Feb. 26, 1963 P. S. E. FREDRIKSSON 3,079,014

PILING OR MAGAZINE PLANTS FOR ELONGATED BANDS

Filed Nov. 6, 1953

3 Sheets-Sheet 1

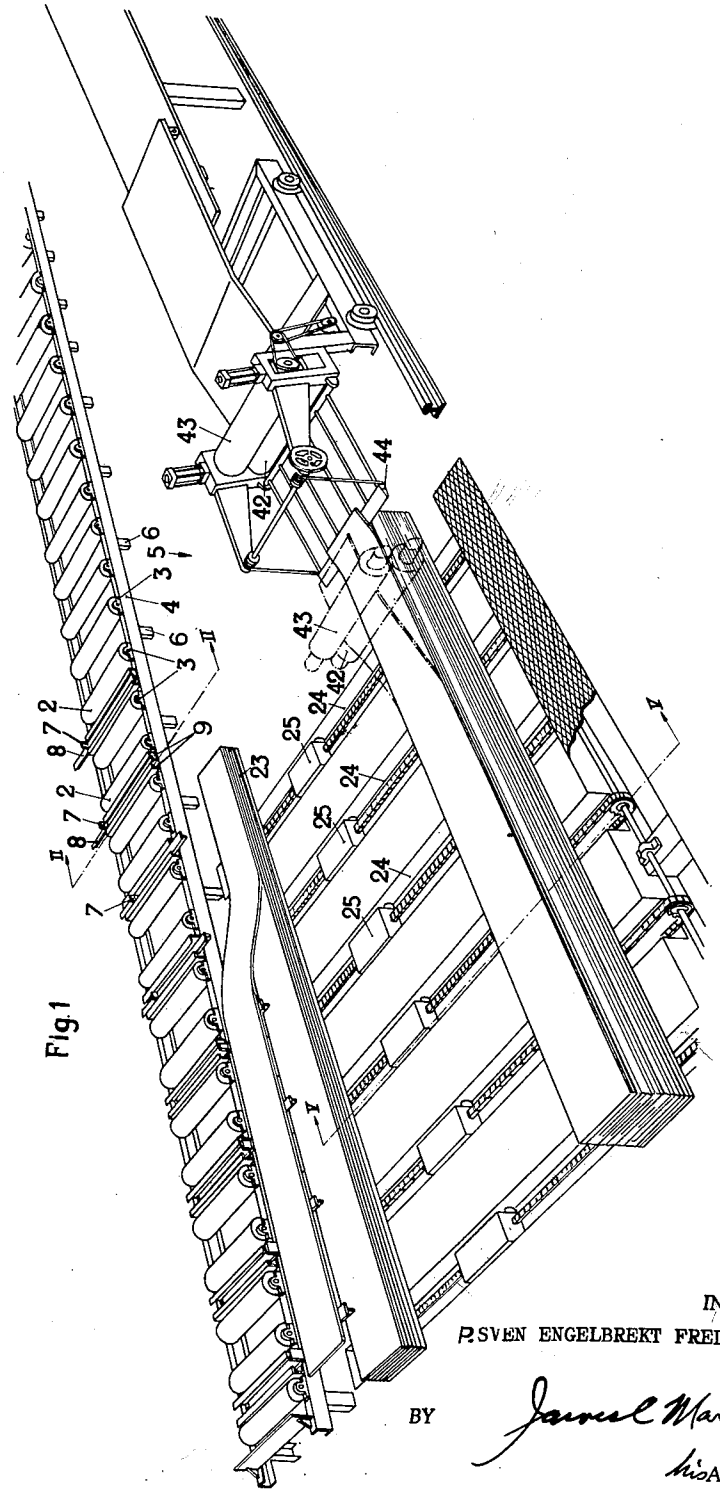


Fig. 1

INVENTOR
P. SVEN ENGELBREKT FREDRIKSSON

BY James C. Marbel

his ATTORNEY

Feb. 26, 1963 P. S. E. FREDRIKSSON 3,079,014

PILING OR MAGAZINE PLANTS FOR ELONGATED BANDS

Filed Nov. 6, 1953

3 Sheets-Sheet 2

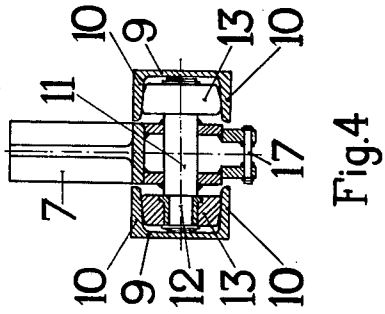


Fig.4

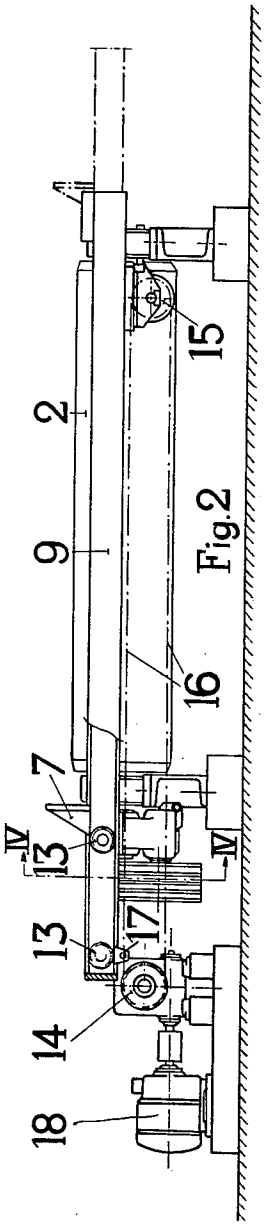


Fig.2

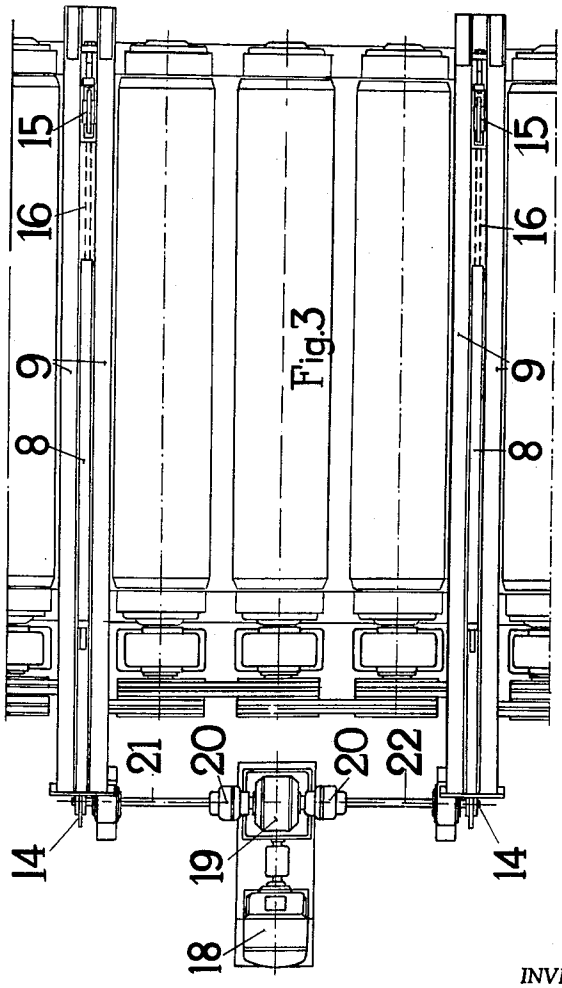


Fig.3

INVENTOR

P. SVEN ENGELBREKT FREDRIKSSON

BY

ATTORNEY

Feb. 26, 1963 P. S. E. FREDRIKSSON 3,079,014

PILING OR MAGAZINE PLANTS FOR ELONGATED BANDS

Filed Nov. 6, 1953

3 Sheets-Sheet 3

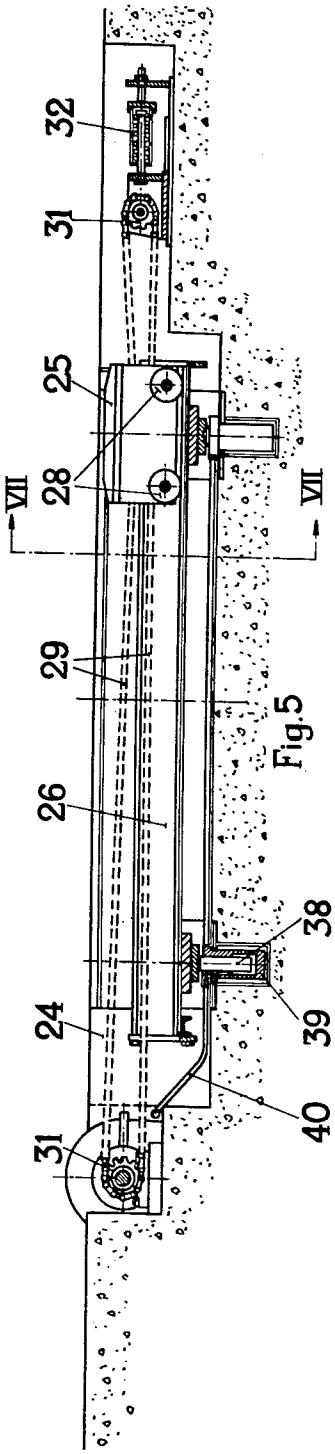


Fig.5

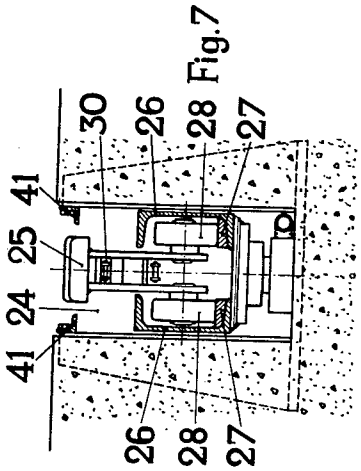


Fig.7

Fig.6

INVENTOR

P. SVEN ENGELBREKT FREDRIKSSON

BY James McMaster his ATTORNEY

United States Patent Office 3,079,014 Patented Feb. 26, 1963

3,079,014
PILING OR MAGAZINE PLANTS FOR ELONGATED BANDS

Per Sven Engelbrekt Fredriksson, Vasteras, Sweden, assignor to Aktiebolaget Svenska Metallverken, Vasteras, Sweden, a joint-stock company of Sweden

Filed Nov. 6, 1953, Ser. No. 390,693
Claims priority, application Sweden Nov. 7, 1952
7 Claims. (Cl. 214—6)

The present invention relates to a piling or magazine plant for elongated, relatively wide bands or strips, preferably of metal or metallic alloys, e.g. brass, or the kind which comprises a conveyor path having a pusher device for said bands and a storing plane for the latter.

In handling large lengths of relatively wide bands, particularly metal bands or bands of metallic alloys having a considerable weight, great difficulties are encountered, which should be overcome at transport, piling, storing and transposition thereof. Said difficulties are accentuated especially when dealing with metal bands or the like, which upon rolling or heat treatment have a relatively high temperature and for that reason may not readily be transpositioned manually.

With the intention to remove the abovementioned difficulties in connection with conveyors, preferably in roller conveyors, onto which, e.g. fresh rolled bands from a rolling mill, are discharged in their entire length, pusher devices of various designs have been arranged for pushing the bands sideways off the conveyor. In certain of said devices the bands are allowed to drop by gravity down to a storing plane, frequently being located considerably below the working plane of the conveyor, which involves difficulty in obtaining even and stable piles and that easily damaged bands are crushed or in another way deformed in a manner making them unfit for further treatment. As a further inconvenience also the very fact should be taken into account that such bands being dropped against the storing plane will bring about a noise, which of course will act highly disturbing.

In order to remedy said inconveniences and to reduce the manual work to a minimum, it has been suggested to lift the bands off the conveyor path by means of a row of suction cups located along and above the band, which are urged downwardly against the band so that the same through the action of the atmospheric pressure will be retained by the cups and e.g. on a crane device travelling in the ceiling be elevated, pushed off and placed down onto the storing plane.

Disregarding the considerable costs of the structural arrangement and the fact that it is necessary after e.g. a hot milling operation to have the bands in the first place left to cool, due to the fact that neither rubber nor other known materials for suction cups are capable of resisting the temperatures in question, one cannot always rely upon the suction cups sufficiently to fit the band, for which reason it may happen that certain parts of the band will leave hold and bulge down. This may in turn result therein that one suction cup after the other may leave hold, the entire band getting dropped in a non-controllable way, which in severe cases may cause accidents.

The invention, which has for its purpose to remove all of the abovementioned inconveniences and to render possible a controllable handling of elongated, relatively wide bands, is mainly characterized by a number of pusher means arranged along the conveyor path and capable of being displaced into its transverse direction and a number of sustaining rails or the like for the bands displaceable in its transverse direction into a position laterally of the conveyor, the pusher means as well as the sustaining rails being actuated to move on one hand individually (comprising also individual sets thereof) and on the other hand in unison, for the purpose to permit the bands to be laterally pushed off the conveyor to get primarily stored on the sustaining rails and thereupon successively laid down upon the storing plane from end to end by retracting the sustaining rails one by one or in sets to their home position.

The invention will now be more clearly explained with reference to an embodiment diagrammatically shown in the attached drawing and in connection herewith further characterizing features of the invention will be set forth.

FIGURE 1 is a perspective view of a piling or magazine plant according to the invention showing a part of a roller conveyor and a band in course of handling being just laid down upon a pile of bands resting on a storing plane.

FIGURE 2 is a section along the line II—II in FIGURE 1.

FIGURE 3 is a plan view of a part of the roller conveyor according to FIGURE 1.

FIGURE 4 is a section along the line IV—IV in FIGURE 2.

FIGURE 5 is a section along the line V—V in FIGURE 1.

FIGURE 6 is essentially a plane view of FIGURE 5.

FIGURE 7 is a section along the line VII—VII in FIGURE 5.

In the drawing in FIGURE 1 a roller conveyor is illustrated which comprises a plurality of rollers **2** rotatably supported in bearings **3**, which are in turn carried by two parallel conveyor beams **4**. The conveyor beams are sustained above the floor designated by **5** by means of a number of supporting members **6**.

The rollers may either be free-running or positively driven, but are assumed in the described example to be positively operated so that bands may be advanced thereon.

Furthermore reference numeral **7** designates a number of so called pusher means, which are fixed at each one sustaining rail or the like **8**. Said rails **8** are capable of being displaced in guides **9**.

The mounting of the rails **8** will be evident from FIGURES 2–4, wherein said guides comprise two channels, the flanges **10** of which face each other and form a space between them.

The rail **8** is traversed at two or several points by shafts **11**, which at each end constitute bearings **12** for freely running supporting wheels **13** travelling on the lower flanges **10** of the channels **9**, thus carrying the rail **8** so that the same may be displaced into the transverse direction of the conveyor. Said displacement is preferably performed by machinery means, e.g. by means of a chain drive, which in accordance with FIGURE 2 consists of two sprocket wheels **14** and **15** for each rail, which latter wheels are stationarily mounted one at each side of the conveyor. Passing over the sprocket wheels is a chain **16**, which is fixed by means of a pivot **17** to the rail **8**, which latter when operating the chain in either direction is thus forced to move into the tranverse direction of the conveyor.

Each chain and consequently each sustaining rail **8** may be individually operated by a separate operating device of any suitable kind or the operation may take place in unison by using a number of rails **8** in sets.

An example of such operation in sets is shown in FIGURE 3, wherein sets comprising two rails **8** are shown as operated by a common electric driving motor **18**, which via a worm gear **19** and clutches **20** will impart rotational movement to two shafts **21** and **22**. Said shafts carry, as shown in the figure, each one sprocket wheel **14**, which are thus simultaneously put into rotation

and via the chains 16 displace the rails 8 into the transverse direction of the conveyor.

The invention, of course, does not merely include the case that the sustaining rails be operated by means of chains or similar arrangements but also other operating methods and arrangements, which are capable in an adequate way to reciprocate the rails in the transverse direction of the conveyor, are possible. The source of power may also vary from case to case according to the available equipment or other resources.

The pusher device for the bands shown and described operates in the following way:

A band, which being for example discharged from a rolling mill, is moved upon the conveyor into its longitudinal direction from the right to the left in FIGURE 1. In a certain advanced position the band is brought to a stop, whereupon all the pusher means 7 and the sustaining rails 8 simultaneously are brought to move into the transverse direction of the conveyor towards the viewer in FIGURE 1. All the pusher means 7 then at first will come into contact with the adjacent edge of the band, whereupon all the band is aligned on the conveyor and located in such a position pushed off the same into the abovementioned direction. After completed motion of the pusher means 7 the band will finally assume a position entirely outside the same and is then sustained by the rails projecting from the conveyor as shelves or brackets. From this position the band shall be laid down upon the underlying storing plane 5, which process in accordance with the invention is carried out from one end of the band to the other. In the example shown the lying down is assumed to take place from the right to the left and to be carried out through individual or setwise retraction of the rails 8 farthest to the right and then successively along the entire conveyor. The right end of the band then will drop relatively softly against the storing plane and will come to rest in its correct position on the same. Successively longer portions of the band will come to rest against the storing plane and the increasing frictional surface between the band and the storing plane will retain the band in its aligned position so that it finally will entirely rest upon the storing plane in a plan extension. After one band has been laid down a plurality of successive bands may be stored upon each other until finally a pile of bands of a desired height designated by 23 in FIGURE 1 is obtained. Obviously all bands in said pile will lie correctly aligned in the same position, whereby the pile at subsequent magazining or the like will permit easier handling.

In order to render possible continuous discharge of the bands from the conveyor it is required, however, that the pile of bands formed should be removed when it approaches the elevation of the rails. This is performed in accordance with the invention by means of a magazining lateral conveyor for the piles, which will be described with reference to FIGURE 1 and FIGURES 5–7.

From the diagrammatic illustration in FIGURE 1 it will be evident that the storing plane 5, which may constitute a concrete floor or the like, is provided with countersunk grooves or channels 24, in which a number of carriages or runners 25 may be displaced in their longitudinal direction. The runners 25 may be raised and lowered and displaced as well in a raised as in a lowered position. All runners are commonly operable at the same rate and are adapted to be lowered into the grooves 24 below the piles 23, to elevate and displace same in the longitudinal direction of the grooves and further to lay down same in a desired position of displacement on the storing plane.

From FIGURES 5–7 the arrangement of each separate runner 25 is shown, wherein in the groove 24 are placed two channels 26 having the flanges facing each other. The lower flanges carry each one rail 27, upon which rails the carriage or runner 25 may be displaced upon wheels 28.

The runner 25 is arranged to be displaced into the longitudinal direction of the groove 24 by means of a chain 29, the one strand of which is fixed to the runner 25 at the point 30 in order to be able to drive the same. The chain 29 runs over a sprocket wheel 31 at each end of the groove 24 and may be tightened at one end by means of an adequate resilient chain tightener generally designated by 32.

As to operation of the chain 24 reference is made to FIGURE 6, wherein the sprocket wheel 31 is rigidly attached to a driving shaft 33, which via clutch 34, a worm gear 35, and a belt drive 36 may be driven from an electric motor 37. In the embodiment shown the driving motion of the motor 37 is transmitted to all runners 25. It is, of course, also possible to arrange individual motors for one or several runners in sets.

The motor 37, as has been mentioned above, will bring about displacement of all runners 25, but it is also necessary to render possible lowering and raising of the runners 25 according to desire in order to permit handling of the piles of bands 23. To this end the beams 26 in the embodiment shown are arranged to be raised and lowered by means of a hydraulic or pneumatic device. Said device consists of two plungers 38, which at each one end of the beams operate in each one cylinder 39. Each cylinder 39 is connected to a source of pressure (not shown) via a fluid pressure line 40. By supplying pressure medium to the cylinders 39 the plungers 38 are forced to elevate to a desired level determined by abutments 41, the beams 26 being raised and the runners 25 thus lifted. A corresponding lowering may then take place by draining the pressure medium.

The lateral conveyor according to the invention operates in the following way:

If e.g. a complete pile is to be removed laterally from the range close to the conveyor 1, the pressure medium is drained from all of the cylinders 39, until all runners are lowered below the level of the floor 5, whereupon the chains 29 are brought to feed the runners 25 in unison below the actual pile and to stop the same in said position. Thereafter pressure medium is supplied to the cylinders 39, so that the plungers will raise all beams 26 so that the pile of bands will come to rest upon the runners 25 above the floor level 5. In said position the chains 29 may again be started to take the pile away to an adequate place where it may be laid down by draining again the pressure medium out of the cylinders 39. By this arrangement thus one pile of bands may be placed adjacent to the other within the entire working surface of the lateral conveyor. The runners 25 are assumed in their lowered position to be able to pass below magazined piles of bands into the entire transverse direction of the lateral conveyor, so that desired rearrangement within the magazine is rendered possible.

In piling the bands in this way, however, further problems will arise in removing the bands for being further machined and handled, which here as little as in the roller conveyor may be performed manually in a convenient manner. To this end, in accordance with the invention, a particular feed device is arranged to cooperate with the lateral conveyor and the storing plane 5. Said feed device, which may be of various kinds and constructions, is, however, preferably equipped with two cooperating rollers 42 and 43 and with a band separating member 44 suitably arranged on a carriage running on rails, the carriage being fed in, the separating member 44 being below the upper band or bands is moved into the pile, the ends of the bands being entered between the rollers 42 and 43 and the bands carried away onto a conveyor path or the like. A feed device which preferably may be used together with the invention is described in my copending application Serial No. 394,832, filed November 27, 1953, now Patent No. 2,830,713, and corresponding to my Swedish application Serial No. 10285/52 filed November 27, 1952, and will not be described in detail here.

Through the principally simple, but nevertheless effective combination of the pusher device, lateral conveyor and feed device according to the invention an extraordinarily advantageous and easily operated plant for handling elongated, relatively wide bands has been obtained, which removes all those inconveniences being encountered up to now when handling such bands.

The invention is not limited to the embodiment shown and described but may be varied in several respects within the scope of the basic inventive idea.

The fact that in the description reference is made mainly to metal bands or the like does not, however, exclude that the invention with the same effect may be used in connection with bands of various materials, e.g. plast, boards, etc.

Having now described the invention, what I claim as new and desire to secure by Letters Patent is:

1. In a plant of the character described, the combination with a conveyor for supporting a length of strip material and laterally adjacent storage means providing a storage bed located below the level of the conveyor, of transfer means comprising a plurality of pusher elements and a plurality of supporting elements located in spaced relation along said conveyor and movable transversely of the length of the conveyor, means for simultaneously moving said transfer means transversely of the conveyor to cause said pusher elements to engage one edge of a strip of material and push the strip laterally off the conveyor to be supported by said supporting elements, and means for selectively retracting said supporting elements in predetermined order to cause the strip of material supported thereby to be lowered progressively of its length by gravity for support by said storage means.

2. Apparatus as defined in claim 1 in which said conveyor comprises a plurality of spaced rollers and said pusher elements comprise a plurality of tongues each movable laterally of the conveyor between two adjacent rollers.

3. Apparatus as defined in claim 2 in which said pusher elements are carried by said supporting elements to provide a plurality of transfer units, each of said units being transversely reciprocable between two adjacent rollers.

4. Apparatus as defined in claim 3 including separate driving means for separately controlling the movement of different ones of said transfer units, whereby to enable the supporting elements to be selectively withdrawn.

5. Apparatus as defined in claim 1 in which said supporting elements are located entirely below the work-supporting plane of the conveyor.

6. Apparatus as defined in claim 5 in which said supporting elements are reciprocable in fixed guides.

7. Apparatus as defined in claim 6 in which said supporting elements are carried by wheels moving in said guides.

References Cited in the file of this patent

UNITED STATES PATENTS

870,592	Smitmans	Nov. 12, 1907
1,306,158	Walker	June 10, 1919
1,556,695	Kronborg	Oct. 13, 1925
1,569,032	Reichel	Jan. 12, 1926
1,637,420	Klein	Aug. 2, 1927
1,748,226	Hunt	Feb. 25, 1930
1,848,898	McFarland	Mar. 8, 1932
1,910,267	Smith	May 23, 1933
1,931,628	Von Reis	Oct. 24, 1933
1,950,377	Allen	Mar. 13, 1934
2,000,273	Conklin et al.	May 7, 1935
2,470,795	Socke	May 24, 1949
2,506,550	Morrison	May 2, 1950
2,549,202	Idelman	Apr. 17, 1951
2,635,729	Drake	Apr. 21, 1953