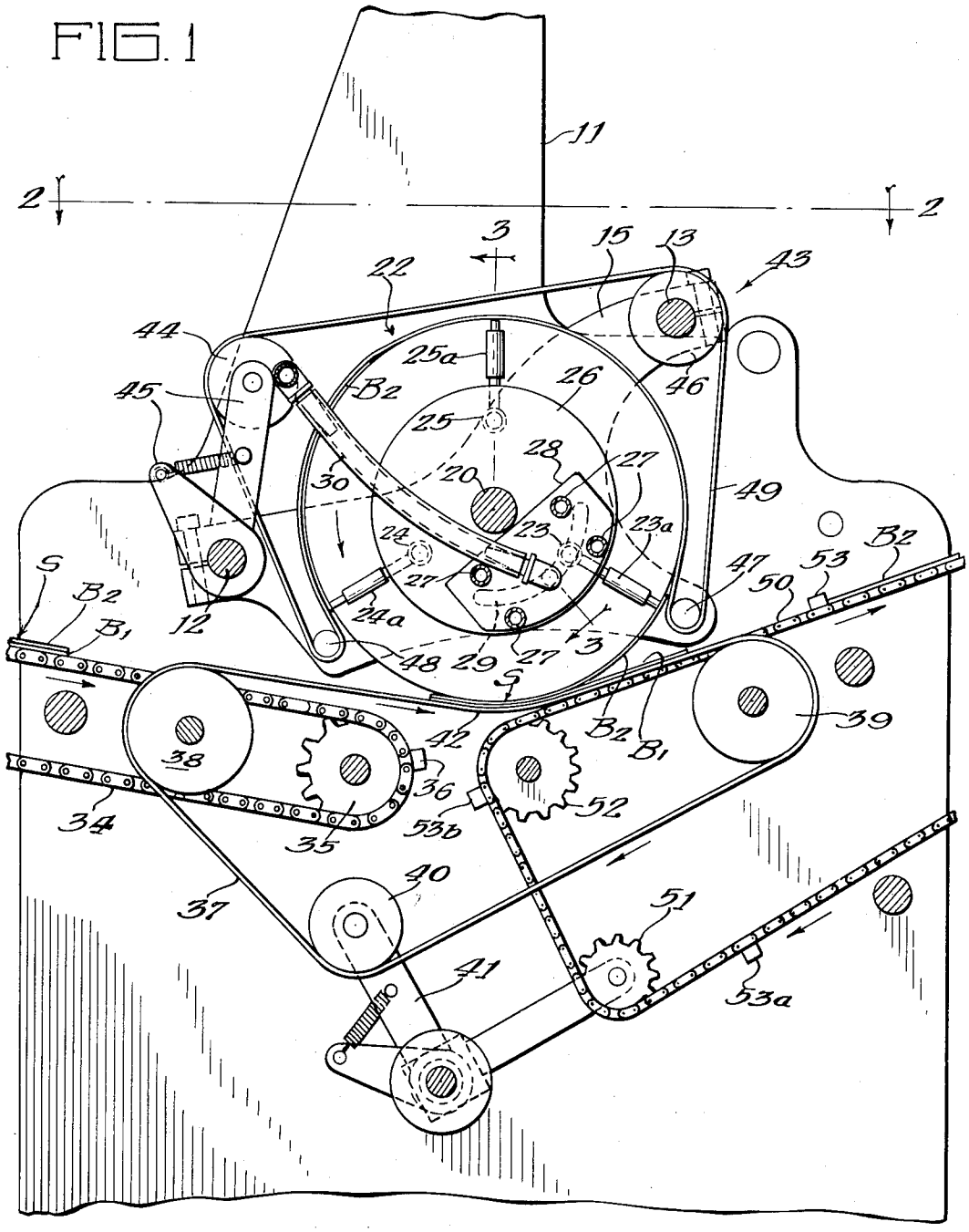
Oct. 25, 1955 O. KILE 2,721,644

UNSTACKER DEVICE

Filed Aug. 23, 1954 3 Sheets-Sheet 1

FIG. 1



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Filed Aug. 23, 1954 3 Sheets-Sheet 2

FIG. 2

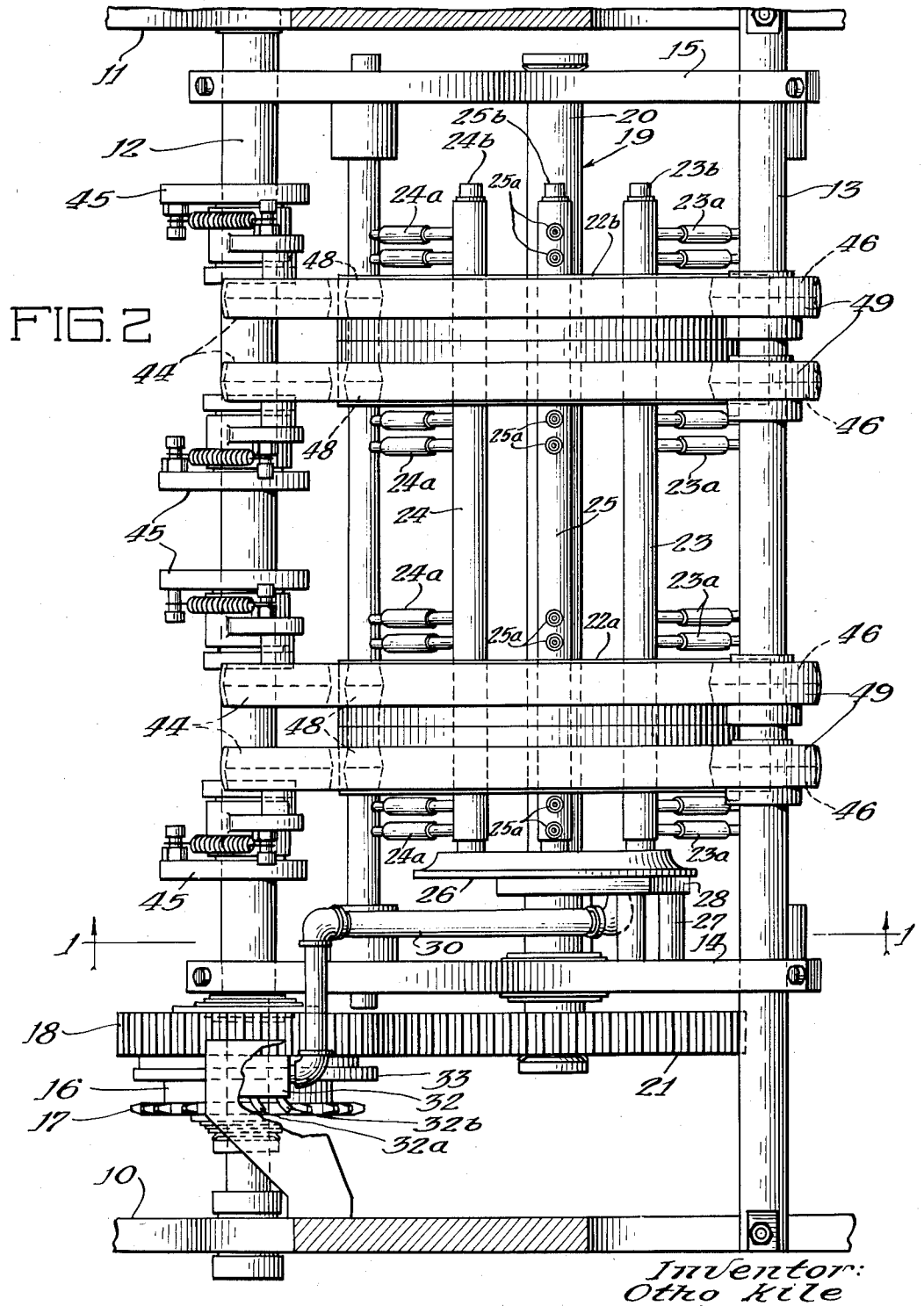

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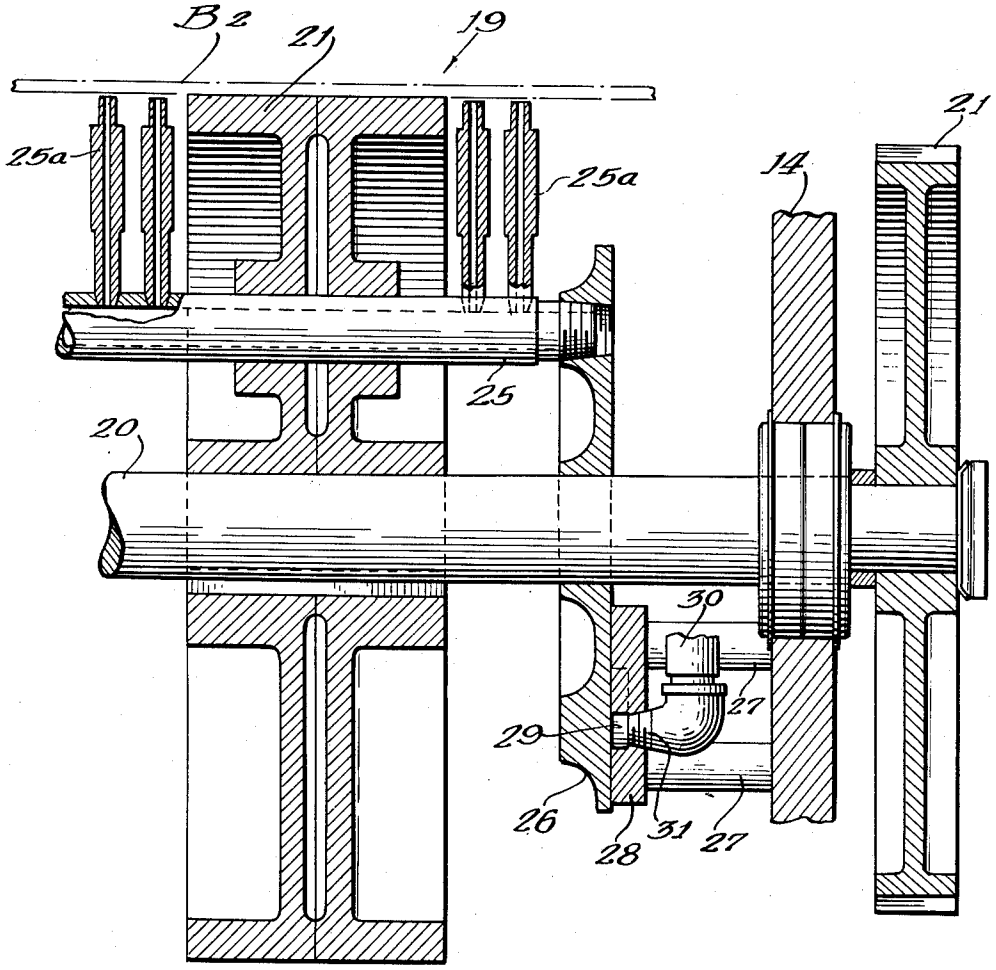
FIG. 3



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UNSTACKER DEVICE

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Application August 23, 1954, Serial No. 451,503

8 Claims. (Cl. 198—35)

This invention relates to an unstacker device for receiving a series of stacks of sheets and removing the top sheet from each stack in the series to place it in a gap in the series behind the stack from which it was removed.

The present device is of considerable value in handling either single sheets or thin booklets, such as specialty catalogs, after they have been printed. As an example of a use to which such devices are put, a saddle stitcher of the type which is employed for the binding of certain types of magazines and specialty catalogs ordinarily delivers books to a trimmer from which they are delivered in stacks of two, and it is necessary to remove the top book of each pair if any further processing is to be performed upon the books.

Stacks of two books coming from a trimmer may be delivered to the unstacker with a space at least as big as a book between each stack of two. The unstacker removes the top book from a pair at a sheet transfer area, carries it around an unstacker drum, and places it on an outfeed chain in an open space in the series of books behind the book from which it was removed.

It is obvious that a series of similar devices could be used to break down a larger stack into single sheets or single books.

The invention is illustrated in a preferred embodiment in the accompanying drawings in which:

Fig. 1 is a vertical sectional view of the device substantially along the line 1—1 of Fig. 2;

Fig. 2 is a plan view partially in section, taken as indicated along the line 2—2 of Fig. 1; and

Fig. 3 is a fragmentary sectional view on an enlarged scale taken as indicated along the line 3—3 of Fig. 1.

Referring to the drawings in greater detail, the machine includes side frame members **10** and **11** having stay shafts **12** and **13** and shaft journal plates **14** and **15** mounted on the stay shafts interiorly of the frame members **10** and **11**. Journalled on the stay shaft **12** between the frame member **10** and the bearing plate **14** is a drive hub **16** provided with a drive sprocket **17** and a pinion **18**.

Journalled in the bearing plates **14** and **15** is an unstacker drum, indicated generally at **19**, which includes a drum shaft **20** having a drive gear **21** which meshes with pinion **18**. The drum shaft **20** is provided with a pair of spaced drum elements **22***a* and **22***b* within which are supported longitudinal air delivery tubes **23**, **24** and **25**, each of said air delivery tubes carrying a gang of eight nozzles, designated respectively **23***a*, **24***a* and **25***a*. As best seen in Fig. 1, the air nozzles **23***a*, **24***a* and **25***a* extend radially to points substantially level with the surfaces of the drums **22***a* and *b*. Since the unstacker drum rotates in the direction indicated by the arrow in Fig. 1 the air nozzles follow each other around in numerical sequence. Secured to the ends of the air delivery tubes **23**, **24** and **25** at one end is an air valve plate **26**, while the opposite ends of the tubes are closed by screw plugs **23***b*, **24***b* and **25***b*.

Projecting inwardly from the journal plate **14** is a set of mounting brackets **27** for a fixed air delivery member

28 which, as best seen in Fig. 3, has a surface abutting the air valve plate **26**. As seen in Figs. 1 and 3, the air delivery member **28** has an arcuate air slot **29** which is on a circle drawn through the air delivery tubes **23**, **24** and **25**, so that each tube is placed in communication with the air slot on each rotation of the unstacker drum **19**. An air inlet tube **30** has a fitting **31** opening into the air slot **29**, and communicates at its outer end with a standard commercial two-way air valve **32** which has a self-contained spring loaded cam follower (not shown), so that the valve may be moved between its two positions by a cam **33** mounted on the drive hub **16**.

One side of the two-way valve **32** connects to an air suction line **32***a*, while the other side connects to an air pressure line **32***b*, so that the air line **30**, and thus the air delivery slot **29**, may be placed alternately into communication with said suction and pressure lines as the valve **32** is moved back and forth by action of the cam **33**. The pinion **18** makes three revolutions for each revolution of the unstacker drum gear **21**, and the cam **33** is so designed as to reverse the valve **32** once for each revolution, or three times for each revolution of unstacker drum **19**.

As seen in Fig. 1, books B1 and B2 in a stack S of two books enter the unstacker on an infeed chain **34** which passes around a sprocket **35** and is provided with lugs **36** which are spaced apart a sufficient distance that there is the space of a book between each two stacks S. The stacks S are picked from the infeed chain **34** by a pair of spaced sheet transfer belts **37** which are in register with the unstacker drum members **22***a* and **22***b* and are driven around suitable rollers **38** and **39** and a tensioning roller **40**, which is mounted on a spring loaded tensioning arm **41**. The belt **37** moves in the direction of the arrows in Fig. 1, and contacts the bottom of the unstacker drum members **22***a* and **22***b* so as to provide a sheet transfer area **42**. The air nozzles **23***a*, **24***a* and **25***a* are in communication with the air slot **29** as they pass through the sheet transfer area **42**.

The device is provided with guide means, indicated generally at **43**, in the form of tensioning guide rollers **44** journalled on spring loaded rocker arms **45** supported on the stay shaft **12**, rollers **46** journalled on the stay shaft **13**, rollers **47** and **48** adjacent the bottom of the drum **19**, and guide belts **49** which are trained over the guide rollers so as to run over the drum members **22***a* and **22***b*.

Single books are removed seriatim from the sheet transfer area **42** by means of an outfeed chain **50** which passes around sprockets **51** and **52** and a third sprocket which is not shown, and the chain **50** is provided with lugs **53** which are so spaced as to carry books from the sheet transfer means seriatim with no substantial space between them.

The reversing of the valve **32** in synchronization with the rotation of the unstacker drum **19** causes alternate suction and pressure on the air slot **29**, and the sequence of operation is as follows: The nozzles **23***a* for the air tubes **23** as they are shown in Fig. 1 are in communication with the air slot **29** which is on a suction cycle, so that the nozzle **23***a* has picked a book B2 off the book B1. The nozzles **24***a* and **25***a* of the air tubes **24** and **25** are not in communication with the air slot **29**, so that they are idle. However, the air nozzles **24***a* had picked up a book B2 on their last previous rotation through the transfer area **42** and carried it into the guide belts **49** for passage around the unstacker drum **19**; and are now prepared to deflect the book B2 onto the outfeed conveyor **50** behind the book B1 from which the nozzle **23***a* has just lifted a book. As the air tube **23** passes off the air slot **29** the cam **33** reverses the air valve **32** so as to put pressure on the air slot **29** as the air tube **24** moves into communication with it. Thus an air blast passes through the nozzle **24***a* which blows the forward margin of the

book B2 held adjacent said nozzle onto the outfeed chain **50**, ahead of the lugs **53***a* which are at the bottom of the chain in Fig. 1.

The nozzles **25***a* are idle, since they have just blown a book B2 onto the outfeed chain **50**, and when the nozzles **25***a* reach the air slot **29** the slot will be on suction again so that the nozzles **25***a* may pick up the next succeeding book B2 of a stack of two at the sheet transfer area **42**.

The foregoing detailed description is given for clearness of understanding only and no unnecessary limitations are to be understood therefrom, as some modifications will be obvious to those skilled in the art.

I claim:

1. An unstacker device for receiving a series of stacks of sheets and removing the top sheet from each stack in the series to place it in a position in the series behind said stack, comprising: a rotatable unstacker drum; driven infeed means for feeding a series of spaced stacks of sheets to a sheet transfer area under the drum; guide means for carrying a sheet around the drum; driven outfeed means for removing sheets from said sheet transfer area; and air blast means for deflecting the top sheet of a stack in the sheet transfer area into the guide means for travel around the drum and for deflecting said sheet into the outfeed means in a space behind a stack after it has travelled around the drum.

2. The device of claim 1 in which the air blast means includes air tubes spaced circumferentially within the drum, and means for alternately causing an air blast in opposite directions through said tubes at the sheet transfer area on alternate rotations of the drum.

3. The device of claim 1 in which the infeed means is adapted to feed sheets to the sheet transfer area in stacks of two, and the outfeed means is adapted to remove sheets seriatim from said area.

4. An unstacker device for receiving a series of stacks of sheets and removing the top sheet from each stack in the series to place it in a position in the series behind said stack, comprising: a rotatable unstacker drum having a plurality of circumferentially spaced air tubes; driven infeed means for feeding a series of spaced stacks of sheets to a sheet transfer area under the drum; guide means for carrying a sheet around the drum; driven outfeed means for removing sheets from said sheet transfer area; air suction and air pressure means communicating with said air tubes; and means synchronized with the rotation of said drum for placing said suction and pressure means in communication with any given air tube alternately on successive movements of said tube through the sheet transfer area, whereby an air tube may draw the top sheet off a stack in said area, carry it around the drum in cooperation with said guide means, and deflect it into the outfeed means in a space behind the stack from which it was drawn.

5. The device of claim 4 in which a fixed air delivery member is provided which is in contact with the drum, said air delivery member having an arcuate air slot with which the air tubes communicate in the sheet transfer area, and valve means are provided to place the air suction and pressure means alternately into communication with said air delivery member.

6. The device of claim 5 in which the valve means consists of a two way valve, and a cam synchronized with the rotation of the drum actuates said valve means to reverse the valve connections as the air tubes pass successively over the slot.

7. The device of claim 4 in which the infeed means includes an infeed chain and a sheet transfer belt which carries stacks of sheets from said chain through the sheet transfer area.

8. An unstacker for receiving a series of stacks of sheets and removing the top sheet from each stack to place it in a space behind said stack, comprising: a rotatable drum having an odd number of circumferentially spaced air tubes; driven infeed means for delivering a series of spaced stacks of sheets to a sheet transfer area beneath said drum; guide means for guiding a sheet around said drum; driven outfeed means for removing sheets from the sheet transfer area; and reversible air blast supply means adapted to deliver air alternately on suction and on pressure to said tubes so they pass successively through said sheet transfer area, whereby each tube may draw the top sheet off a stack at the transfer area on one revolution of the drum and blow it into the outfeed means in a space behind said stack on the next revolution.

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