United States Patent

[11] **3,547,280**

[72] Inventor **James E. Giegerich**
Norristown, Pa.

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[73] Assignee **Certain-Teed Products Corporation**
Ardmore, Pa.
a corporation of Maryland

[54] **TAB STACKING APPARATUS**
2 Claims, 8 Drawing Figs.

[52] **U.S. Cl.** **214/6,** 83/86
[51] **Int. Cl.** **B65g 57/10**
[50] **Field of Search** 214/6M, 6H, 6F, 6P, 6D, 6K

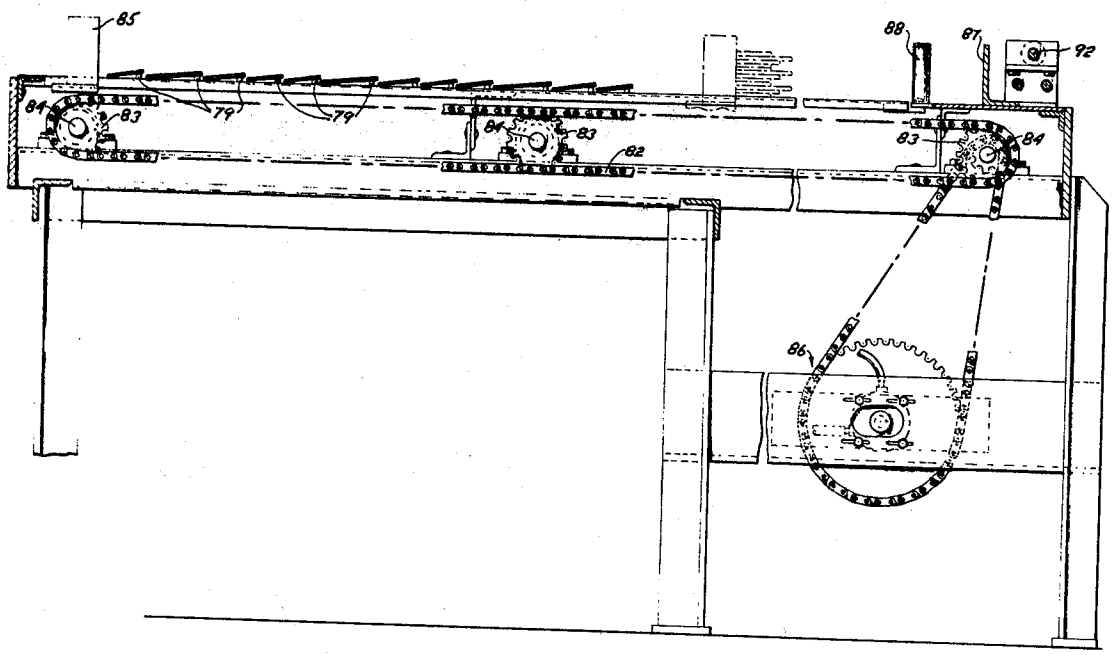
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Primary Examiner—Gerald M. Forlenza
Assistant Examiner—Robert J. Spar
Attorney—Synnestvedt & Lechner

ABSTRACT: Shingle-manufacturing equipment includes hopper from which shingles are stripped one at a time and fed to cutting assembly provided for subdividing shingles into a plurality of strips of various widths. Cutting assembly includes cutters, e.g. rotary disc type, ganged on shaft for simultaneous cutting of shingle along plurality of lines extending transversely of the long axis of the shingle. Transfer apparatus deposits subdivided shingles onto collecting table with one side edge of each strip being held in a raised condition with respect to the adjacent side edge of the following strip on the table. A traveling stacker moves lengthwise of the table successively engaging the lower edge of each strip and moving that strip over the following strip.

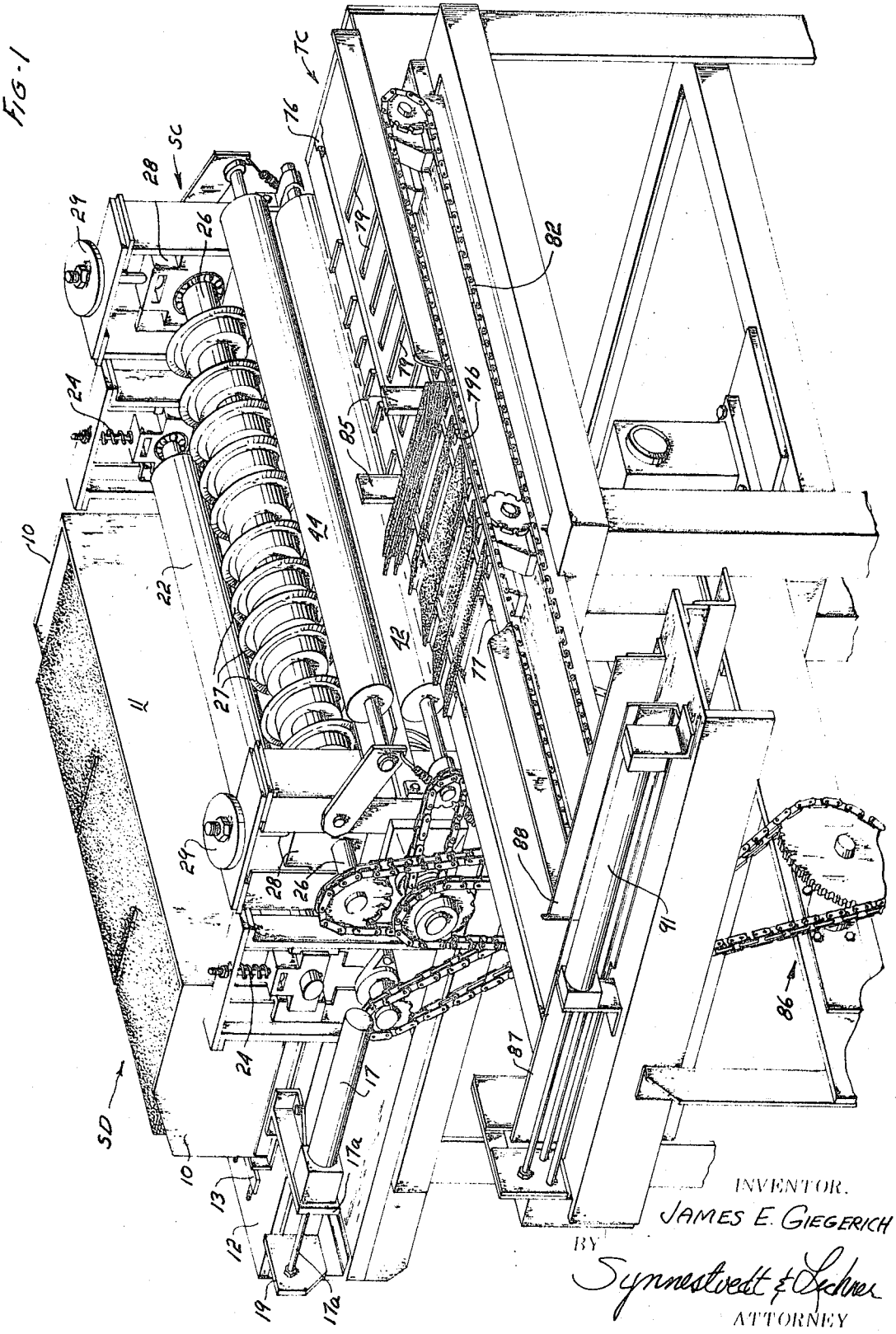


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FIG. 1



INVENTOR.
JAMES E. GIEGERICH
BY
Synnestvedt & Lechner
ATTORNEY

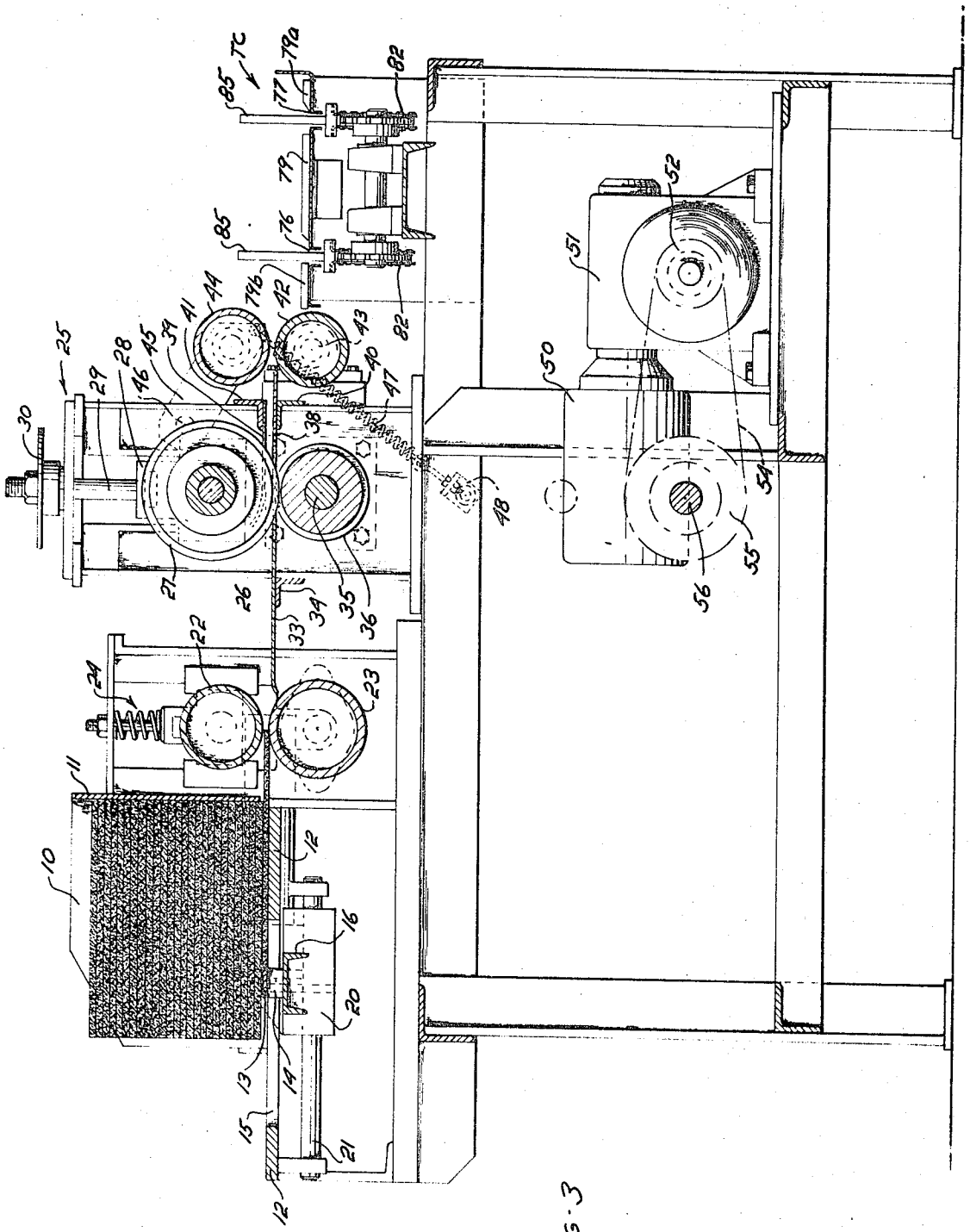


FIG. 3

INVENTOR.
JAMES E. GIEGERICH
BY
Synnestvedt & Lechner
ATTORNEY

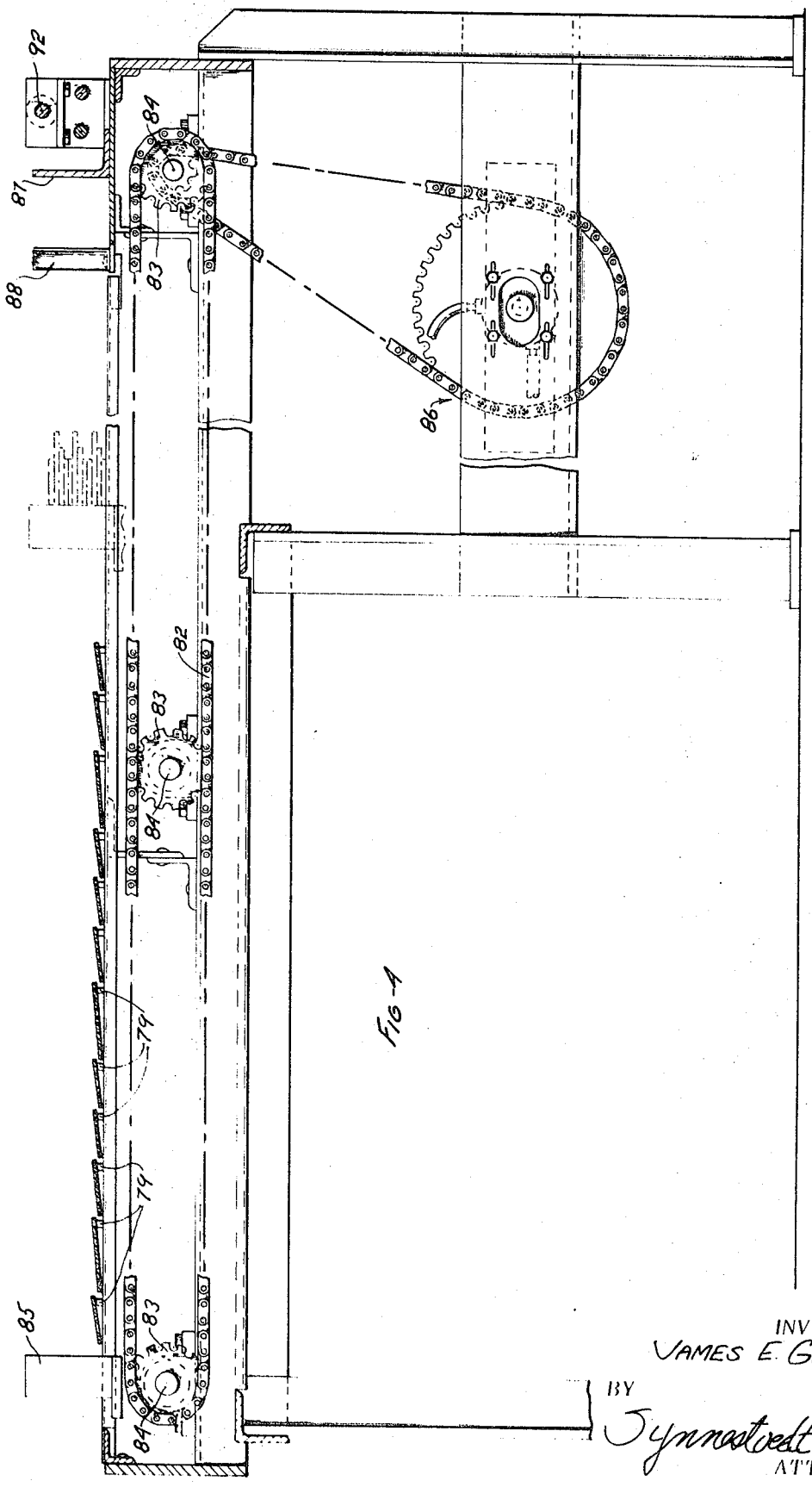


FIG 1

INVENTOR.
JAMES E. GIEGERICH

BY
Synnestvedt & Lechner
ATTORNEY

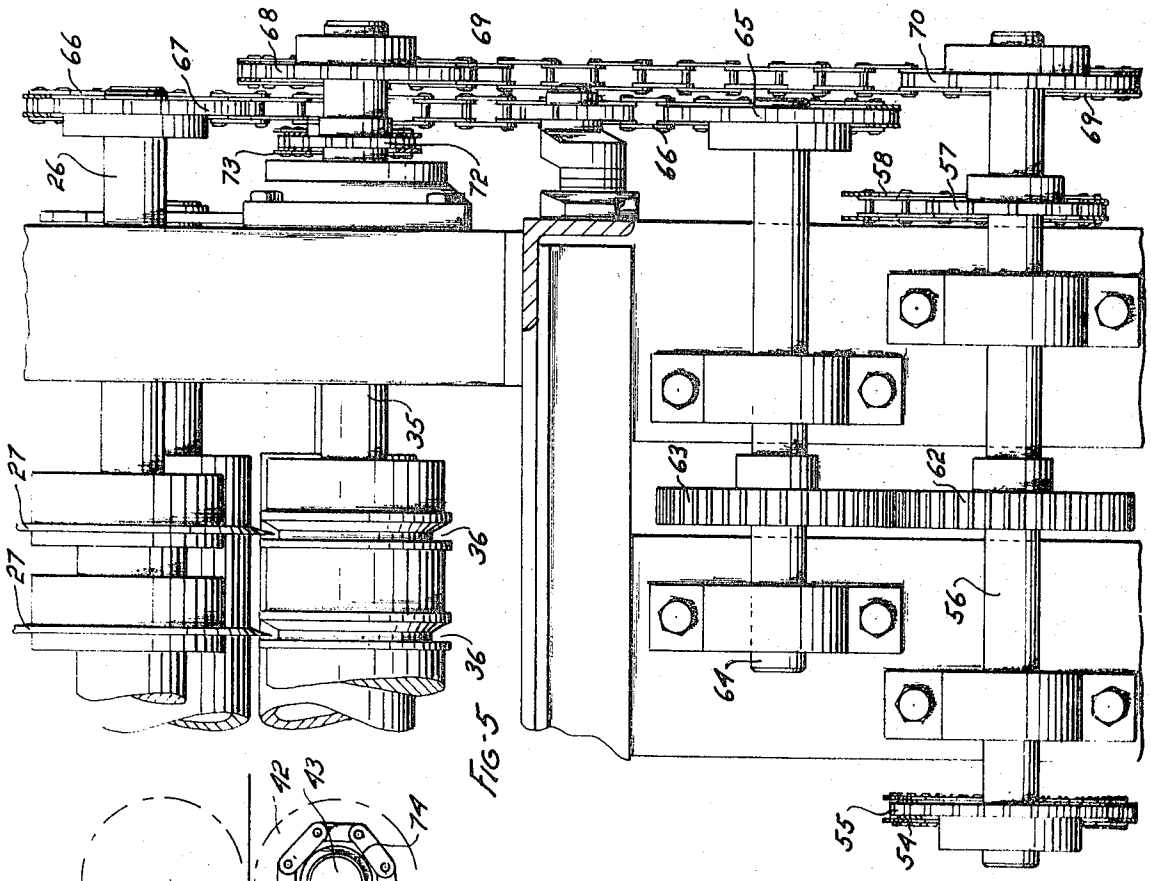


FIG-5

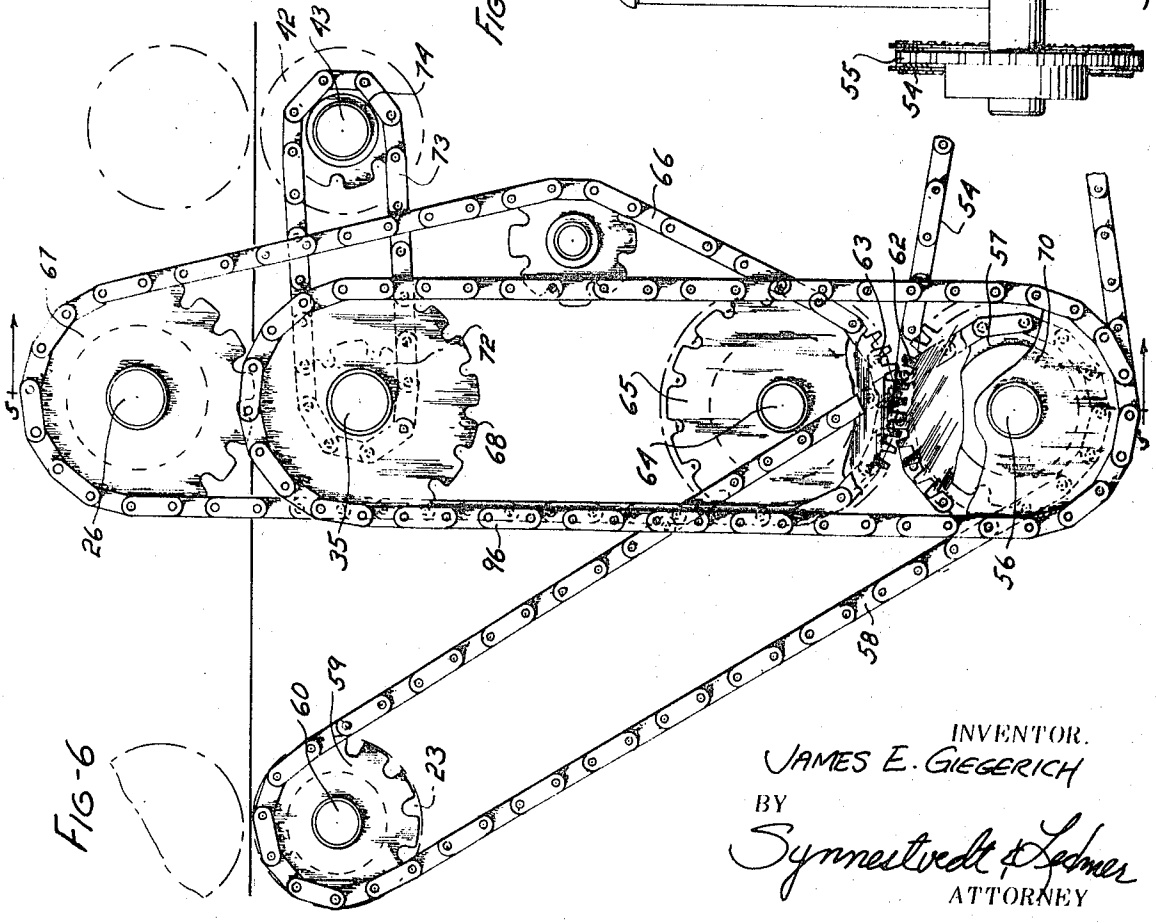


FIG-6

INVENTOR.
JAMES E. GIEGERICH
BY
Synnestvedt & Lechner
ATTORNEY

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FIG-7

FIG-8

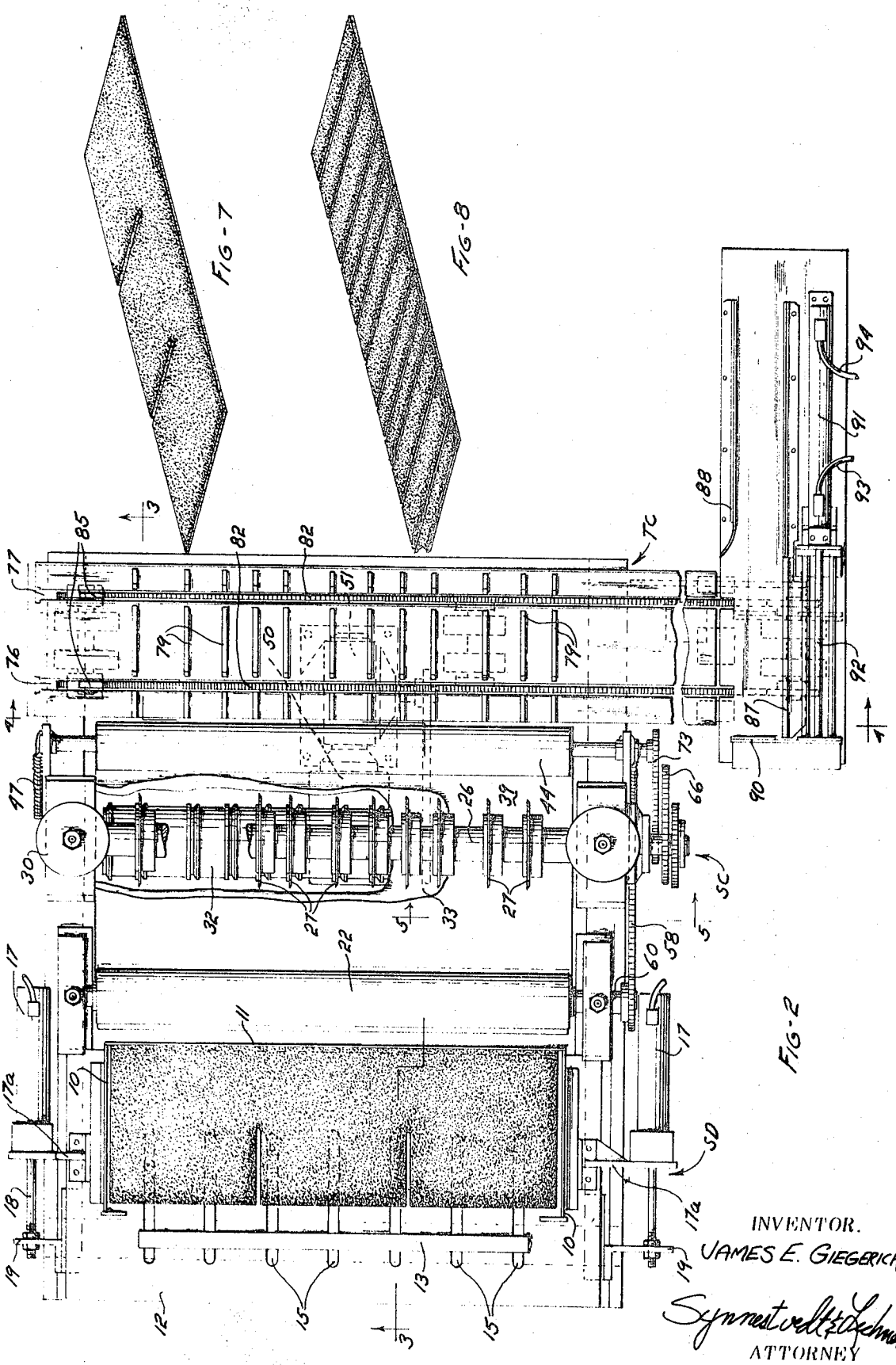


FIG-2

INVENTOR.
JAMES E. GIEGERICH

Synnestvedt & Lechner
ATTORNEY

TAB STACKING APPARATUS

This invention relates to apparatus for forming and stacking rectangular sheetlike articles. Although not limited thereto, the invention is more particularly directed to the provision of apparatus for subdividing large rectangular shingle sheets into a number of smaller rectangular strips, hereinafter usually called tabs and to the stacking of such tabs.

The invention is especially adapted for use in conjunction with equipment of the general kind described in copending application Ser. No. 715,774, filed March 25, 1968, and owned by the assignee of this application. Equipment is described in that application for the manufacture of composite shingles made up of conventional rectangular shingle sheets on which are superimposed strips or tabs, preferably of various widths, at intervals along the top surface of each shingle sheet. Composite shingles of the kind involved are disclosed in U.S. Design Pat. No. D-209,719, issued Dec. 26, 1967. With the foregoing general background in mind, the present invention is well adapted for the manufacture of the tabs from the large shingles of the same kind used for the base shingle of the composite and for efficiently and simply collecting the tabs so formed for ultimate use in the assembly of the composite shingles.

The present invention simplifies a somewhat troublesome and time-consuming step in the manufacture of such composite shingles inasmuch as the cutting of the large sheet shingles into strips of different widths and the stacking of the tabs so formed into easily handleable bundles is a difficult task for the average workman to cope with. The tabs, being made up from asphalt-impregnated feltlike paper, covered with a granular slate or similar coarse material, are difficult to cut and, because they are somewhat rough and of various widths, are hard to stack manually or by known stacking equipment.

Accordingly, in its broader aspects, a central object of the invention is the provision of stacking apparatus for forming a stack of rectangular articles arranged in side-by-side relationship.

A still further object of the invention is the provision of apparatus for manufacturing narrow rectangular strips from larger rectangular sheet shingles.

Another important object, closely related to both of the foregoing, is the provision of apparatus for subdividing sheet shingles into a group of tabs or strips arranged in side-by-side relationship and for thereafter stacking the resulting tabs or strips.

Yet another object of the invention is the provision of apparatus of the kind described which incorporates features providing for safety, dependability and economy of operation.

The foregoing and various other objects and advantages inherent in the operation of equipment formed in accordance with the invention are achieved by a collecting table for supporting the tabs in side-by-side relationship, the table being provided with support means for holding one edge of each tab in a raised position with respect to the adjacent edge of the next adjacent tab. Pusher means are mounted for movement lengthwise of the table into successive engagement with the other edge of each of said tabs. The pusher means moves each engaged tab over the following tab until all are stacked at a station from which they are conveyed away for subsequent use. According to one important aspect of the invention, cutting means comprising rotary knife type cutter elements ganged on a rotating shaft and spaced therealong at irregular intervals, subdivide larger sheets into a plurality of tabs. Means are preferably provided intermediate the rotary cutters and the collecting table for transferring the tabs so formed onto the table in side-by-side relationship.

The various objects and advantages of the invention will become fully apparent upon reference to the following description of the preferred embodiment of the invention as shown in the accompanying drawings in which:

FIG. 1 is an isometric view showing apparatus formed in accordance with the invention;

FIG. 2 is a plan view of the apparatus shown in FIG. 1;

FIG. 3 is a sectional elevational view, taken along line 3–3 of FIG. 2, the view being on a slightly enlarged scale as compared with FIG. 2;

FIG. 4 is an enlarged sectional view, the section being taken on line 4–4 of FIG. 2;

FIG. 5 is an exploded view of the portion of the structure shown in FIG. 2, the view being a sectional view on line 5–5 of FIG. 2;

FIG. 6 is an elevational view showing the drive train used in the illustrative embodiment of the invention;

FIG. 7 is a view of a base shingle of the kind from which tabs of the kind referred to herein are formed; and

FIG. 8 shows the shingle following subdivision into tabs.

Attention is first directed to FIGS. 1 through 3. As therein shown, the apparatus generally comprises a shingle dispensing mechanism identified by the reference character SD. A shingle-slitting or cutting mechanism identified by the reference character SC follows the dispensing mechanism and receives shingles therefrom. The shingles are subdivided into tabs of different widths by the slitting mechanism and the subdivided shingles are thereupon fed to tab stacking mechanism generally identified by the reference character TC.

The shingle dispensing mechanism SD preferably comprises a hopper having sidewalls **10**, a rear wall **11** and a floor **12** on which a supply of sheet shingles is adapted to rest. As can be seen most clearly in FIG. 3, a clearance space through which shingles are adapted to be fed, is provided between the bottom of the rear wall **11** and the hopper floor. The amount of clearance is governed by adjustable gauging bars, not shown, and is made large enough to allow for the stripping of just one shingle at a time from the bottom of the stack, the next shingle in the stack being retained in the hopper by the lower edge of the gauging bars which are mounted on rear wall **11**.

Stripping of shingles from the hopper is accomplished by means of transversely extending pusher bar **13**. As shown best in FIG. 3, pusher bar **13** is mounted on spacers **14** which fit within slots **15** formed in the floor **12**. Each spacer is in turn secured to transversely extending pusher bar support channel **16**.

The pusher bar is reciprocated back and forth through a path whose limits are defined by the stroke of double acting air cylinders **17** mounted on brackets **17***a* secured to the floor on each side of the hopper. Each air cylinder **17** is fitted with a piston and a piston rod **18**, the end of which is bolted to a connecting bracket **19**, the latter being secured in turn to linear bearing members **20** which are journaled on bearing rods **21**, one of which is shown in FIG. 3. The pusher bar support channel **16** is secured to the bearing members **20** and thus moves therewith on the rods **21**.

It will be evident that pressurization of the cylinders **17** by means of suitable control mechanism effects movement of the pusher bar first to the right as viewed in FIG. 1. During this movement, it engages the bottom shingle in the stack, forcing the shingle out through the clearance space into the nip formed between a pair of transfer rollers **22** and **23**.

Roller **23** is driven by means described hereinafter and roller **22** is urged downwardly by means of compression spring **24** so that the shingle is gripped between the two rollers, pulled from the stack and moved further to the right as viewed in FIG. 3, to the shingle cutting or subdividing assembly SC. Preferably, the rollers are coated with a relatively soft material in order to minimize slippage and damage to the same during the withdrawal of each shingle.

The shingle-cutting assembly SC is mounted on a stand **25** and comprises a first shaft **26** on which disc type rotative cutting elements or knives **27** are mounted. Shaft **26** is journaled in a pair of vertically movable takeup bearings **28**, movement of which is effected by means of adjusting screws **29**, and upon movement thereof in the appropriate direction, the shaft **26** and hence the knives **27** can be raised or lowered and thereby set in the desired position. Shaft **26** is driven by means described hereinafter.

As mentioned above, the decorative effects achieved when a roof is shingled with shingles on which tabs are applied are emphasized when tabs of different widths are applied. In order to cut the shingles to form such tabs, it is preferred that the knives **27** are mounted on the shaft **26** at irregular intervals, as can best be seen in FIG. **2**, by means of clamping sleeves and retainers of known construction.

During movement of the complete shingles to the slitter assembly, they are supported on a plate **33** which is mounted on a suitable support angle **34** which extends transversely of the cutter stand **25** and is secured thereto. As can best be seen in FIG. **3**, the plate supports each shingle as it leaves the rollers **22** and **23** and is moved to the cutter assembly.

Mounted beneath the knives **27** is a second shaft **35** which carries grooved cutting members **36**. The cutting members **36** are rotatively driven by means described hereinafter and each is provided with a grooved portion **37**, into which the knives **27** extend with their cutting edges adjacent a vertical side wall thereof. As each shingle is fed into the nip between the rotating knives and the rotating cutting members **36**, the knives and the cutting members effect subdivision thereof along lines extending transversely to the long axis of the shingle. During the cutting operation, the portions of the shingle immediately adjacent the lines of separation are free to yield slightly into the grooves, thus substantially eliminating any tearing of shingle material.

During the cutting operation, the rotary movement of knives and cutting members advances the shingle to the right as viewed in FIGS. **2** and **3** between top and bottom guide plates **38** and **39**. The plate **38** is secured to a transversely extending angle **40** which is in turn connected to the stand **25** on which the cutter is supported. An angle **41**, also secured to the cutter stand, supports the plate **39**.

A driven roller **42**, journaled in bearings **43**, is mounted in the path of the tabs just beyond the tab supports **38** and **39**. A roller **44** is mounted immediately above the roller **42**, the roller **44** being journaled in a pair of arms **45** which are pivotally mounted on pins **46**, secured to the cutter stand. Springs **47** are secured to the arms and to spring anchors **48** and urge the rollers **44** downwardly towards engagement with the roller **42**. The two rollers form a tab transfer means which pick up the tabs as they leave the cutters and transfers them onto a collecting surface on table TC.

Rotation of the cutter elements as well as the transfer rollers **22**, **23** and transfer rollers **42**, **44** is effected by an electric motor **50** which is provided with a reduction gearing housed in a box **51**. The gear box **51** has an output shaft **52**, on which a toothed sprocket wheel **53** is secured, as is shown in FIG. **3**. A drive chain **54** meshes with the toothed sprocket wheel and with a sprocket wheel **55** keyed to a shaft **56** shown in FIGS. **3** and **6**. A second sprocket wheel **57** is also mounted on the shaft **56**. A roller chain **58** of conventional construction meshes with the teeth of sprocket wheel **57** and with the teeth of a toothed sprocket wheel **59**, secured to shaft **60**. The shaft **60** carries the transfer rollers **23**, thus effecting continuous rotation thereof upon operation of motor **50**.

In order to drive the shaft **26** and hence the cutter elements **27**, a gear **62** is also keyed to the shaft **56** and meshes with a gear **63** mounted on a stub shaft **64**. Shaft **64** also carries a toothed sprocket wheel **65** which is secured thereto, the teeth of sprocket wheel **65** meshing with roller-type chain **66**, which also meshes with the teeth of sprocket wheel **67** secured to shaft **26**.

Grooved cutter member **36** is driven in like manner by a sprocket wheel **68** which is in turn driven by a drive chain **69** which meshes with a sprocket wheel **70** also keyed to the shaft **56**. Shaft **35** also carries a sprocket wheel **72** which drives a chain **73** and a sprocket wheel **74** keyed to shaft **43** thus driving transfer roller **42**.

The tabs which are formed from the subdivided shingle are advanced by the transfer rollers **42** and **44** and deposited onto the surface of tab collecting table **75**, with all tabs being positioned in side-by-side relationship. The collecting table extends transversely of the cutting assembly and is provided with a pair of longitudinally extending slots **76** and **77** whose purpose will be described subsequently.

According to the invention, means **78** are provided for elevating one edge of each tab with respect to the adjacent edge of the following tab on the surface of the collecting table. Preferably, this means comprises tilting or elevating bars **79** which fit between the slots **76** and **77** and preferably also includes shorter barlike pieces **79*a*** and **79*b*** arranged on the outboard sides of the slots.

Chains **82** which mesh with sprocket wheels **83** mounted on shafts **84** are located immediately beneath the slots **76** and **77**. A transfer or tab pusher lug **85** is secured to each of the chains **82**. Chains **82** and hence the transfer lugs **85** are driven by means comprising a pneumatically operable actuator **86** of conventional construction. Actuator **86** effects movement of the transfer lugs from the position shown in FIG. **4** lengthwise of the table to a position adjacent the right hand edge and thereafter effects withdrawal of the transfer lugs to the full line position.

When the tabs comprising a subdivided shingle are deposited on the surface of the table, one edge of each tab is thus held in a raised position with respect to the next adjacent tab by means of the bars **80**. Immediately following the depositing of the tabs on the table, the transfer lugs are driven lengthwise of the table (toward the right as viewed in FIG. **4**) so that the lowermost edges of the tabs are successively engaged and the raised edges of such tabs are pushed over the next adjacent tab. As the lowered edge of successive tabs are engaged, such tabs and all tabs previously stacked are pushed over the following tab until all tabs are stacked at one end of the collecting surface.

The stack is moved until it reaches an upstanding wall **87** located well out of the path of movement of subsequently subdivided shingles being fed from the cutter assembly. The transfer lugs are thereafter immediately retracted by means of the rotary actuator **86** and the next shingle to be subdivided by means of the cutter is now deposited on the collecting table with one edge of each tab held in raised position by means of the bars **79**, **79*a*** and **79*b***.

Preferably, the tabs are deposited at one side of the collecting surface immediately adjacent a first tab trough side wall **87**, best shown in FIGS. **2** and **4**. As is shown in FIG. **2**, the stacks of tabs are thereafter moved off the table through a trough consisting of the upstanding wall **87** and a second sidewall **88** laterally spaced therefrom. Movement of the tabs through the trough is effected by a pusher bar **90** which is driven by means comprising an air cylinder **91** fitted with a piston rod **92**. Air lines **93** and **94** are controllably pressurized to deliver air to one or the other side of a piston within the cylinder which effects movement of the piston rod **92** and hence the pusher plate **90** in a reciprocal path. The trough is preferably long enough so that two or three stacks of tabs may be deposited therein. Although mechanism may be provided for transferring the stacks of tabs from the trough to the stations at which they are used, in most cases, this operation can be handled by a machine attendant.

The foregoing apparatus has been found to be extremely effective for the subdividing of shingles into narrow tabs and for the stacking and collecting of tabs for subsequent use in the manufacture of composite shingles. The stacking arrangement has been proven to be particularly effective in practice, effecting considerably savings in labor costs. The invention is simple and reliable and eliminates the need for the manual feeding of shingles into the path of the rotary cutters, thereby eliminating a considerably safety hazard.

I claim:

1. Apparatus for collecting narrow rectangular tabs formed by dividing rectangular shingles comprised of an asphalt impregnated paper coated on one side with a granular slate material along a plurality of lines extending transversely of the long axis thereof comprising: a table with a substantially flat tab support surface thereon, said tab support surface carrying

a plurality of tab elevating elements, said elements comprising a plurality of spaced apart bars mounted on said support surface, a pair of feed rollers extending substantially lengthwise of said table and being engageable with said tabs to thereby effect advance of the tabs lengthwise of the tab elevating elements onto said support surface with one edge of each tab being held by a tab elevating element in a raised condition relative to the adjacent edge of the next adjacent tab and with the lowered edge resting on said tab support surface, tab pusher means movable in a path extending lengthwise of said support surface and engageable in succession with the lowered edge of each of the tabs, thereby stacking the tabs by moving the engaged tabs onto the unengaged tabs, and a pusher plate positioned at the end of the path of travel of said pusher means and mounted for reciprocal movement transversely of said path to effect transfer of each stack of tabs as a unit off of said collecting surface.

2. Apparatus according to claim 1 wherein said strip support members comprises a plurality of narrow bars mounted on said support surface and extending transversely of path of movement of said pusher means, said strip feed means being adapted to deposit said strips with one edge of each strip being located on one of said bars and the opposite edge thereof resting on said collecting surface.