

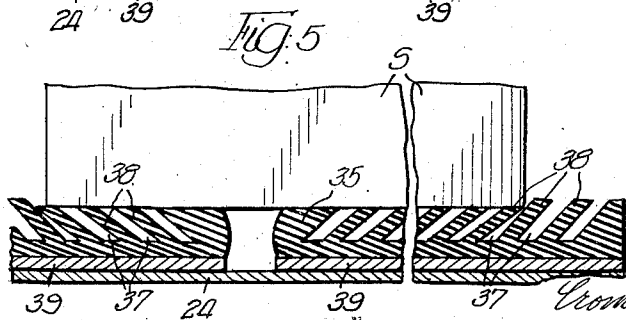
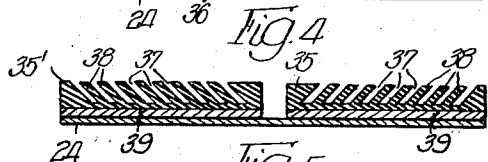
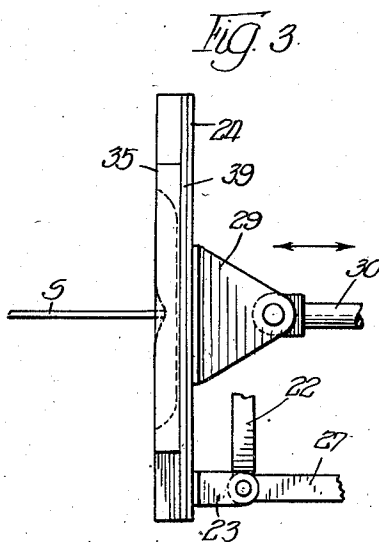
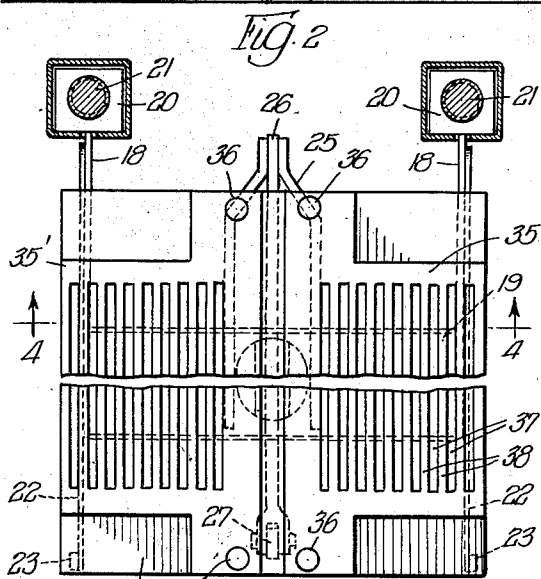
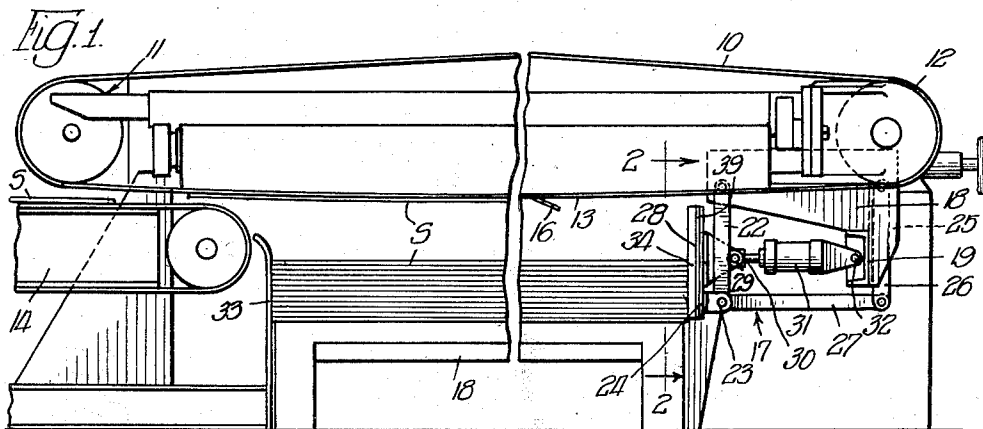
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2,821,391

BUMPER PAD FOR SHEET PILING MECHANISM

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BUMPER PAD FOR SHEET PILING MECHANISM

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9 Claims. (Cl. 271—86)

This invention relates to mechanisms for piling metal sheets as they emerge from a high speed processing line and is more particularly concerned with improvements in a stop member for such mechanisms.

It is a general object of the invention to provide improvements in a stop mechanism which is adapted to be used with apparatus for receiving metal sheets from a high speed processing line and placing them in a pile and which is capable of arresting the forward movement of the metal sheets without damaging them as they are released by a magnetic conveyor.

It is a more specific object of the invention to provide in a metal sheet piling machine an improved stop mechanism which comprises a yieldable bumper arranged in the path of movement of the sheets, a resilient pad on the face of the bumper which receives the initial impact from the leading edges of the successive sheets as they are dropped from a magnetic conveyor, and which permits the bumper to move the sheets back until their trailing edges are aligned against a fixed abutment without damage to the leading edges of the sheets and with minimum wear on the surface of the bumper.

It is a further object of the invention to provide a bumper pad for use on a movable stop member in a sheet piler machine which bumper pad is formed of a relatively thick material having substantial resiliency and having portions thereof cut away to provide laterally spaced yieldable sections of rib-like form which permit the pad to absorb the impact stresses without damage to the edge of the metal sheets and with a minimum of wear on the pad surface.

It is a still further object of the invention to provide a shock absorbing pad for a stop mechanism in a sheet piler machine which pad is formed of relatively heavy vulcanized rubber and provided with a plurality of laterally spaced vertical recesses of substantial depth which extend into the pad diagonally of the surface thereof and define rib-like sections which yield with increasing resistance under impact.

These and other objects and advantages will be apparent from a consideration of the apparatus which is shown by way of illustration in the accompanying drawings wherein:

Fig. 1 is a side elevation, partially schematic, of a simplified form of sheet piling machine which includes a stop mechanism having a bumper which incorporates therein the principal features of the invention;

Fig. 2 is a cross section taken on the line 2—2 of Fig. 1, to an enlarged scale and with portions broken away, the section showing in elevation the face of the resilient pad which is provided on the bumper;

Fig. 3 is an end elevation of the bumper and the resilient pad mounted thereon;

Fig. 4 is a cross section on the line 4—4 of Fig. 2; and

Fig. 5 is a cross section similar to Fig. 4 showing a metal sheet engaging with the surface of the resilient pad as it is stopped by the bumper.

Referring to Fig. 1, there is shown somewhat sche-

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atically a magnetic conveyor 10 which includes a pair of sheaves 11 and 12, at least one of which is power driven, and endless belts 13 extending around the sheaves. The conveyor contains electromagnets, not shown, which have downwardly facing poles and which, while energized, are adapted to hold sheets S against the underside of the belts 13 so that the belts can advance the sheets toward the right. The sheets S are fed to the conveyor 10 by a feed conveyor 14 which receives them from the processing line and delivers them to the left of entry end of the conveyor 10. An operating arm 16 of a normally closed control switch for the electromagnets extends into the path of sheets advancing along the underside of the conveyor 10. The position of this arm 16 is adjusted so that the leading edge of each sheet engages the arm to open the switch, deenergize the magnets, and release the sheet as the sheet reaches the proper position with respect to the stop mechanism indicated at 17 and a lift arrangement 18 beneath the conveyor 10 which supports the pile of sheets. The parts thus far referred to aside from the stop mechanism are not per se a part of the present invention but can be of any standard or desired construction and, therefore, are not shown nor described in greater detail. Applicant's prior patents, No. 2,374,074, dated April 24, 1945, No. 2,600,475, dated June 17, 1952, and No. 2,642,174, dated June 16, 1953, may be referred to for details of suitable mechanism with which the present invention is adapted to be employed.

The stop mechanism 17 preferably comprises a frame suspended beneath the conveyor 10 near the exit end which may be adjusted lengthwise of the conveyor to accommodate different lengths of sheets S. This frame includes a pair of laterally spaced, vertically disposed side plates 18 (Fig. 2) and a transversely extending connecting beam 19 rigidly attached thereto. The side plates 18 are preferably suspended from a pair of nut forming members 20 at their upper edges which are mounted on screw threaded spindles 21, the latter being supported in suitable structural members. Rotation of the spindles 21, of course, adjusts the stop mechanism 17 lengthwise of the conveyor as required for different lengths of sheets. A pair of depending links 22 are pivotally connected at their upper ends adjacent the upper edges of the frame plates 18 and at their bottom ends to relatively short ears 23 on the stop plate 24. The suspending frame also includes an upstanding bracket 25 which is rigidly connected to the cross beam 19. A depending link 26 is pivotally connected at its upper end to the top end of the bracket 25 and at its lower end to a relatively long ear 27 extending from the stop plate 24. The links 22 and 26 are the same length and the upper pivot points are all at the same level, likewise the lower pivot points. Consequently, the bumper always remains vertical as it swings.

The bumper plate 24 is provided with a shock absorbing or cushioning means which comprises an extending bracket forming member 28 which is pivotally connected at 29 to the end of the piston 30 of an air cylinder 31. The air cylinder 31 is pivotally connected at 32 to the cross beam 19. This arrangement of the bumper mounting and cushioning means, which is more specifically described in my copending application Serial No. 231,732, filed June 15, 1951, now Patent No. 2,761,682, permits the bumper plate 24 to move to the right against the air pressure in the cylinder 31 with the face of the plate 24 held vertical, when the sheet S strikes the latter. The air cylinder absorbs the force of the impact as the sheet S strikes the face of the plate 24 and the bumper moves to the right. The air pressure in the cylinder 31 is controlled so that it quickly restores the bumper to its normal position and as the bumper moves back it pushes the sheet along with it to the left.

A fixed abutment or stop plate member 33 is posi-

tioned in back of or to the left of bumper plate 24, which has a vertical face adapted to be engaged by the trailing edges of the sheets as the bumper pushes them back. Thus the sheets are moved into proper aligned position with the sheets already placed on the pile as the bumper pushes them back and the sheets are piled with the trailing edges aligned against the face of the abutment member 33.

The bumper plate 24 is provided with a bumper pad 34 of special construction which is adapted to receive the initial impact of the sheets S as the forward edges thereof strike the stop mechanism 17. The sheets S are travelling with considerable speed and when they are released by the magnets on the conveyor 10, inertia carries them forward so that they strike the bumper pad 34 with considerable force and there is a tendency to cut into the surface of the pad. The impact force and the tendency to cut the pad varies with the size, weight and thickness of the sheet.

The bumper pad 34 is preferably made in two sections 35 and 35' which are identical. Alternatively, the pad may be made in a single section, if desired. The illustrated pad sections 35 and 35' are attached to the supporting bumper plate 24 by means of bolts or other fastening elements 36 which extend through suitable apertures adjacent the laterally spaced inner edges of the pad sections and are secured in suitable threaded apertures in the plate 24. Each pad section 35, 35' comprises a relatively thick sheet of vulcanized rubber which is provided with a plurality of vertically extending laterally spaced recesses 37 which are generally rhomboidal in cross section and which terminate short of the top and bottom marginal edges. The recesses 37 extend at an angle to the face of the pad and divide the pad section in the transverse direction into a series of vertically extending rib-like formations 38 which are adapted to hinge about their bottom edges with the ends thereof being restrained by their connection with the solid back or bottom portions of the pad section. The width, depth and spacing of the recesses 37 are determined in accordance with the impact forces to which the pad sections will be subjected, which varies with the size and character of the sheets and the speed of operation of the piling conveyor 10. The pad sections 35, 35' are formed from a suitable grade of vulcanized rubber or similar material which in its solid condition is relatively hard but has substantial resiliency. The rubber pad or sheet material is preferably backed by a relatively thin metal plate 39 to which it may be attached by vulcanizing or the like. The size, shape and location of the slots 37 is adjusted so that when the sheets are projected against the face of the pad 34, the rib-like formations 38 will tend to hinge about their bottom edges and cushion the impact of the edge of the sheets as illustrated in Figs. 3 and 5. The slots 37 may be cut into the rubber sheet after it is formed or they may be provided in the material as it is initially formed or vulcanized. The characteristics of the material in the pad, the inclination of the slots 37, the width of the slots and their spacing may all be selected to meet varying conditions. The pad sections may be designed to handle sheets of different size, weight and thickness, the resiliency of the pad being adjusted for efficient operation and long service life. When properly designed for the sheet material being handled, the pad will cushion the leading edges of successive sheets and without damage to the edges while at the same time there is sufficient resiliency in the material and its reaction to the impact of the sheets is such that the pad material is not cut or torn by the edge of the sheets but is merely flattened out sufficiently to absorb the impact stresses and thereafter returns to its normal position ready for the next succeeding sheet to strike the surface thereof.

While the invention has been described in connection with a particular sheet piling structure, it is not limited to the details of the piling apparatus and the stop mechanism

which are shown and described for purposes of illustration. Likewise, the pad sections are described as formed from vulcanized rubber but they may be formed from any similar material having the necessary hardness and resiliency to permit repeated impact of the sheets on the surface thereof without failure of the material due to fatigue and without undue wear on the same.

I claim:

1. In a stop mechanism for piling metal sheets which are advancing in a processing line comprising a bumper positioned to be engaged by the leading edges of the sheets and receiving the initial impact thereof, and a pad on the surface of said bumper which is formed from resilient rubber-like material and which is slotted on its face with the slots extending lengthwise in a direction which is substantially normal to the plane of the sheets and said slots extending transversely in a direction which is diagonal relative to the sheet engaging face of the pad.

2. In a stop mechanism for piling metal sheets which are delivered from a processing line by an overhead conveyor, said mechanism comprising a bumper positioned to be engaged by the leading edges of the sheets as they are released by the conveyor and receiving the initial impact thereof, and a pad on the surface of said bumper which is formed from relatively hard but resilient material and which is slotted on its face with the slots extending lengthwise in a direction which is substantially normal to the plane of the sheets and said slots extending into the pad in a direction which is diagonal relative to the leading edge of the sheet as it engages the pad.

3. In a stop mechanism for piling sheets of relatively hard material which are delivered from a processing line by an overhead conveyor, a bumper positioned to be engaged by the leading edges of the sheets as they are released by the conveyor and drop beneath the same, and a pad on the surface of said bumper for receiving the initial impact of the leading edges of the successive sheets, said pad being formed from resilient material having substantial hardness, said pad being slotted on its face with the slots extending in a direction which is transverse of the plane of the sheets and said slots extending into the pad at a substantially acute angle to the sheet engaging face of the pad.

4. In a piler mechanism for metal sheets having a movable bumper positioned for yielding engagement with the leading edges of the advancing sheets, a bumper pad comprising a sheet-like pad member of resilient material and having substantial thickness which is provided with a series of vertically extending laterally spaced recesses, which recesses extend into the pad in the direction of their depth at a substantially acute angle to the surface of the pad.

5. In a piler mechanism for metal sheets having a movable bumper positioned for yielding engagement with the leading edges of the sheets as they are released from an overhead conveyor, a bumper pad comprising a sheet-like pad member of relatively hard resilient material and having substantial thickness, said pad having a series of vertically extending laterally spaced recesses which divide the same into a plurality of spaced ribs, and said ribs extending in the direction of their depth in inclined relation to the surface of the pad whereby they hinge about their connecting portions with the body of the pad and whereby they are also compressed upon receiving the initial impact of the edges of the sheets.

6. In a bumper positioned for yielding engagement with the leading edges of advancing sheet material, a bumper pad formed of resilient material having substantial thickness which is provided with a series of vertically extending laterally spaced recesses, which recesses extend in the direction of their depth at a substantially acute angle to the surface of the pad and divide the pad into a plurality of angularly extending rib sections which yield upon impact of the sheet material with the edges thereof which are in the surface of the pad.

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7. A bumper pad comprising a rigid backing plate and a vulcanized rubber pad thereon having a series of elongate vertically directed, laterally spaced recesses extending into the pad at a substantially acute angle to the surface thereof with the recesses adjacent opposite lateral edges of the pad extending in opposite angular directions.

8. In a piler mechanism for sheet material having a movable bumper positioned for yielding engagement with the leading edges of the advancing sheets, a bumper pad having a surface thereof positioned for receiving the impact of the sheets, said bumper pad comprising a pad member of relatively hard but resilient rubber and having substantial thickness, said pad member having a series of vertically extending laterally spaced recesses which divide the same into rib-like sections, said rib-like sections having a generally rhomboidal cross section, and said rib-like sections extending into the pad member in the direc-

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tion of their depth at a substantially acute angle to the impact receiving surface of the pad member.

9. In a piler mechanism as recited in claim 8 and said bumper pad comprising a pair of said pad members arranged in laterally spaced relation on said bumper with the rib-like sections arranged vertically and extending into the pad members in opposite angular directions relative to the vertical center of the bumper.

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